COMPASS
COMMUNITY PLANNING ASSOCIATION
of Southwest Idaho

Final Report

Treasure Valley Transportation System: Operations, Management, and ITS

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IBI GROUP
DKS
McFarland Management, LLC

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Table of Contents

Table of Contents

Table of Contents

Table of Contents

List of Tables

List of Tables

List of Figures

List of Figures

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List of Acronyms and Abbreviations

AAA	AMERICAN AUTOMOBILE ASSOCIATION
ACHD	ADA COUNTY HIGHWAY DISTRICT
AD	ARCHIVED DATA
APC	AUTOMATIC PASSENGER COUNTERS
APTS	ADVANCED PUBLIC TRANSPORTATION SYSTEMS
ATIS	ADVANCED TRAVELER INFORMATION SYSTEMS
ATMS	ADVANCED TRAFFIC MANAGEMENT SYSTEM
AVL	AUTOMATIC VEHICLE LOCATION
AVSS	ADVANCED VEHICLE SAFETY SYSTEMS
C2C	CENTER-TO-CENTER
C2F	CENTER-TO-FIELD
CAD	COMPUTER AIDED DISPATCH
CARS	CONDITION ACQUISITION AND REPORTING SYSTEM
CCDC	CAPITAL CITY DEVELOPMENT CORPORATION
CCTV	CLOSED CIRCUIT TELEVISION
CFR	CODE OF FEDERAL REGULATIONS
CMAQ	CONGESTION MITIGATION AND AIR QUALITY
CMP	CONGESTION MANAGEMENT PROCESS
CMS	CONGESTION MANAGEMENT SYSTEM
COMPASS	COMMUNITY PLANNING ASSOCIATION OF SOUTHWEST IDAHO
CTAI	COMMUNITY TRANSPORTATION ASSOCIATION OF IDAHO
CV	COMMERCIAL VEHICLE
CVO	COMMERCIAL VEHICLE OPERATIONS
DIGB	DISTRICT INTEROPERABILITY GOVERNANCE BOARD
DMS	DYNAMIC MESSAGE SIGNS
EAS	EMERGENCY ALERT SYSTEM
EM	EMERGENCY MANAGEMENT
EMS	EMERGENCY MANAGEMENT SYSTEM
EOC	EMERGENCY OPERATIONS CENTER
F2F	FIELD-TO-FIELD
FHWA	FEDERAL HIGHWAY ADMINISTRATION
FTA	FEDERAL TRANSPORTATION AGENCY
FTE	FULL TIME EQUIVALENTS
HAR	HIGHWAY ADVISORY RADIO
HAZMAT	HAZARDOUS MATERIAL

List of Acronyms and Abbreviations

HOV	HIGH OCCUPANCY VEHICLE
ICM	INTEGRATED CORRIDOR MANAGEMENT
ICMB	INTERAGENCY COMMUNICATIONS BUSINESS MEETING
IROC	INTERAGENCY REGIONAL OPERATION CENTER
ISTEA	INTERMODAL SURFACE TRANSPORTATION EFFICIENCY ACT
IT	INFORMATION TECHNOLOGY
ITD	IDAHO TRANSPORTATION DEPARTMENT
I-TRIPS	IDAHO'S TRANSPORTATION REIMBURSEMENT, INTEGRATION, AND PERFORMANCE SYSTEM
ITS	INTELLIGENT TRANSPORTATION SYSTEMS
MC	MAINTENANCE AND CONSTRUCTION
MPOS	METROPOLITAN PLANNING ORGANIZATIONS
NAWAS	NORTH AMERICAN WARNING ACTIVATION SYSTEM
O&M	OPERATIONS AND MAINTENANCE
ODOT	OREGON DEPARTMENT OF TRANSPORTATION
PDMS	PORTABLE DYNAMIC MESSAGE SIGNS
PSAP	PUBLIC SAFETY ANSWERING POINTS
RCC	REGIONAL COMMUNICATIONS CENTER
RCTO	REGIONAL CONCEPTS FOR TRANSPORTATION OPERATIONS
RF	RADIO FREQUENCY
RPC	REGION 12 PLANNING COMMITTEE
RWIS	ROAD WEATHER INFORMATION SYSTEM
SIEC	STATEWIDE INTEROPERABILITY EXECUTIVE COMMITTEE
SLA	SERVICE LEVEL AGREEMENT
TMC	TRAFFIC MANAGEMENT CENTER
TOCS	TRANSPORTATION OPERATIONS CENTER SYSTEM
TSMO	TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS
TSP	TRANSIT SIGNAL PRIORITY AND TRANSPORTATION SIGNAL PLAN
TV	TELEVISION
TVROWG	TREASURE VALLEY REGIONAL OPERATIONS WORK GROUP
TVT	TREASURE VALLEY TRANSIT
TWG	TRANSPORTATION WORKING GROUP
USDOT	UNITED STATES DEPARTMENT OF TRANSPORTATION
VRT	VALLEY REGIONAL TRANSIT
WRTM	WEATHER RESPONSIVE TRAFFIC MANAGEMENT

Executive Summary

Plan Highlights:

- Presents a ten-year regional vision and strategy for effective operation of the multi-modal transportation system in the Treasure Valley using Transportation System Management and Operations (TSMO).
- Discusses the relevance of TSMO to meeting the transportation needs and goals of the Treasure Valley in the facing of growing transportation demand, limited funding for transportation investment, and Communities in Motion 2040 long-term planning goals.
- Highlights TSMO and Intelligent Transportation Systems (ITS) investments and initiatives implemented in the Treasure Valley since the *2006 Treasure Valley ITS Strategic Plan*.
- Describes existing ITS infrastructure and operational needs as identified by diverse transportation and emergency management stakeholders.
- Describes a new Operational Vision for the Treasure Valley developed by stakeholder agencies.
- Identifies Regional TSMO Strategies and Operational Priority Corridors that are relevant to the needs of the Treasure Valley.
- Identifies existing and future agency roles and responsibilities to deliver Regional TSMO strategies as part of an Operation Concept.
- Updates the federally-mandated Treasure Valley ITS Architecture that describes how agencies and systems interact to support TSMO.
- Provides recommendations to integrate TSMO further into the regional transportation planning process, including project development and performance measurement.
- Describes a plan for more integrated management of shared regional communications infrastructure.
- Presents a ten-year project based Implementation Plan that includes both funded and unfunded ITS and communications implementation projects to support the regional operational vision.
- Identifies near-term initiatives and opportunities for "achieving the vision."

Overview

Treasure Valley Transportation System: Operations, Management, and ITS is a regional plan for Transportation System Management and Operations (TSMO) in the Treasure Valley for the next ten years and beyond. The plan covers both Ada and Canyon Counties, which together form Idaho's Treasure Valley as well as the planning area for COMPASS, the region's federally designated Metropolitan Planning Organization.

Over the last 15 years, substantial investments have been made in Intelligent Transportation Systems (ITS) technologies, communications, plans, and personnel to support operation of the multi-modal transportation system. Proactive management of the Treasure Valley transportation system, through strategies such as incident management, traffic signal coordination, transit management, and real-time traveler information, are an increasingly important part of the region's overall transportation strategy. TSMO strategies provide cost-effective options to meet the mobility, safety, environmental, and economic development goals of the region.

This plan, which updates the 2006 Treasure Valley ITS Strategic Plan, is the result of nearly 15 months of collaboration among multi-modal transportation and emergency management agencies in the Treasure Valley. The plan builds upon past investments and current partnerships, charting a roadmap for continued progress and benefits in the years ahead.

The timeframe for the plan is 10 years (2014 through 2024), reflecting the near-term focus of operations strategies as well as rapid advancement of transportation technologies.

Why is TSMO important to the Treasure Valley?

The expected growth in transportation demand in the Treasure Valley over the next 10 to 20 years will outpace the region's ability to expand the roadway capacity of the regional transportation system. Additionally, a growing portion of the region's congestion is due to operational issues such as traffic incidents, weather, special events, and coordination of infrastructure across jurisdictions. These issues cannot be cost-effectively addressed only through expansion of the transportation system capacity.

This challenge requires innovative thinking about how to accommodate growth by making the most of the existing multi-modal transportation system, and strategically investing available transportation dollars in effective and affordable solutions. TSMO provides affordable solutions to address many acute transportation challenges in a relatively short time frame as compared to conventional infrastructure projects.

TSMO is also supportive of the goals and objectives of the *Communities in Motion 2040* long-range regional transportation plan. It also complements of other low-cost strategies such as Transportation Demand Management and system preservation. The data generated by ITS systems can also support performance measurement, a topic receiving increased attention under federal transportation law.

As importantly, past investments in ITS infrastructure and the ongoing commitment of operating agencies provide a solid foundation for future successes in management of the transportation system.

What is Transportation System Management and Operations?

As defined by the U.S. Department of Transportation, Transportation System Management and Operations is "an integrated program to optimize the performance of the existing infrastructure through implementation of multi-modal, cross-jurisdictional systems, services, and projects. These systems, services, and projects are designed to preserve capacity and improve security, safety, and reliability of transportation systems."

There are many examples of TSMO, and ITS, at work in the Treasure Valley today. For example:

- **Incident and Emergency Management:** The Idaho Transportation District, Ada County Highway District, Idaho State EMS Communications Center (StateComm), and Emergency Management personnel use technologies to identify and respond to traffic incidents, special events, and severe weather across the region.
- **Traffic Signal Coordination:** Many traffic signal systems in the region are integrated into advanced computerized systems that optimize signal timing based on prevailing traffic conditions and/or incident/event scenarios.
- **Traveler Information:** The Idaho Transportation District provides multimodal real-time traveler information through its 511 traveler information telephone system and website (511.idaho.gov).
- **Transit Management:** Valley Regional Transit has invested in technologies that support real-time tracking and dispatch of transit vehicles, and will provide real-time bus arrival information to its customers.

ITS is the application of advanced technology to transportation. Examples include advanced traffic signal control systems, roadway incident management or CCTV cameras, and electronic information signs for highway or transit travelers. ITS technologies are the "enabling tools" that underlie many TSMO strategies.

Figure 1–1: What is Transportation System Management and Operations?

Operational Vision for the Treasure Valley

Through workshops and discussions, participating agencies developed a ten-year vision for Transportation System Management and Operations in the Treasure Valley:

Operational Vision for the Treasure Valley:

Provide active management of the Treasure Valley's multimodal transportation system through agency partnerships and investment in ITS technology as an essential regional strategy to maximize the performance of the transportation system.

This vision is supported by Key Principles detailed in the plan, including: the need to work collaboratively to operate the complete multimodal transportation system; to integrate the region's transportation and emergency management centers through technology and operational plans; and to take a regional, coordinated approach to operations challenges across jurisdictional boundaries. The end result is a more safe, reliable, and efficient transportation experience for the traveling public.

Regional TSMO Strategies

As part of the planning process, participating agencies identified Regional TSMO Strategies that use operational and technology-based approaches to improve transportation system performance in the Treasure Valley. Most of these operational strategies use enabling ITS technologies, but they also require coordination among agency plans, policies, operating protocols, and resources to be successful.

The plan identifies 30 Regional TSMO Strategies in 11 categories (Table ES–1). In developing the toolkit, the team assessed the level of existing implementation for each strategy, as well as the target future level of implementation for those strategies. This assessment forms the basis for determining the future ITS infrastructure needs of the region as well as the interactions among agencies, systems and personnel (the Operational Concept).

Additionally, the plan identifies Operations Priority Corridors (Figure 1–2) within the Treasure Valley that are currently, or are expected to become in the next ten years, "operationally significant." This means that active application of one or more of the Regional TSMO strategies may be appropriate in these corridors to effectively operate the transportation network and accommodate growing transportation demand.

REGIONAL TSMO TOOLKIT	
Regional Transportation Management • Traffic Surveillance • Regional Traffic Management • Transportation Demand Management • Roadside Lighting • Railroad Grade Crossings	**Regional Operations Coordination and Planning** • Multi-Agency Operations Coordination and Planning
Freeway Management • Ramp Metering • Active Traffic Management	**Public Transportation Management** • Advanced Transit Operations Management • Regional Transit Fare Integration • Transit Surveillance and Security • Multi-Modal Travel Coordination • Real-time Transit Information • Transit Signal Priority
Arterial Management • Enhanced Traffic Signal Operations • Pedestrian and Bicycle Operations and Safety	**Road Weather Operations** • Road Weather Information Systems • Weather-Adaptive Traffic Management • Winter Roadway Maintenance
Incident and Emergency Management • Regional Incident and Emergency Management • Emergency Vehicle Routing and Signal Preemption • Regional Alert System	**Maintenance and Construction** • Maintenance and Construction Management • Work Zone Management
Traveler Information • Roadside Traveler Information Dissemination • Regional Traveler Information • Trip Planning and Routing Website • Parking Availability Information and Guidance	**Regional Data Archiving** • Regional Transportation Data Archive
	Regional Communications Infrastructure Management • Communications Infrastructure Coordination

Table ES–1: Regional TSMO Toolkit Strategies

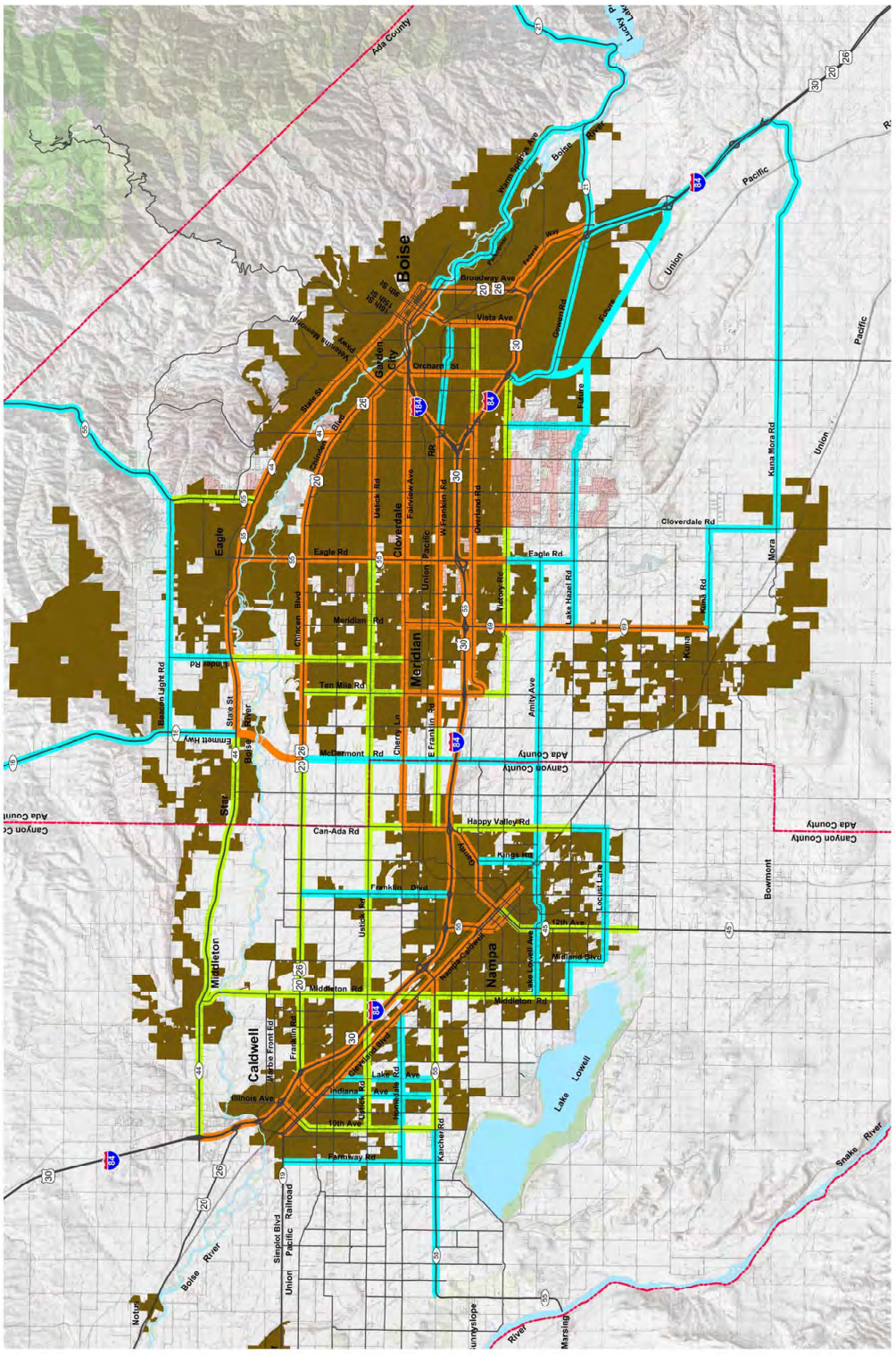

Figure ES-1 Treasure Valley Operations Priority Corridors

Operational Concept

A key need identified by participating agencies in the planning process was to work collaboratively to address regional, multimodal operational needs such as incident management, integrated freeway/arterial management, and traveler information. To support this vision for integrated, multi-agency transportation system operations in the Treasure Valley, the plan contains an Operational Concept that describes the high-level roles and objectives for implementing operational strategies contained in the Regional TSMO strategies toolkit.

The Operational Concept is built around specific operational services (e.g., Incident and Emergency Management) and describes existing and future strategies and objectives. They also describe existing and future agency roles in delivering those services. The Operational Concept emphasizes the organizational aspects of TSMO implementation that are a necessary complement to ITS deployment.

The concepts described in the Operational Concept may be expanded in the future to form the basis for detailed regional plans known as Regional Concepts for Transportation Operations (RTCOs), project-level Concepts of Operations, and Interagency Agreements that formalize the roles and expectations of agencies involved in delivering operational and/or technical support services.

Treasure Valley ITS Architecture

The plan contains an update to the Treasure Valley ITS Architecture. It describes how ITS devices and systems are integrated across the region to fulfill TSMO operational strategies. The Treasure Valley ITS Architecture conforms to the USDOT planning requirements for a regional ITS architecture (23 CFR 940). It complements the Idaho Transportation Department's Statewide and District 3 ITS architectures, as well as the adjacent Oregon Department of Transportation Statewide ITS Architecture.

The ITS architecture contains a detailed description of the ITS elements and system interfaces that are required to implement operational strategies. It contains an inventory of ITS systems, by responsible stakeholder, and indicates the systems that are interconnected today as well as those that will be interconnected in the future.

The Treasure Valley ITS Architecture forms an important planning and implementation tool for ITS project proponents and designers. Federal law requires that ITS projects deployed in the region are consistent with the ITS Architecture to be eligible for federal funding.

The Treasure Valley ITS Architecture will be maintained by COMPASS going forward. An electronic TurboArchitecture™ version of the ITS architecture is available at www.compassidaho.org.

TSMO in the Regional Planning Process

The plan emphasizes the beneficial connection between Transportation System Management and Operations and the regional transportation planning process. To fully realize the potential for TSMO in meeting regional transportation needs, it is important that transportation operations is fully integrated, or "mainstreamed," into the regional transportation process. This is often referred to as "planning for operations."

Key opportunities to link TSMO and regional planning include:

- Integrating operations into long-range transportation planning (*Communities in Motion 2040*).
- Linking operations with the regional Congestion Management Process, which is focused on reducing regional congestion hotspots.
- Incorporating TSMO strategies and regional operations program needs into project development and funding processes.
- Using operations system data to support planning analysis and performance measurement.
- Regional coordination among all agencies involved in project planning, funding, implementation, and operation of TSMO programs and infrastructure.
- Using emerging tools and models to estimate the benefits of operational projects, so they can be compared with other forms of transportation investment.

By integrating planning and operations, agencies benefit from increased awareness among decision makers, transportation professionals, and the public about the opportunities to apply TSMO strategies to address the region's transportation needs. The region gains access to a new low-cost toolkit of TSMO strategies. Operating agencies can build greater understanding of the resource and policy needs to successfully operate the transportation system. Finally, transportation planners can benefit from access to a wealth of detailed operational data to better understand transportation needs and the performance of the transportation system.

ITS Project Implementation Plan

The Implementation Plan is a ten-year, project-based plan to construct the ITS and communication infrastructure necessary to support regional TSMO strategies. The plan is fiscally unconstrained, and includes both programmed (funded) projects as well as projects that may be funded in future years and/or pursued opportunistically as funding sources emerge (such as grants).

The plan identifies high-level project needs, lead and participating agencies, and an estimated project time line (specific year for programmed projects, or near-, medium-, or long-term for unfunded projects). The top agency deployment projects are identified in Table ES–2.

Experience shows that flexibility is an important part of successfully funding and implementing ITS infrastructure. Many times, ITS improvements such as field devices or fiber optic communications can be coordinated with other transportation capital investments. In other case, project definitions and extents evolve based on detailed operational analysis or available funding. The Implementation Plan, along with the Operations Priority Corridors map discussed previously, serve as an important references for this evolving project planning process.

It is recommended that the project list in the Implementation Plan is updated as a "living document" at least once per year to reflect deployment progress and evolving needs.

Achieving the Vision

A significant amount of money, time, and effort has been invested by agencies in the Treasure Valley to create this plan. Numerous opportunities – ranging from regional coordination to deployment of ITS infrastructure – that have identified through the planning process can be acted upon in the years immediately following completion of the plan.

The plan concludes with a summary of specific near-term actions that may be undertaken in the first two years following the completion of the plan to sustain the momentum.

- **Establish a Treasure Valley Regional Operations Work Group** to continue interagency coordination that began in the planning process.
- **Jointly pursue innovative funding sources and building sustainable funding** for ongoing deployment, operations, and maintenance of TSMO infrastructure and programs.
- **Develop Regional Concepts for Transportation Operations** for critical operational areas that require coordination across jurisdictions and modes.
- **Develop Interagency Agreements** to formalize agency roles and expectations for ITS and communications infrastructure use.
- **Coordinate management of regional communications infrastructure** to reduce costs and improve performance for all participating agencies in a shared regional communications network.
- **Implement priority projects,** identified by the agency and the region, to sustain momentum and demonstrate the benefits of innovate approaches to system management.
- **Build awareness of operational needs and benefits** among regional decision makers, transportation professionals, and the general public.
- **Maintain the TSMO plan as a living document,** reflecting project deployment progress, evolving needs, new ITS and communications inventory, Regional TSMO Strategies, Operations Priority Corridors, and updates to the Regional ITS Architecture.

NEAR-TERM HIGHEST PRIORITY PROJECTS	
ADA COUNTY HIGHWAY DISTRICT	
RC-2	Create Interagency Agreements and ITS Management and Operations
RC-5	Update/Develop Standard Specifications for ITS and Communication infrastructure
C-1	Establish and Maintain Regional Communication Coordinating Committee
C-2	Create Regional Agreement for Fiber Optic Sharing and Management
CITY OF CALDWELL	
TM-18	Caldwell Arterial Traffic Management Center and System: Phase 1
C-9	City of Caldwell Field-to-Center Fiber Optic Backbone
CITY OF NAMPA	
RC-5	Update/Develop Standard Specifications for ITS and Communication infrastructure
TM-17	Nampa Arterial Traffic Management Center and System
TM-20	City of Nampa Integration with Regional Virtual TMC
C-10	North Nampa Fiber Optic Loop
COMPASS	
RC-1	Establish and Maintain regional operations working group
EMERGENCY MANAGEMENT RESPONDERS	
IM-2	Incident and Emergency Management (IEM) RCTO
IM-4, 5, 6	Idaho State Police, Ada County Sheriff, Canyon County Sheriff Integration with Regional Virtual TMC
C-2	Create Regional Agreement for Fiber Optic Sharing and Management
IDAHO TRANSPORTATION DEPARTMENT – DISTRICT 3	
MULTIPLE	To enhance mobility through improved traffic signal progression – either as a project lead or partnering with local agencies
TO ENHANCE MOBILITY THROUGH IMPROVED TRAFFIC SIGNAL PROGRESSION – EITHER AS A PROJECT LEAD OR PARTNERING WITH LOCAL AGENCIES	
TM-5	ITD Statewide Central Control Software Implementation – Phase 2
C-4	Virtual TMC Communications/Network
STATE COMMUNICATIONS	
IM-3	Emergency Responder CAD Integration with Traffic Management/511 Traveler Information
VALLEY REGIONAL TRANSIT	
PT-2	ValleyRide Fixed Route Management and AVL System
PT-22	Downtown Boise Multi-Modal Center: Technology Applications
PT-23	Caldwell/Nampa Multi-Modal Center: Technology Applications
PT-25	ValleyRide Dispatch Centers - Integration with Regional Virtual TMC

Table ES–2: Near-Term Agency Priority Projects

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Chapter 1: Introduction

Chapter Highlights:

- Discusses the purpose of the plan – providing a ten-year Transportation System Management and Operations strategy and Intelligent Transportation Systems deployment plan for the Treasure Valley.
- Explains why Transportation System Management and Operations is an important tool for meeting the region's transportation needs.
- Describes the study area and the transportation/ emergency management agencies that participated in the development of the plan.
- Provides background, including previous planning efforts and key past achievements, since the previous (2006) plan.
- Describes how the plan is organized and introduces the Operational Services that are used as themes to structure the document.

This document presents a regional plan for Transportation System Management and Operations (TSMO) in the Treasure Valley, Ada and Canyon Counties, ID, for the next ten years and beyond.

Over the last 15 years, substantial investments have been made in Intelligent Transportation Systems (ITS) technologies, communications infrastructure, plans, and personnel in the Treasure Valley to support transportation operations. Every day, travelers in the Treasure Valley benefit from past investments and the ongoing efforts of transportation agencies to manage traffic incidents and events, respond to weather emergencies, maintain reliable transit services, and provide real-time traveler information (see Figure 1–1) .

Proactive management of the Treasure Valley's transportation system, using ITS technology and other methods, is an increasingly important part of the region's overall strategy to cost-effectively meet the mobility, safety, environmental, and economic development goals of the region. This plan builds upon past efforts and successes, charting a roadmap for continued progress and benefits in the years ahead.

This document updates the 2006 Treasure Valley Intelligent Transportation Systems Strategic Plan, with additional emphasis on non-technical keys to success for the regional operations program.

This plan, which updates the *2006 Treasure Valley ITS Strategic Plan*, is the result of nearly 15 months of collaboration among multi-modal transportation and emergency management agencies operating at the local, county, regional, state, and federal levels. Plan

development was led by the Community Planning Association of Southwest Idaho (COMPASS), the designated metropolitan planning organization for Ada and Canyon Counties.

Like the 2006 plan, this plan includes a regional ITS architecture in "Chapter 7: Treasure Valley ITS Architecture", which provides a blueprint for how ITS systems deployed by various agencies interconnect to support transportation operations. And, like the 2006 plan, it also includes an updated ITS implementation plan in "Chapter 11: ITS Implementation Plan", which describes the projects necessary to build the technology infrastructure to meet the operational needs of the region.

However, this plan places additional emphasis on other, non-technical elements of a successful regional operations program, such as:

- Agency roles and responsibilities,
- Regional coordination and agreements,
- Supporting transportation policies,
- Integration with regional planning, and
- Performance measurement.

These elements are essential to the growth and success of the regional operations program in the Treasure Valley. Accordingly, they appear as consistent themes throughout this document, from the operational vision for the Treasure Valley to the implementation plan.

Why is TSMO Important for the Treasure Valley?

As in most metropolitan areas across the United States, it is expected that the growth in transportation demand in the Treasure Valley over the next 10 to 20 years will outpace the region's ability to expand the roadway capacity of the regional transportation system. This requires new and innovative thinking about how the region can accommodate growth by making the most of the transportation infrastructure that exists today, and by strategically investing available transportation dollars in solutions that make a difference.

What is Transportation System Management and Operations?

As defined by the U.S. Department of Transportation, Transportation System Management and Operations is "an integrated program to optimize the performance of the existing infrastructure through implementation of multi-modal, cross-jurisdictional systems, services, and projects. These systems, services, and projects are designed to preserve capacity and improve security, safety, and reliability of transportation systems."

There are many examples of TSMO, and ITS, at work in the Treasure Valley today. For example:

- **Incident and Emergency Management:** The Idaho Transportation District, Ada County Highway District, Idaho State EMS Communications Center (StateComm), and Emergency Management personnel use technologies to identify and respond to traffic incidents, special events, and severe weather across the region.
- **Traffic Signal Coordination:** Many traffic signal systems in the region are integrated into advanced computerized systems that optimize signal timing based on prevailing traffic conditions and/or incident/event scenarios.
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ITS is the application of advanced technology to transportation. Examples include advanced traffic signal control systems, roadway incident management or CCTV cameras, and electronic information signs for highway or transit travelers. ITS technologies are the "enabling tools" that underlie many TSMO strategies.

Figure 1–1: What is Transportation System Management and Operations?

There are a number of reasons why TSMO is a key part of the transportation future of the Treasure Valley.

1. **Operational Issues are a Growing Source of Regional Traffic Congestion.** To the traveling public, congestion is frequently cited as the primary transportation concern. Federal research shows that much of the congestion faced by cities is the result of operational issues such as traffic accidents, construction, and severe weather (Figure 1–2). For example, it is impractical and ineffective to expand freeway capacity as a means of managing the congestion caused by traffic incidents that could occur in any location, at any time. Rather, it is important to quickly detect, respond to, and clear such traffic incidents to restore full operating capacity. Additionally, providing real-time information to travelers so they can seek alternative routes will also save time and aggravation. These kinds of TSMO strategies are designed to improve the performance of the transportation system based on real-time conditions; therefore, they can be effective solutions for much of the congestion and traveler delay in the Treasure Valley.

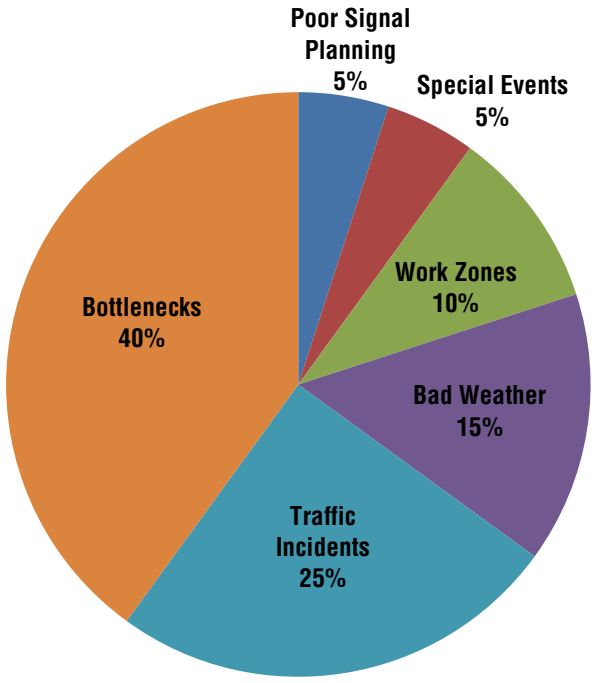


Figure 1–2: Causes of Congestion (Source: FHWA)

2. **Agencies are Seeking Affordable Solutions to Meet Growing Transportation Needs.** The past five years of fiscal austerity have been challenging for the agencies responsible for meeting the transportation needs of the Treasure Valley. Recent experiences emphasize the need for agencies to find ways to "do more with less," and to consider low-cost alternatives to major capital investments as a routine approach to corridor and project planning. In this regard, TSMO offers several key advantages. Compared to conventional roadway expansion projects, TSMO projects are relatively low-cost—yet, they can still provide transportation system benefit relative to the investment. Secondly, TSMO strategies can be introduced with relatively short lead times. Even where eventual capacity expansion is warranted, TSMO strategies may provide a near-term solution that defers the need for an expensive capacity investment.
3. **TSMO Complements Other Low-Cost Regional Transportation Strategies.** While capacity expansion is certainly part of the Treasure Valley's transportation future, an increasing proportion of the region's investment will come from strategies to increase the diversity, resiliency, and state of repair of the existing transportation system. These strategies include smart growth planning (i.e., tying transportation investment to land use), addressing congestion "hotspots" identified through the congestion management process, system preservation, transportation demand management, and multimodal transportation investments. Transportation system management is a mutually supportive strategy that should be a part of the region's flexible, low-cost transportation investment toolkit.
4. **Performance Measurement is Increasingly Important to Transportation Funding and Decision Making.** The current federal transportation authorization, known as Moving Ahead for Progress in the 21st Century, or MAP-21, underscores the increasing importance of performance measurement in transportation planning and investment decision-making. Many TSMO strategies are designed explicitly to impact the performance of the transportation system—for example, by reducing congestion, improving reliability, or increasing safety. Furthermore, ITS systems generate a wealth of data and information that can be used to gain unprecedented insight into the needs and performance of the transportation system. This allows for more focused investment on transportation needs that merit attention using strategies with demonstrable effectiveness.

5. **Past TSMO Investments and Partnerships are an Outstanding Foundation for Future Success.** As evidenced by the past accomplishments of the region (highlighted later in this chapter), agencies in the Treasure Valley have made substantial past investments in ITS infrastructure, communications, operating plans, partnerships, and highly-trained staff. Much of the technological and institutional infrastructure to support future operations goals exists today. By leveraging past investments and successes, agencies are well positioned to advance the regional TSMO program to the next level, to the immense benefit of the region as a whole.

How does TSMO Support Regional Transportation Goals?

Transportation Systems Management and Operations are an essential part of the Treasure Valley's transportation strategy. Currently COMPASS is updating the regional long-range transportation plan for Ada and Canyon Counties. Known as *Communities in Motion 2040*, the plan identifies a range of regional goals and objectives for the region's transportation system.

The TSMO program is an integral part of the region's overall transportation strategy for meeting these goals. The Table 1–1 illustrates how TSMO can be an effective, and cost-effective, part of the Treasure Valley's transportation future.

By encouraging efficient use of existing infrastructure, TSMO contributes to other important regional goals included in the *Communities in Motion 2040* plan. For example, an efficient, reliable transportation network strengthens the economic vitality and quality of life in existing urban and activity centers. This, in turn, promotes focused urban growth, reduces sprawl, preserves farmland and open space, and encourages the development of communities that are healthy, diverse, and offer transportation choices.

COMMUNITIES IN MOTION: REGIONAL TRANSPORTATION GOALS AND OBJECTIVES		TSMO CONTRIBUTION TOWARD MEETING REGIONAL GOALS AND OBJECTIVES
1.1		
1. 1.	Enhance the transportation system to improve accessibility to jobs, schools, and services; allow the efficient movement of people and goods; and ensure the reliability of travel by all modes considering social, economic and environmental elements.	TSMO helps the Treasure Valley to maximize the capacity and efficiency of existing transportation infrastructure through active management and informed travelers. It also helps to improve the reliability and efficiency of the transportation system. TSMO also supports the development of a multimodal transportation system that provides quality, reliable, and affordable alternatives to driving.
1.1.1.	Develop local transportation plans and corridor plans that link the transportation system and local land use.	TSMO strategies provide additional flexibility in balancing transportation demand and supply related to land use and growth decisions.
1.1.2.	Manage congestion and delay.	Many TSMO strategies are geared specifically toward addressing congestion and travel delay, particularly non-recurring congestion. Real-time traveler information also helps the public make more informed choices based on actual conditions and travel times.

Table 1–1: TSMO Contributions to Regional Transportation Goals and Objectives

COMMUNITIES IN MOTION: REGIONAL TRANSPORTATION GOALS AND OBJECTIVES	TSMO CONTRIBUTION TOWARD MEETING REGIONAL GOALS AND OBJECTIVES
1.1.3. Monitor system performance.	ITS infrastructure generates a wealth of data that can be used to continuously monitor the performance of the transportation network.
1.1.4. Develop transportation system to support healthy environment.	By reducing delay and congestion for all modes, such as through improved traffic signal coordination, TSMO supports reduction of emissions and greenhouse gases.
1.1.5. Promote and implement effective access management strategies on major regional corridors.	TSMO complements strategies like access management to optimize corridor throughout and access without expansion of roadway capacity.
1.1.6. Encourage transit ready development consistent with transit plans (from goal 4.1).	TSMO ensures that transit services operate reliably, to maximize the attractiveness of the mode to potential transit customers in these communities.
1.1.7. Reduce VMT.	TSMO promotes quality alternatives to driving, as well as reduction in wasted vehicle miles spent trying to avert congestion or searching for parking.
1.1.8. Educate agencies on best practices.	Both public agencies and the traveling public benefit from the data generated by ITS systems that demonstrate actual transportation system performance.
1.1.9. Improve truck freight movements and reduce their effect on mobility and accessibility for other transportation modes. (Also under goal 6.1).	Commercial traffic benefits from real-time information on traffic conditions. TSMO systems can also be used to promote commercial vehicle safety, and to collect data that provide insight into commercial vehicle movements and needs.
1.1.10. Enhance transportation connectivity to and access from surrounding areas (for services and destinations in Ada and Canyon Counties).	TSMO strategies are applicable and effective in rural travel corridors, particularly for safety and weather-related traveler information.
1.2	
1. 2. Improve safety and security for all transportation modes and users.	TSMO offers diverse strategies for increasing traveler safety and security, such as information to reduce secondary collisions at incident scenes; rural travel safety in snow, fog and ice; and security surveillance cameras to ensure security on transit vehicles and facilities.
1.2.1. Monitor and evaluate crash data.	TSMO data can assist in evaluating the transportation impacts (e.g., delay) of incidents, as well as the effectiveness of incident response programs in restoring normal traffic flow.
1.2.2. Monitor and evaluate incident/potential hazards data.	Traveler information systems can be used to advise motorists of incidents, safety hazards, and public emergencies.
1.2.3. Educate all users about sharing the road and using the system.	Signalized pedestrian crossings, bicycle detection at traffic signals, and other safety measures can increase both awareness and safety of pedestrian and bicycle road users.

Table 1-1: TSMO Contributions to Regional Transportation Goals and Objectives (continued)

COMMUNITIES IN MOTION: REGIONAL TRANSPORTATION GOALS AND OBJECTIVES		TSMO CONTRIBUTION TOWARD MEETING REGIONAL GOALS AND OBJECTIVES
1.3		
1. 3.	Protect and preserve existing transportation systems and opportunities.	By allowing the region to make the most of existing transportation infrastructure, TSMO can defer or even eliminate the need for costly and lengthy capacity expansion projects.
1.3.1.	Maximize the useful life of existing transportation system.	Technology upgrades, such a traffic signal coordination, help to extend the effectiveness of existing transportation assets in the face of growing or changing demand. Asset management systems can also help to monitor, track, and prioritize infrastructure re-investment.
1.3.2.	Maintain and complete the network / fill in the gaps in existing transportation system.	With their relatively low cost and short implementation timeframe, TSMO strategies may be affective in addressing system gaps and hotspots.
1.3.3.	Educate agencies about strategies to maintain and fill in existing transportation system.	Consideration of operations solutions during planning and project development can raise awareness of cost-effective strategies to meet identified needs.
1.3.4.	Coordinate and maximize benefits of maintenance investments for all modes.	ITS technologies and communications systems are well suited to sharing among agencies to maximize effectiveness and reduce overall maintenance costs. Certain TSMO strategies are aimed specifically at efficiency and coordination of construction and winter maintenance activities.
1.3.5.	Create programs that encourage people to try other modes.	Real time transit traveler information and travel planning tools been demonstrated nationally to increase the convenience and appeal of transit and ride sharing programs.
1.3.6.	Prioritize projects with higher benefits across modes.	Many TSMO investments rank favorably in terms of cost effectiveness, ease of implementation, and benefits to multiple modes.
1.3.7.	Prioritize projects with a good cost-benefit ratio.	Compared to traditional capacity expansion projects, TSMO investments generally have a high benefit-to-cost ratio, and those benefits can be realized relatively quickly.
1.3.8.	Encourage ITS/existing commuter programs.	A regional approach to TSMO maximizes the effectiveness of existing and future ITS investments.

Table 1-1: TSMO Contributions to Regional Transportation Goals and Objectives (continued)

COMMUNITIES IN MOTION: REGIONAL TRANSPORTATION GOALS AND OBJECTIVES		TSMO CONTRIBUTION TOWARD MEETING REGIONAL GOALS AND OBJECTIVES
1.4		
1. 4.	Encourage high connectivity within the local transportation system to preserve capacity on the regional system and encourage walk and bike trips.	TSMO strategies ensure that complex, multimodal, and high-demand corridors operate at maximum performance to meet growing demands.
1.4.1.	Promote local transportation plans and corridor plans to link to local land use.	TSMO strategies can be considered as potential mitigation measures for new development and for managing transportation demand in high-density activity centers.
1.4.2.	Share best practices.	Results of operational programs can be demonstrated to policy makers and the public through the use of before-after studies and performance measures.
1.4.3.	Support local Safe Routes to Schools programs.	Pedestrian and bicycle enhancements such as crosswalk signals, pedestrian countdown timers, and bicycle detection can improve safety of those traveling to and from school or transit.
1.4.4.	Encourage all communities to become bike-friendly communities.	
1.4.5.	Enhance connectivity between transit and bike/walk network.	

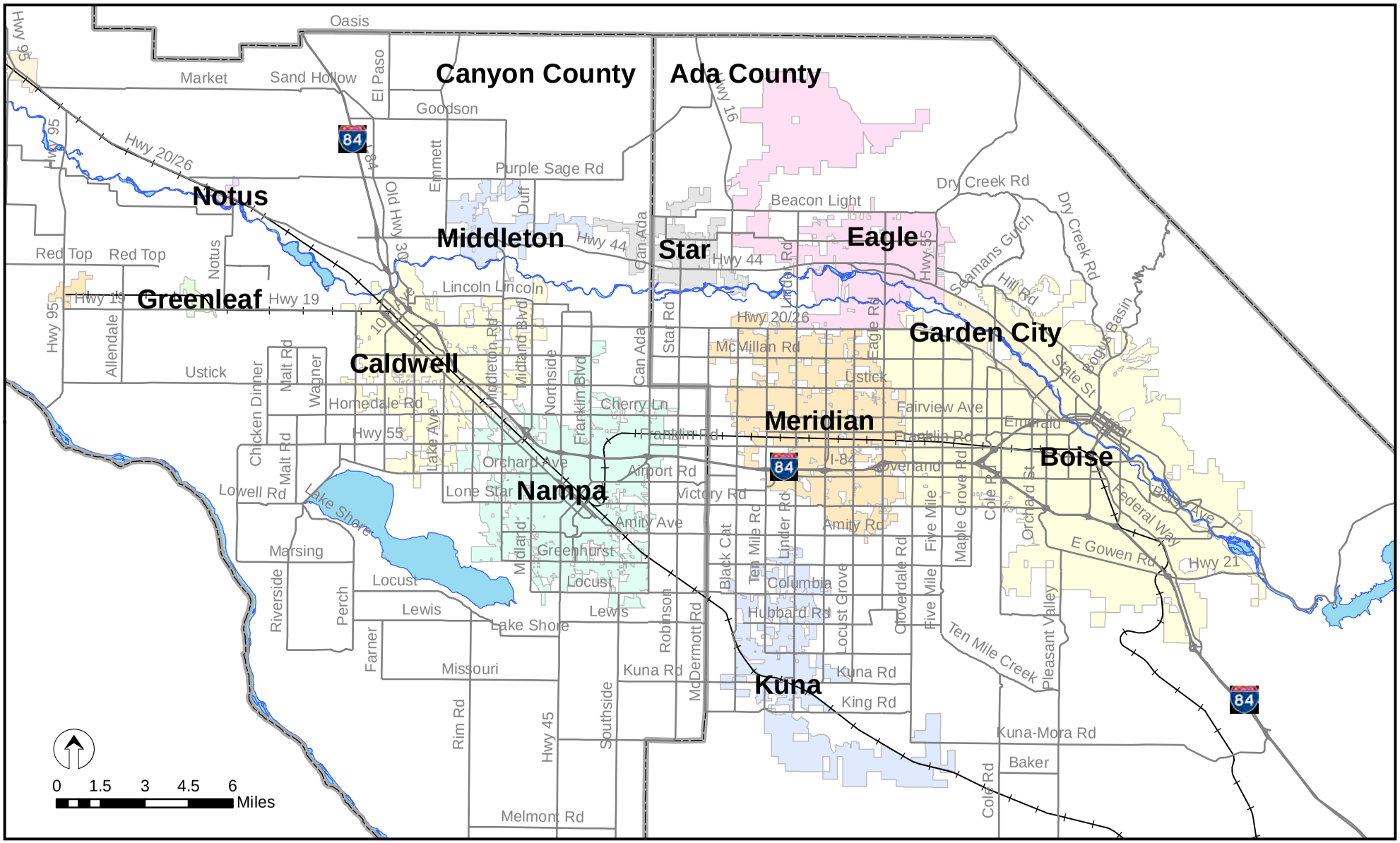
Table 1-1: TSMO Contributions to Regional Transportation Goals and Objectives (continued)

Geographic Scope

Geographically, this plan covers both Ada and Canyon Counties (Figure 1–3), which together form Idaho's Treasure Valley (and the designated planning area of COMPASS, the region's federally designated Metropolitan Planning Organization).

The spine of the Treasure Valley extends from the Oregon border on the west to the Boise urbanized area on the east, following Interstate 84 (I-84) corridor. The Treasure Valley includes the cities of Boise, Eagle, Garden City, Kuna, Meridian, and Star in Ada County; plus Caldwell, Nampa, Middleton, Notus, Wilder, Greenleaf, Melba, and Parma in Canyon County. The Boise Urbanized Area, with a population in excess of 200,000, is a federally designated Transportation Management Area.

Figure 1-3 TSMO Planning Area (Ada and Canyon Counties)



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Treasure Valley Transportation System: Operations, Management and ITS

Timeframe

The time horizon for this plan is 10 years (2014 through 2024). Unlike some plans, with study horizons of 20 years or even longer, this operations-oriented document is geared toward strategies and implementation projects that can be achieved in the relatively near term.

There are several reasons why a 10-year planning horizon is appropriate for an operations plan:

- Due to the rapid pace of technology evolution, it is difficult to predict available technologies, and the operational strategies that they enable, beyond a 10 year horizon. For example, the pace of mobile computing, the spread of social media, and the emergence of "big data" has evolved substantially since the 2006 plan. The rapid pace of technological evolution is one reason that this plan also focuses on operational strategies, rather than on the specific technological "widgets" that will be used to implement those strategies.
- At the same time, large-scale ITS implementation programs, such as communications networks, data collection, and traffic signal updates, are inherently multi-year efforts that may require five to ten year lifecycles to plan, fund, and implement at a regional scale.
- Operations strategies are generally geared toward optimization of existing transportation infrastructure. They are particularly appropriate as near-term solutions that can be implemented in the near term, possibly to defer the need for large-scale capacity expansion projects which may have long implementation lead times.

Due to the factors stated above, it is recommended that a major update of this plan occur approximately five years following its completion (i.e., 2018). This ensures that the regional transportation vision and strategy remain current with emerging technologies, evolving regional needs, ITS project implementation, innovations in transportation system management and operations practices, and updates to the United States Department of Transportation (USDOT) National ITS Architecture.

Agency Participation

The success of this plan development and later execution is dependent on interested and engaged stakeholders. Table 1–2 provides a listing of the agencies and their representatives that actively participated in the planning process. They represent various disciplines including traffic operations, emergency response, law enforcement, transit operations, and communications. This entire list of stakeholders includes those who participated in the technical working group and other contributing stakeholders.

AGENCY	REPRESENTATIVE	TECHNICAL WORKING GROUP	OTHER CONTRIBUTING STAKEHOLDER
ADA COUNTY HIGHWAY DISTRICT	Jim Larsen	●	
	Felicia Statkus, P.E.	●	
	Terry Little P.E.		●
	Wendi Tillman		●
ADA COUNTY-CITY EMERGENCY MANAGEMENT	Doug Hardman		●
ADA COUNTY PARAMEDICS	Harry Eccard		●
ADA COUNTY SHERIFF	Ben Ealey		●

Table 1–2: Agencies and their Representatives Participated in the Planning Process

AGENCY	REPRESENTATIVE	TECHNICAL WORKING GROUP	OTHER CONTRIBUTING STAKEHOLDER
BOISE CITY	Eugene Smith (police)		●
	Martin Knoelk (fire)		●
CANYON COUNTY HIGHWAY DISTRICT NO. 4	Chris Hopper		●
CANYON COUNTY SHERIFF	Lt. Todd Herrera		●
CITY OF CALDWELL	Brent Orton P.E.		●
	Jared Hale	●	
CITY OF MERIDIAN	Tim Curns		●
	David Zaremba		●
	Lt. Jamie Leslie (police)		●
CITY OF NAMPA	Clair Bowman	●	
	Ken Nutt	●	
	Matt Pavelek (police)		●
COMPASS	MaryAnn Waldinger	●	
	Lethal Coe		●
	Walt Satterfield		●
FEDERAL HIGHWAY ADMINISTRATION	Lance Johnson P.E.	●	
IDAHO TRANSPORTATION DEPARTMENT (ITD) – DISTRICT 3	Kevin Sablan P.E.	●	
	Dave Jones P.E.		●
	Tom Points P.E.		●
	Jim Morrison		●
	Dan Bryant		●
	Dave Kuisti P.E.		●
IDAHO TRANSPORTATION DEPARTMENT (ITD) – HEADQUARTERS	Gary Sanderson	●	
	Bob Koeberlein P.E.		●
	Bryan Smith		●
	Tony Ernest		●
IDAHO STATE POLICE	Steve Richardson		●
NAMPA HIGHWAY DISTRICT NO. 1	Eric Shannon P.E.	●	
OREGON DEPARTMENT OF TRANSPORTATION – REGION 5	Tom Davis		●
IDAHO DEPARTMENT OF HEALTH AND WELFARE EMERGENCY MEDICAL SERVICES COMMUNICATIONS CENTER (STATECOMM)	Chris Loffer	●	
	Michele Carreras		●
TREASURE VALLEY TRANSIT	Terri Lindenberg		●
VALLEY REGIONAL TRANSIT	Bruce Sackron	●	
	Adalberto Sosa		●

Table 1-2: Agencies and their Representatives Participated in the Planning Process (continued)

Technical Working Group

The members of the Technical Working Group met monthly during the course of developing this planning document. They provided invaluable input, reviewed preliminary materials, and guided the consultant activities. This group also helped to define the overall structure and content of the project workshops and final project deliverables, including this document. The commitment of their time and expertise to the success of this project was an essential element of the planning process.

Other Contributing Stakeholders

The "other contributing stakeholders" played an important role in the planning process and participated in several different ways:

- Provided input and advise during ad hoc meetings
- Participated in the three project workshops
- Reviewed project deliverables

During the course of the project the consultant team conducted several ad hoc meetings with stakeholders. The focus of these meetings included gaining general understanding of operations and technology applications throughout the valley, reviewing and revising existing conditions, reviewing and revising proposed future projects, and understanding emergency response operations and coordination with transportation agencies. These ad hoc meetings were an important element of the planning process and essential information was gathered and incorporated in this final planning document.

Project Workshops

Three project workshops were conducted to engage the entire stakeholder group. During these workshops the participants provided important input that guided the contents of this planning document. Each workshop had approximately 20-25 participants from a wide variety of operations disciplines. Each workshop had representation from traffic operations (both arterial and freeway), emergency response, transit, and transportation planning, as well as representatives from Ada and Canyon Counties. This diversity of participants resulted in a balanced planning document that includes an implementation plan with projects that will benefit all of the regional transportation operations agencies.

The three workshop topics and benefits were are summarized in Table 1–3:

WORKSHOP	TOPICS	BENEFITS
Visioning Workshop *September 27, 2012*	• Operations vision for the Treasure Valley	• Crafted new transportation operations vision
Operational Concept and Architecture Workshop *April 8, 2013*	• Review draft concept of operations • Review draft ITS architecture • Exercise: I-84 crash scenario	• Established regional coordination growth areas • Confirmed regional operational concept and ITS architecture
Plan Implementation Workshop *September 19, 2013*	• Review project final report • Discuss implementation steps	• Obtained input to finalize plan • Developed steps toward plan implementation

Table 1–3: Workshop Topics and Benefits

Previous ITS Plans and Studies

Over the past 15 years, Treasure Valley ITS deployments have been guided by two ITS strategic plans and architectures – the first published in 1999 and the second in 2006. These plans were preceded by a feasibility study (1997) which established the regional interest and need for the first ITS Plan to be created. The 2013 plan updates the 2006 document and focuses on coordinated regional transportation operations (through the implementation of management techniques and supporting technologies). Additionally, the region has produced several supporting plans and studies that help define existing conditions (such as fiber optic communication infrastructure), execute a recommended ITS project (such as a freeway detour plan), or evaluate specific applications (such as ramp metering). A list of the important relevant planning documents is provided in Table 1–4.

YEAR	ITS PLAN OR STUDY	IMPORTANT OUTCOMES
1999	*ITS Strategic Plan and Architecture (COMPASS, formerly Ada Planning Association)*	• First ITS deployment roadmap • List of ITS projects • Communication plan • ITS architecture
2006	*ITS Strategic Plan and Architecture (ACHD)*[1]	Updated ITS plan and architecture information
2007	*Incident Management Manual and Detour Plans (ACHD)*	Defined detours and coordination plans for all I-84 and I-184 Interchanges
2008	*Ramp Meter Study (ITD)*[2]	Analyzed ramp metering at 9 I-84 Interchanges
2009	*Communication Infrastructure (ACHD)*	Documented Ada County gigabit ethernet network
2012	*Communication Infrastructure Inventory (ITD)*	Documented fiber optic communications inventory

Table 1–4: Treasure Valley ITS Plans and Studies

History of ITS in the Treasure Valley 1999 - 2005

Following the completion of the 1999 ITS plan and architecture, significant ITS deployment activities took place in the areas of:

- **Regional Transportation Management**
  - Ada County Highway District (ACHD) Transportation Management Center (TMC) established to manage signals and freeway operations (funded in partnership with ITD) (2000)
  - Idaho Department of Health and Welfare Emergency Medical Services Communications Center (StateComm) began dispatching for ITD and inputting information into the statewide 511 Traveler Information System
- **Freeway Management**
  - Began motorists assistance program
  - Installed 13 closed circuit television (CCTV) cameras
  - Installed 7 freeway dynamic message signs (DMS)
  - Installed 33 speed monitoring stations

1 Ada County Highway District
2 Idaho Transportation Department

- **Arterial Management**
  - Centrally managed over 375 signals in Ada County
  - Installed 40 CCTV cameras in Ada County
  - Installed 35 video detection devices for signal operation
  - Installed 2 arterial DMS
  - Expanded signalized intersections and began planning for coordination in Canyon County
  - ACHD and ITD installed Advanced Transportation Management System (ATMS) software to track & report freeway and arterial incidents (2004)
- **Traveler Information**
  - Deployed a statewide 511 Traveler Information System (website and phone) (ITD)
  - Deployed a Treasure Valley traffic management website (ACHD)
- **Public Transportation Management**
  - Installed several high intensity activated cross walk (HAWK) pedestrian activated beacons
- **Maintenance and Construction**
  - Deployed five road weather information systems in I-84 in the Treasure Valley (ITD)
- **Regional communications Infrastructure Management**
  - Installed fiber optic communication (~98 miles worth) to support signal control and camera image transmission
  - Installed fiber from ACHD TMC to StateComm/Idaho State Police, ITD, Ada County Staff and media outlets to share CCTV images

The early 2000s were a time of significant population growth in the Treasure Valley which stressed the capabilities of the roadway network. The ITS deployments helped to relieve some of the pressure with technology solutions.

By 2005 so much deployment had occurred that it became obvious an update to the ITS planning documentation was needed. Since the completion of the 2006 ITS plan and architecture, additional ITS deployments have taken place, necessitating the need for this planning activity focusing less on capital infrastructure and more on management and operations.

Figure 1–4 illustrates a high level history of ITS planning in the Treasure Valley.

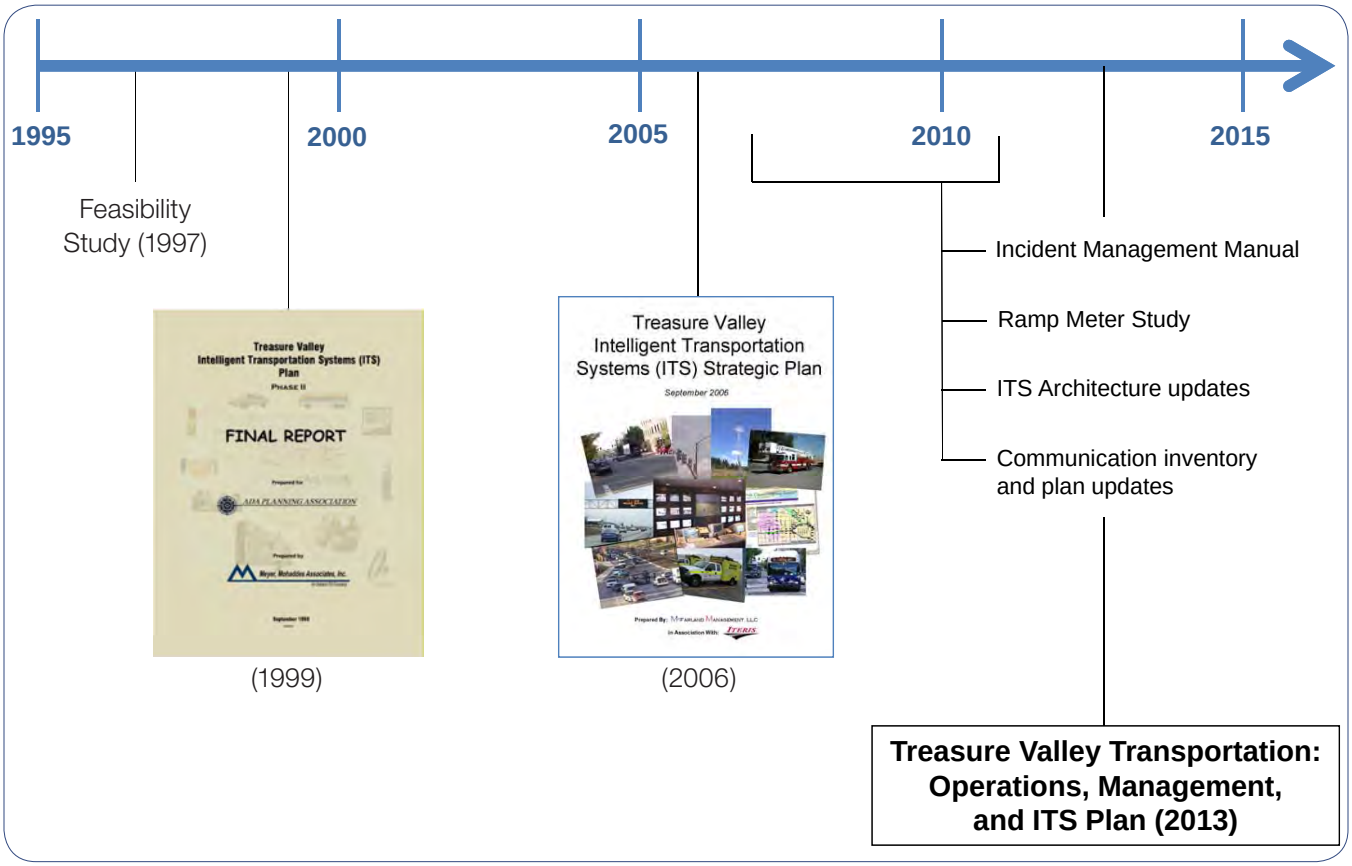

Figure 1–4: History of ITS Planning in the Treasure Valley

Key Achievements Since 2006

From 2006 to present, ITS deployments continued throughout the Treasure Valley at an aggressive pace. Contained in this plan is an accurate assessment of the existing conditions. Key achievements during this timeframe include:

- **Regional Operations Coordination and Planning**
  - Prepared incident management manual and detour plans
  - Analyzed ramp metering at nine I-84 interchanges
  - Documented and inventoried communication infrastructure
- **Regional Transportation Management**
  - Upgraded video and communication equipment in the TMC (ACHD)
  - Expanded StateComm responsibilities to dispatching and 511 management functions (ITD)
- **Freeway Management**
  - Continued motorist assistance program
  - Added 14 CCTV cameras
  - Added two freeway DMS

- Added seven speed monitoring stations
- Began implementation of freeway management software

- **Arterial Management**
  - Added over 40 centrally controlled signals in Ada County
  - Upgraded signal controllers at all intersections in Ada County
  - Added 50 CCTV cameras in Ada County
  - Installed an additional 615 video detection devices for signal operation
  - Upgraded signal controllers and began coordinating signals at key corridors (Canyon County)
- **Traveler Information**
  - Expanded and enhanced the statewide 511 Traveler Information System (ITD)
  - Also made upgrades to their traffic management website (ACHD)
- **Public Transportation Management**
  - Added 20 more HAWK and rectangular rapid flash beacons (RRFB's) to improve pedestrian access and safety
  - Enhanced 511 with fixed route transit operations information (ITD)
  - Deployed demand response computer aided dispatch and scheduling systems, automated vehicle location devices, in-vehicle mobile data terminals, and fixed route management software (Treasure Valley Transit [TVT])
  - Deployed demand response computer aided dispatch and scheduling systems, automated vehicle location devices, and in-vehicle mobile data terminals (Valley Regional Transit [VRT])
  - Began a joint effort to deploy Transit Signal Priority on the State Street corridor (VRT and ACHD)
- **Maintenance and Construction**
  - Preparing to deploy a maintenance activity tracking system (within ITD 511 system) (Canyon County)
  - Deployed five road weather information systems at key locations in Ada County to assist maintenance operations, additionally ITD operates nine Roadway Weather Information Systems (RWIS) stations (ACHD)
- **Regional Communications Infrastructure Management**
  - Installed fiber optic communication (225 miles worth) to support signal control and camera image transmission
  - Regional communications network shifted to all ethernet/IP communications

The Treasure Valley transportation and emergency response agencies have embraced operations and supporting technology in a significant way over the past 15 years. As part of this culture, extensive ITS infrastructure has been deployed and is currently being used to manage the transportation network and coordinate with various agencies. It is also important to note that the Cities of Nampa and Caldwell in Canyon County has been working to position themselves for a significant expansion in ITS deployment to better manage their communication networks and signal systems and coordinate with the freeway operations.

Plan Organization

The plan is organized into twelve chapters as shown in Table 1–5.

CHAPTER	CONTENTS
CHAPTER 1: INTRODUCTION	Provides background on the plan, its objectives, scope, history, and agency involvement.
CHAPTER 2: OPERATIONAL VISION FOR THE TREASURE VALLEY	Describes the transportation operational vision of the Treasure Valley over the next ten years.
CHAPTER 3: EXISTING CONDITIONS	Presents an overview of existing ITS infrastructure and agency roles/responsibilities in the Treasure Valley.
CHAPTER 4: NEEDS ASSESSMENT	Summarizes outreach and discussion among stakeholder agencies on the perceived operational, technological, and institutional needs of the region which formed a basis for the operational vision.
CHAPTER 5: REGIONAL OPERATIONS STRATEGIES AND CORRIDORS	Discusses operations strategies that are applicable to the area, and how they can be applied to specific transportation facilities.
CHAPTER 6: OPERATIONAL CONCEPT	Describes the roles and responsibilities of participating agencies in delivering transportation operations strategies at the regional level.
CHAPTER 7: TREASURE VALLEY ITS ARCHITECTURE	Presents the updated regional ITS architecture for the Treasure Valley, which describes how regional ITS systems and devices are connected to deliver operational services. This chapter is accompanied by an electronic TurboArchitecture™ database that contains detailed ITS architecture information (available on the COMPASS website).
CHAPTER 8: COMMUNICATIONS PLAN	Provides a framework for development of a shared, regional, interagency transportation communications network based on existing conditions and the goals outlined in the operational vision.
CHAPTER 9: LINKING PLANNING AND OPERATIONS	Discusses specific ways to integrate transportation operations into regional transportation planning, including the Congestion Management Process, project development, and “Planning for Operations.”
CHAPTER 10: REGIONAL OPERATIONS PERFORMANCE MEASURES	Presents candidate performance measures that can be used to measure the effectiveness of transportation operations programs and progress toward agency or regional goals – in many cases, leveraging the significant amount of useful data generated by ITS systems.
CHAPTER 11: ITS IMPLEMENTATION PLAN	Describes an implementation strategy for ITS and communications infrastructure projects for the next 10 years and beyond. These projects provide the enabling tools that allow agencies to implement regional transportation operational strategies captured in the operational vision.
CHAPTER 12: ACHIEVING THE VISION	Discusses action items and next steps, both by individual agencies and through regional cooperation, to implement the operational vision.

Table 1–5: Chapter Organization and Contents

Operational Services

Throughout this plan, from the needs assessment through the implementation plan, material is organized thematically into "operational services." These operational services represent transportation operations topics and practices of regional importance to the agencies of the Treasure Valley. They provide an organizing structure that allows readers of this plan to trace specific themes from chapter to chapter.

The operational services are:

- Regional Operations Coordination and Planning
- Regional Transportation Management
- Freeway Management
- Arterial Management
- Incident and Emergency Management
- Traveler Information
- Public Transportation Management
- Road Weather Operations
- Maintenance and Construction
- Regional Data Archiving
- Regional Communications Infrastructure Management

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Chapter 2: Operational Vision for the Treasure Valley

Chapter Highlights:

- Presents an operational vision for the Treasure Valley – where do we want to be in terms of regional transportation system management and ITS infrastructure in 10 years?
- Describes supporting key principles that elaborate on the vision and are critical to its success.
- Provides a detailed vision for each operational service, with specific objectives for each.

This chapter presents an operational vision for the Treasure Valley over the next 10 years based on needs and opportunities identified by regional stakeholders. The vision builds upon the existing operations state of practice, prior investments in existing ITS infrastructure, and interagency partnerships to address the emerging transportation needs of the Treasure Valley. The operational vision reflects the perspectives of a range of multimodal transportation and emergency management agencies in the Treasure Valley, as well as the needs of their ultimate customers, the traveling public. It also includes ideas expressed during a project workshop hosted by COMPASS on September 27, 2012, as part of the development of the updated ITS Plan.

Figure 2–1: Meeting the mobility needs of the Treasure Valley requires a cooperative approach to operation and management of the transportation system.

Operational Vision for the Treasure Valley

Provide active management of the Treasure Valley's multimodal transportation system through agency partnerships and investment in ITS technology as an essential regional strategy to maximize the performance of the transportation system.

Key Principles

- Meet the expectations of the traveling public, transportation, and emergency agencies at the federal, state, regional, county, and local levels that **work cooperatively to manage the "complete" transportation system** across jurisdictions, modes, and roadway classifications.
- **Integrate regional transportation and emergency management centers** through center-to-center information sharing, training, and protocols for improved situational awareness and response capability to a wide range of incident types.
- Execute operational strategies among partner agencies in accordance with **Regional Concepts for Transportation Operations (RCTOs)** for a coordinated and effective response to real-time conditions.
- **Disseminate quality, timely, and real-time information** to the traveling public that promotes effective demand management, maximizes travel options, and increases public satisfaction in light of the ever-changing transportation system conditions.
- **Coordinate investment and management of regional ITS and communications infrastructure**, including resource sharing opportunities, which provide increased operational capacity at lower overall cost to the public.
- Develop **interagency agreements** that document agency roles and responsibilities, including operating protocols, information sharing, maintenance, and funding, to ensure long-term sustainability and transparency of the regional operations programs.
- Recognize that transportation operations is an **integral part of the region's overall transportation strategy and policy** as a low-cost, high impact means of addressing transportation needs.
- **Develop and monitor performance measures** to quantify the impacts of operational strategies in meeting transportation objectives, demonstrate return on investment, and identify opportunities for future operations investments.
- Achieve **sustained capital, operations, and maintenance funding** among partnering agencies to promote the shared, long-term success of the regional operations program.

Detailed Vision by Operational Service

Through the visioning process, stakeholder agencies identified numerous specific opportunities to enhance the Treasure Valley's current operational capabilities.

Organized by operational service, Table 2–1 captures detailed aspects of the future operational vision identified by stakeholders.

VISION BY OPERATIONAL SERVICE	
REGIONAL OPERATIONS COORDINATION AND PLANNING	• Promote ongoing coordination of regional transportation and emergency management agencies through a regional operations working group to discuss funding, project development, and other operational issues. • Govern use of shared infrastructure, including CCTV cameras, variable message signs, and communications systems, through written interagency agreements with defined roles, policies, monitoring mechanisms, and accountability. • Establish working groups involving agency representatives with both technical expertise and decision-making authority. • Encourage regional decision-making on major infrastructure investments, policies, projects, etc. impacting multiple stakeholders be made through an open and collaborative process to ensure that all regional needs are considered. • Build policy-maker recognition of the need for sustained operating and maintenance funding to support regional operations programs, including personnel, day-to-day operational costs, and ITS equipment replacement. • Ensure that ITS/operations projects are successfully funded and understood to be part of the region's toolkit of low-cost strategies to address regional transportation needs and supported by operational performance measures. • Capitalize on resource sharing opportunities, including technical personnel, training, infrastructure, and spare parts, to reduce costs and increase capabilities. • Gain a commitment to maintenance funding that is commensurate with increased deployment of field infrastructure and systems. • Develop local and/or regional design guidelines to provide for future ITS needs (e.g., building communications conduit during road reconstruction projects; data collection infrastructure), allowing for incremental completion of the region's ITS and communications infrastructure networks. • Recognize operations/ITS strategies by incorporating the vision and needs into regional transportation planning policies and plans (e.g., Communities in Motion). • Integrate operations strategies, data, and performance measures into the region's CMP. • Integrate regional ITS Implementation Plan and operational considerations into TIP project programming and selection criteria. • Maintain consistency between the Treasure Valley ITS plan and architecture with Idaho's statewide ITS plan and ITS Architecture through coordination and periodic plan updates/maintenance.

Table 2–1: Future Operational Vision Identified by Focus Area

VISION BY OPERATIONAL SERVICE	
REGIONAL TRANSPORTATION MANAGEMENT	• Integrate traffic and emergency management centers through virtual information sharing, interoperable voice and data communications, incident response protocols, and agency partnerships. • Promote coordinated monitoring and management across the regional freeway and arterial networks, including spillover effects from one system to the other. • Use Integrated Corridor Management (ICM) within the Interstate I-84/I-184 corridors and parallel arterial corridors to accommodate traffic spillover effects, ease ramp congestion, and facilitate detour route implementation. • Integrate traffic management across jurisdictional boundaries in the Treasure Valley, including incidents straddling the Ada-Canyon County line. • Create a virtual information sharing network among traffic and emergency management centers ("Virtual Interagency Regional Operation Center (IROC)" concept), including StateComm, ITS, ACHD, ITD, maintenance dispatch, law enforcement, and emergency management public safety answering points (PSAP). • Ensure 24/7/365 operation of the region's full traffic and incident management capabilities, potentially through joint operating agreements among agencies during off-peak periods. • Incorporate emerging third-party data sources, leveraging probe data and intelligent vehicles, in combination with agency-owned detection infrastructure. • Incorporate redundancy into traffic management systems infrastructure in the event that a primary center goes down, as well as redundant reserves of key traffic controller technology components (e.g., traffic controllers).
FREEWAY MANAGEMENT	• Integrate freeway management ITS infrastructure into ITD's new central control software and future virtual traffic management center (TMC) systems to promote regional multi-agency management of freeway corridors. • Deploy freeway travel time detection infrastructure to support real-time traffic management, traveler information, and planning/performance measurement functions. • Explore strategies to maintain the reliability of traffic flow on the regional freeway network, such as ramp metering.

Table 2-1 Future Operational Vision Identified by Focus Area (continued)

VISION BY OPERATIONAL SERVICE	
ARTERIAL MANAGEMENT	• Use of state-of-the-art centralized and field traffic signal management technology and methods, including adaptive signal control where appropriate, to maximize efficiency of the regional arterial network. • Integrate isolated traffic signals into central traffic control systems for improved coordination and maintenance. • Integrate adjacent local and state traffic signal systems, particularly in Canyon County (e.g., Nampa-Caldwell Boulevard and Karcher Road), potentially with off-hours control sharing capabilities. • Deploy arterial travel time detection infrastructure to support real-time traffic management, traveler information, and planning/performance measurement functions. • Implement incident management and detection capabilities (e.g., CCTV cameras) deployed at signalized intersections. • Develop joint local/state management of traffic signal infrastructure, with clear agreements and reimbursement mechanisms for signal maintenance work. • Incorporate bicycle/pedestrian enhancements into traffic signal/intersection improvements (e.g., bicycle detection). • Deploy pedestrian beacons and signals to improve safety and driver awareness, and integrate devices with adjacent traffic signals to maintain operational efficiency.
INCIDENT AND EMERGENCY MANAGEMENT	• Ensure widespread use of coordinated incident response plans, including detour routes, by transportation management centers, maintenance personnel, and first responders to effectively coordinate incident response and provide consistent traveler information. • Share video with emergency operation centers (EOC), emergency vehicles, and maintenance dispatchers to facilitate incident identification, confirmation, and response. • Promote active participation of event planners and venues, such as the Idaho Center and Boise State University, to mitigate impacts of traffic events and provide informed options to the traveling public. • Integrate intelligent vehicle crash information for TMC incident detection (e.g., Condition Acquisition and Reporting System [CARS]/Mayday initiative). • Integrate transportation and emergency management information systems (e.g., integration of advanced traffic management systems with computer aided dispatch systems, or the Idaho State Police crash database with the regional transportation data archive). • Share traffic CCTV video and traffic flow information to support regional emergency management response for both traffic and non-traffic incidents. • Coordinate traffic management agencies on estimated incident response and clearance times to support traffic management, detour planning, and traveler information. • Use traveler information assets (e.g., 511, variable message signs) to push emergency management related messages. • Maintain ongoing workgroup and policy-level coordination among emergency management and transportation agencies to discuss needs, available assets, and response strategies.

Table 2-1 Future Operational Vision Identified by Focus Area (continued)

VISION BY OPERATIONAL SERVICE	
REGIONAL TRAVELER INFORMATION	• Build and maintain a single, multimodal, "go-to" location for public traveler information from all jurisdictions and modes, building upon existing 511 telephone and web infrastructure. • Disseminate traveler information using the broadest means possible, including mobile devices and third-party information providers, for maximum public awareness and benefit. • Develop a two-way exchange of information, incorporating both traditional "push" information from agencies as well as incident and traffic probe data provided by the traveling public. • Provide arterial-level traffic flow/speed data for principal arterials and other critical corridors. • Incorporate traveler information generated by local agencies into the regional 511 system. • Provide information on traffic events affecting long-distance travel corridors (e.g., severe weather, pass closures) in coordination with adjacent ITD districts and Oregon Department of Transportation (ODOT). • Disseminate traffic surveillance video to the public and the media, ensuring that it can be disabled at the operating agency's discretion. • Develop multi-modal trip planner capabilities integrating transit, bicycle, and pedestrian options.
PUBLIC TRANSPORTATION MANAGEMENT	• Leverage regional ITS systems to improve transit service reliability and real-time information, with the goal of increasing transit quality and ridership. • Incorporate roadway congestion, incident, and weather information into transit dispatch through two-way communications and integration with regional traffic management centers and field infrastructure (e.g., cameras). • Develop communications interoperability with emergency management agencies (e.g., for onboard emergencies and threats). • Deploy transit signal priority, cooperation with local traffic agencies, on key transit corridors to reduce transit travel time and delay. • Implement a "one call, one click" system for scheduling demand-responsive transit services.
ROAD WEATHER OPERATIONS	• Use Road Weather Information Systems, National Weather Service data, and other advanced local forecast tools to provide detailed road weather information/warnings to travelers and road maintenance personnel. • Use real-time communication to share road plowing status and winter weather response information with the public. • Integrate onboard snowplow automatic vehicle location (AVL)/weather detection information with regional road weather maintenance infrastructure to supplement available road condition information.
MAINTENANCE AND CONSTRUCTION MANAGEMENT	• Develop a "clearinghouse" of event information for inter-agency reporting coordination of roadway maintenance, construction, and special event activities (e.g., Idaho Center) that impact the transportation system. The Idaho State Police annual event calendar is one possible springboard for this effort. • Use ITS technologies to promote work zone safety, traffic management, and traveler information to minimize adverse impacts of construction coordination.

Table 2–2: Table 2-1 Future Operational Vision Identified by Focus Area (continued)

VISION BY OPERATIONAL SERVICE	
REGIONAL DATA ARCHIVING	• Collect, consolidate, and store regional multimodal operations/ITS data to support regional planning applications, before-after studies, return on investment analysis, and performance measurement. • Increase automation of multi-modal data collection, using a field data collection network designed to capture needed operations and performance data. • Migrate toward open source standards for data exchange among agencies.
REGIONAL COMMUNICATIONS INFRASTRUCTURE MANAGEMENT	• Complete interagency fiber optic network connecting centers and field ITS devices in both Ada and Canyon Counties. • Ensure communications system reliability through redundant paths and network infrastructure. • Develop a regional fiber consortium to coordinate and manage regional fiber optic and communications assets, including interagency agreements addressing ownership, service levels, and funding. • Pool regional funding for fiber network maintenance, potentially through a third-party contractor, with specified individual agency funding contributions. • Design and implement a shared regional transportation and emergency management radio system to improve interagency coordination.
OTHER ELEMENTS	• Anticipate and leverage emerging opportunities for two-way communications with intelligent vehicles, mobile devices, and third-party data providers for information dissemination, incident detection, probe data, and safety applications.

Table 2-1 Future Operational Vision Identified by Focus Area (continued)

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Chapter 3: Existing Conditions

Chapter Highlights:

- Discusses the state of ITS and communications infrastructure deployment in the Treasure Valley today.
- Provides maps of existing infrastructure locations and ownership.
- Presents an overview of the regions traffic and emergency management centers.
- Describes the roles and responsibilities of agencies who build, operate, and maintain infrastructure.

This chapter provides an overview of how TSMO is carried out in the Treasure Valley today. Specifically, this chapter captures agency roles and institutional relationships, management centers and functions, and existing regional ITS infrastructure and programs.

Agency Roles and Institutional Relationships

Agencies provide a wide range of transportation system management and operations services in the Treasure Valley today through their own endeavors and through many coordinated partnerships. Table 3–1 lists the strategies used by agencies in the Treasure Valley today. Chapters 5 and 6 provide details on how stakeholders in the region envision expanding these strategies and service areas in the future.

Partnerships are a cornerstone for successful operations, particularly since travelers see the transportation infrastructure as one network and are oblivious to jurisdictional boundaries. A number of partnerships are described in the next section as they relate to each of the management centers. These institutional relationships can be generally summarized as follows:

- StateComm provides traffic management center functions for the State of Idaho.
- ACHD manages, operates, and maintains the transportation infrastructure for all the cities within Ada County.
- A number of traffic signals owned by ITD are operated and maintained by ACHD, the City of Caldwell, and the City of Nampa.
- Fiber optic communications infrastructure is shared among some stakeholders.
- Maintenance resources are shared among some agencies.
- Incident response is primarily coordinated between ITD, StateComm, ACHD, and the Idaho State Police but also involves many other transportation and emergency management agencies, including local police and fire.

	TRAFFIC MANAGEMENT				INCIDENT & EMERGENCY MANAGEMENT			TRAVELER INFORMATION			PUBLIC TRANSPORTATION MANAGEMENT			ROAD WEATHER OPERATIONS		MAINTENANCE & CONSTRUCTION MANAGEMENT	
	CCTV Images or Monitoring	Freeway Management	Arterial Management	Enhanced Traffic Signal Operations	Regional Incident and Emergency Management	Emergency Vehicle Routing and Signal Preemption	Regional Alert System	Roadside Traveler Information	Traveler Information Dissemination	Regional Transportation Operations Data Sharing	Advanced Transit Operations Management	Regional Transit Fare Integration	Transit Surveillance and Security	Road Weather Information Systems	Winter Roadway Maintenance	Maintenance and Construction Management	Work Zone Management
TRANSPORTATION SYSTEMS MANAGEMENT & OPERATIONS AGENCIES																	
ITD DISTRICT 3	●	●	●	●	●	●		●	●	●				●	●	●	●
ACHD	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●
CANYON COUNTY			●		●				●					●	●	●	●
CITY OF CALDWELL			●	●	●	●			●						●	●	●
CITY OF NAMPA	●		●	●	●	●			●						●	●	●
BOISE AIRPORT			●		●				●						●	●	●
BOISE STATE UNIV.	●		●						●	●					●	●	●
EMERGENCY MANAGEMENT AGENCIES																	
IDAHO STATECOMM	●				●	●	●	●	●	●							
911	●				●	●	●										
IDAHO STATE POLICE	●				●	●	●										
LOCAL FIRST RESPONDERS					●	●	●										
PUBLIC TRANSPORTATION MANAGEMENT AGENCIES																	
VALLEY REGIONAL TRANSIT					●				●		●	●	●			●	●
TREASURE VALLEY TRANSIT					●				●		●	●	●			●	●

Table 3–1: Existing Strategies Used in the Treasure Valley

Management Centers and Functions

Centers provide the overarching management and operations of the transportation system. Communications between centers enables coordination between modes and across jurisdictional boundaries. Management centers also communicate with devices in the field and vehicle fleets to provide control, coordinate activities, and to gather and provide information. Figure 3–1 provides a high-level illustration of the ITS services provided by management centers in the Treasure Valley today as well as their interaction with field devices, vehicles, and travelers.

The centers that oversee the main day-to-day management of the transportation network fall into one of the following categories:

- **Traffic Management:** These centers monitor and control the roadway network. Key agencies with traffic management centers (TMCs) (formal or informal) include ITD, ACHD, City of Caldwell, City of Nampa, and Boise State University.
- **Incident & Emergency Management:** These centers primarily manage public safety, including management of incidents that occur on the roadway network. Although there are many centers in this category, StateComm and 911 dispatch centers are vital for incident management.
- **Public Transportation Management:** These centers manage fixed-route and demand response transit services. Valley Regional Transit (VRT) and Treasure Valley Transit (TVT) operate these centers in the region.

This section includes a detailed table for each of the key centers and includes:

- Description of center
- Operating agency
- Staff full time equivalents (FTEs) employed
- Functions performed
- ITS infrastructure operated
- Partnerships

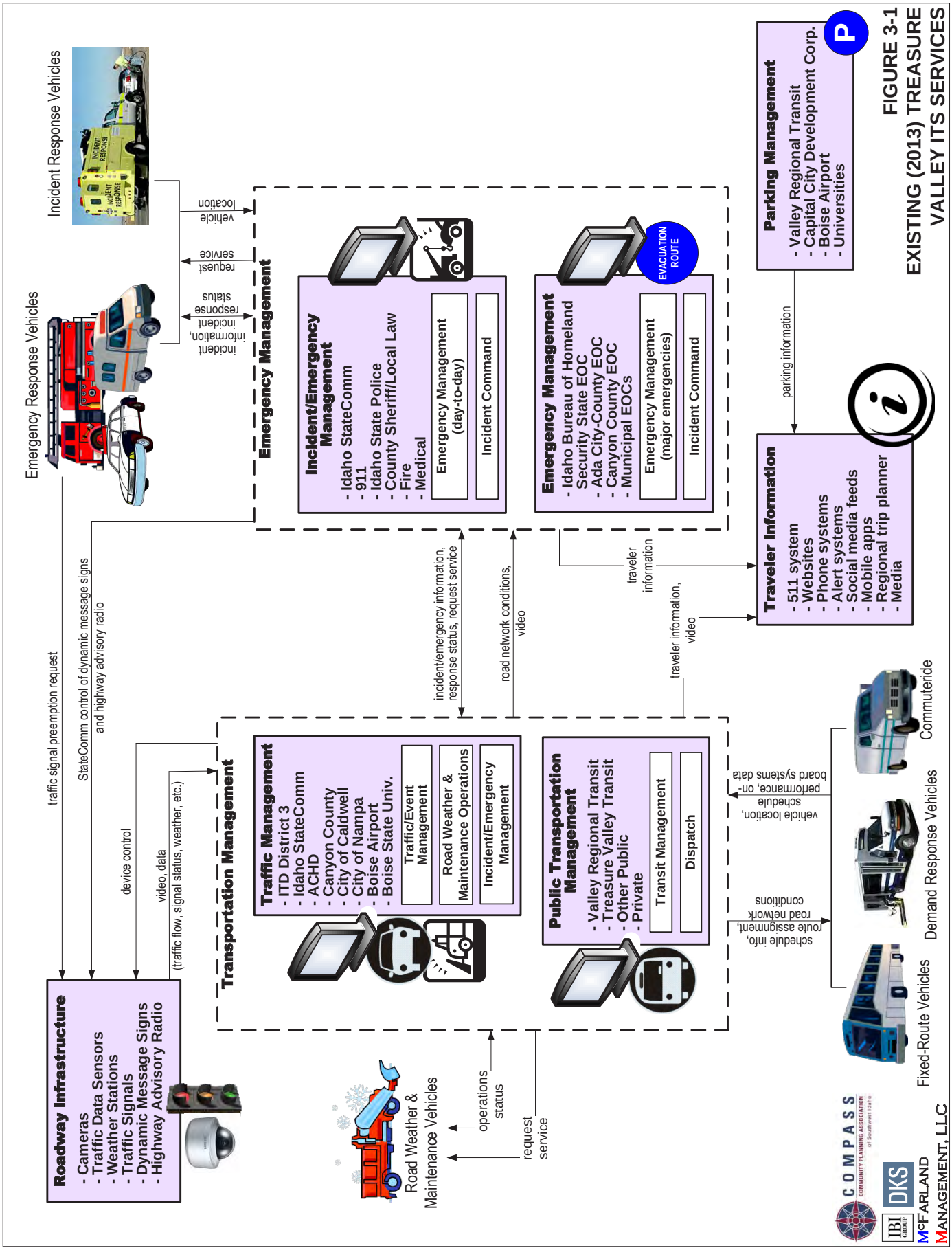


FIGURE 3-1
EXISTING (2013) TREASURE VALLEY ITS SERVICES

ITD DISTRICT 3 TRAFFIC OPERATIONS (MAINTENANCE SHOP)

DESCRIPTION	ITD District 3 manages the operations and maintenance of state routes for 10 counties as described in the *Idaho ITS Strategic Plan* (March 2011). In the Treasure Valley ITD manages operations and maintenance from their maintenance shop and business offices during normal hours of business. ITD also partners with StateComm for around the clock response to incidents and other traffic events. Key focus areas in the Treasure Valley include management of freeways and urban arterials, incident management, winter operations, and traveler information dissemination.		
OPERATING AGENCY	ITD District 3	**STAFF FTES**	Electrical/signal crew: 3 Striping crew: 8 Sign/stencil crew: 6 Incident response crew: 3
GEOGRAPHIC COVERAGE	☒ Ada County ☒ Plus eight other counties	☒ Canyon County	☐ Statewide Idaho

FUNCTIONS	ITS INFRASTRUCTURE	
• Freeway/arterial traffic management • Incident and emergency management • Road weather and maintenance operations • Traveler information	• Traffic signals (Peek)1 • CCTV cameras • Dynamic message signs • Highway advisory radio • Traffic data stations • Weather stations • Incident response vehicles	• Advanced traffic management system (Delcan) • Condition Acquisition and Reporting System (CARS) • 511 traveler information system (phone, 511.idaho.gov, mobile applications, email/text alerts, social media feeds) • Road weather, maintenance, and incident response vehicle fleet

PARTNERSHIPS

- **Ada County Highway District:** The ACHD TMC and ITD coordinate traffic management activities. ITD District 3 pays 50% of ACHD's TMC operating costs.
- **Canyon County (and cities within):** ITD, Canyon County, and cities in Canyon County have been working on an update to CARS that will allow local agencies to input data on maintenance and construction projects on local roads.
- **City of Caldwell:** ITD operates and maintains the traffic signals along the I-84 business loop (Cleveland Boulevard and Blaine Street) in Caldwell. There have been recent discussions about converting this to a local roadway. The city and ITD have ad hoc maintenance agreements regarding locations where city roadways intersect ITD-operated traffic signals.
- **City of Nampa:** ITD and the city have been working on a formal agreement for the city to maintain traffic signals on state routes with funding support from ITD.
- **Idaho Bureau of Homeland Security:** ITD and Homeland Security share fiber communications infrastructure in Canyon County.
- **Idaho StateComm:** StateComm resides within the Idaho Department of Health and Welfare but acts as a de facto TMC for ITD. They coordinate incident response, monitor CCTV cameras, post messages to dynamic message signs, and provide highway advisory radio alerts. They also enter data into CARS, which is then disseminated to ITD's 511 system. There is a formal agreement between the two agencies and ITD provides funding for the services provided by StateComm.
- **Idaho State Police:** Idaho State Police dispatch ITD's incident response vehicles. ITD and Idaho State Police share fiber communications infrastructure.
- **Media:** The media receives ITD video feed from the ACHD TMC. ITD issues press releases to the media regarding impacts to the roadway network.
- **Syringa Networks:** ITD and Syringa (a private utility company) share fiber communications infrastructure.

ACHD TRAFFIC MANAGEMENT CENTER / TRAFFIC OPERATIONS

DESCRIPTION	ACHD has operated its TMC since 2000. Operators at the TMC manage the day-to-day operations and maintenance of the roadway network (freeway and arterial) within Ada County, monitor and respond to traffic demand associated with incidents, and disseminate traveler information. The TMC operates from 5:30 a.m. to 6:30 p.m. Monday through Friday. The TMC has three consoles: one for an ACHD operator, one for an ACHD traffic signal engineer, and one for an independent radio broadcaster. ACHD also staffs the TMC for Boise State University football games, heavy shopping days (e.g., day after Thanksgiving), and other special events.		
OPERATING AGENCY	ACHD	**STAFF FTES**	Signal Engineers: 3 Signal Technicians: 6 Electronic/ITS Technicians: 3
GEOGRAPHIC COVERAGE	☒ Ada County	☒ Canyon County (limited)	☐ Statewide Idaho

FUNCTIONS	**ITS INFRASTRUCTURE**
• Freeway traffic management (Ada and Canyon Counties) • Arterial traffic management (Ada County) • Incident and emergency management (Ada County) • Road weather and maintenance operations (Ada County) • Traveler information (Ada County and some Canyon County)	• Advanced traffic management system (IBI Group) • Traffic signals (Naztec) • Central traffic signal system (Naztec ATMS.now) • CCTV cameras • Dynamic message signs • Traffic data stations • Video Detection • Weather stations • www.achdidaho.org • Road weather and maintenance vehicle fleet

PARTNERSHIPS	• **Ada County Sheriff's Office (ACSO):** ACHD and ACSO coordinate incident management activities. ACSO monitors and controls ACHD's cameras after hours.
	• **Boise Airport:** The airport will receive video feeds from the TMC.
	• **Boise State University:** ACHD and Boise State University coordinate traffic management for Boise State University football games and share fiber optic communications infrastructure. Boise State University does applied research for ACHD.
	• **Cities of Boise, Eagle, Garden City, Kuna, Meridian, and Star:** ACHD manages, operates, and maintains the transportation infrastructure for all the cities within Ada County. ACHD and the City of Boise share fiber optic communications infrastructure. ACHD has direct fiber optic communications to the Cities of Boise, Garden City, and Meridian.
	• **Idaho StateComm**: ACHD and StateComm coordinate incident management activities.
	• **Idaho State Police:** ACHD and Idaho State Police coordinate incident management activities.
	• **Idaho Transportation Department:** ACHD and ITD coordinate traffic management activities.
	• **Media**: The media receives video feeds from the TMC. ACHD issues press releases to the media regarding impacts to the roadway network.
	• **Radio stations:** The TMC hosts an independent radio broadcaster who sends real-time traveler information to radio stations. ACHD also has fiber optic communications to four radio stations.

CITY OF CALDWELL TRAFFIC OPERATIONS [FUTURE TRAFFIC SIGNAL LAB]			
DESCRIPTION	The primary responsibilities of the City of Caldwell street department are the operations and maintenance of the Caldwell roadway network. Maintenance crews help support traffic control activities on an as-needed basis for incidents and other events. The city manages operations and maintenance from their business offices during normal hours of business. A traffic signal lab is being planned as part of a new city building. The lab will be used to support operations and maintenance functions and will be operated on an informal basis using existing staff.		
OPERATING AGENCY	City of Caldwell Street Department	**STAFF FTES**	22
GEOGRAPHIC COVERAGE	☐ Ada County	☒ Canyon County (Caldwell Only))	☐ Statewide Idaho

FUNCTIONS	ITS INFRASTRUCTURE
• Arterial traffic management • Incident and emergency management • Road weather and maintenance operations • Traveler information	• Traffic signals (Naztec, Peek) • Central traffic signal system (Naztec Streetwise) • cityofcaldwell.com/page/road_closures/ • Road weather and maintenance vehicle fleet

PARTNERSHIPS	
	• **Ada County Highway District:** The city and ACHD both use Naztec traffic signals. The agencies share maintenance resources, training, and spare parts.
	• **Canyon County:** The city and county share server resources and fiber optic communications infrastructure. Formal agreements have been developed on a link by link basis.
	• **Canyon County Sheriff's Office:** The Canyon County 911 center works with the city when traffic control support is needed. The sheriff's office also to reports maintenance needs.
	• **City of Nampa:** The Cities of Caldwell and Nampa would like to interconnect traffic signals where applicable and share maintenance and technical support. Ad hoc or formal agreements have not yet been developed.
	• **Idaho Transportation Department:** ITD operates and maintains the traffic signals along the I-84 business loop (Cleveland Boulevard and Blaine Street). There have been recent discussions about converting this to a local roadway. The city and ITD have ad hoc maintenance agreements regarding locations where a city roadway intersects an ITD-operated traffic signal.
	• **Media:** The city issues press releases to the media regarding impacts to the roadway network.
	• **Canyon County Highway District No. 4:** The Canyon County Highway District coordinates traffic operations and improvement projects with the city.

CITY OF NAMPA TRAFFIC OPERATIONS [TRAFFIC SIGNAL SHOP]

DESCRIPTION

Several divisions within the Public Works Department work together to manage the operations and maintenance of the Nampa roadway network:

- Engineering: responsible for design
- Streets: maintains the city's roadways and pavement markings
- Traffic: operates the transportation network (includes traffic signals)
- Vehicle Maintenance: responsible for road weather and maintenance vehicle fleet

The city manages operations and maintenance from their business offices during normal hours of business. A traffic signal shop is used to support operations, including monitoring of traffic signals. Maintenance crews help support traffic control activities on an as-needed basis for incidents and other events.

OPERATING AGENCY	City of Nampa Public Works Department	**STAFF FTES**	2 traffic signals/lighting

GEOGRAPHIC COVERAGE	☐ Ada County	☒ Canyon County (Nampa Only)	☐ Statewide Idaho

FUNCTIONS	**ITS INFRASTRUCTURE**
• Arterial traffic management • Incident and emergency management • Road weather and maintenance operations • Traveler information	• Traffic signals (M1, Peek) • Video detection • Central traffic signal system (Northwest Signal NWSCentral) • Traffic data stations • cityofnampa.us (home page, streets page) • Road weather and maintenance vehicle fleet

PARTNERSHIPS

- **City of Caldwell:** The Cities of Caldwell and Nampa would like to interconnect traffic signals where applicable and share maintenance and technical support. Ad hoc or formal agreements have not yet been developed.
- **City of Nampa Police Department:** The Nampa Police Dispatch Center works with the city traffic division when traffic control support is needed. The police department also reports maintenance needs.
- **Idaho Transportation Department:** ITD and the City have been working on a formal agreement for the city to maintain traffic signals on state routes with funding support from ITD.
- **Media:** The city issues press releases to the media regarding impacts to the roadway network.
- **Nampa Highway District No. 1:** The Nampa Highway District coordinates traffic operations and improvement projects with the city.

BOISE STATE UNIVERSITY TRAFFIC MANAGEMENT CENTERS: BRONCO STADIUM AND RESEARCH			
DESCRIPTION	**Bronco Stadium TMC:** The primary purpose of the TMC is to manage traffic and parking demand associated with special events, particularly football games. The TMC includes a command post in Bronco Stadium to handle operations at the stadium as well as a Transportation and Parking Services command post in one of the parking structures to manage pre- and post-game traffic. The command posts use ACHD's website to monitor still traffic camera images. An ACHD traffic signal engineer works from the ACHD TMC to monitor traffic cameras and adjust signal timings in response to actual traffic demand. **Research TMC:** The purpose of the research TMC is to support research applications and to train professionals and students on TMC operations. The research TMC has interfaces with ACHD's advanced traffic management and central traffic signal systems.		
OPERATING AGENCY	Boise State University	**STAFF FTES**	100+ staff for football games
GEOGRAPHIC COVERAGE	☒ Ada County	☐ Canyon County	☐ Statewide Idaho
FUNCTIONS	• Special event management • Parking management • Research	**ITS INFRASTRUCTURE**	• Access to ACHD's advanced traffic management system (IBI Group) • Access to ACHD's central traffic signal system (Naztec ATMS.now)
PARTNERSHIPS	• **Ada County Highway District:** ACHD and Boise State University coordinate traffic management for Boise State University football games and share fiber optic communications infrastructure. Boise State University does applied research for ACHD. • **Media:** Boise State University issues press releases to the media regarding impacts to the roadway network.		

IDAHO STATE EMS COMMUNICATIONS CENTER (STATECOMM)			
DESCRIPTION	StateComm is an emergency management center that operates around the clock in Meridian. They are co-located with the Idaho State Police Regional Communications Center (RCC). StateComm provides emergency dispatch and communications for Emergency Medical Services (EMS), ITD, hazardous material incidents, public health emergencies, AMBER alerts, and many other situations. They coordinate with agencies at the local, state, and federal levels depending on the scope of the incident. Approximately 65% of StateComm's operations focus on ITD activities. Medical and other emergencies take precedence at StateComm over day-to-day traffic management and operations.		
OPERATING AGENCY	Idaho Department of Health and Welfare	**STAFF FTES**	14
GEOGRAPHIC COVERAGE	☒ Ada County	☒ Canyon County	☒ Statewide Idaho

FUNCTIONS	ITS INFRASTRUCTURE
• Freeway/arterial traffic management • Incident and emergency management • Road weather and maintenance operations • Traveler information	• Computer aided dispatch • Advanced traffic management system (Delcan) • Condition Acquisition and Reporting System (CARS) • North American Warning Activation System (NAWAS) • Emergency Alert System (EAS) • Operate CCTV cameras, dynamic message signs, and highway advisory radio

PARTNERSHIPS

- **Ada County Highway District:** ACHD and StateComm coordinate incident management activities.
- **Idaho Transportation Department:** StateComm acts as a de facto TMC for ITD. They coordinate incident response, monitor CCTV cameras, post messages to dynamic message signs, and provide highway advisory radio alerts. They also enter data into CARS, which is then disseminated to ITD's 511 system. There is a formal agreement between the two agencies and ITD provides funding for the services provided by StateComm.
- **Other Partnerships:** In addition to ITD, StateComm also partners with:
  - Idaho Bureau of Homeland Security
  - Idaho Department of Environmental Quality
  - Idaho E911 Emergency Communications Commission
  - Idaho Department of Fish and Game
  - Idaho Mountain Search & Rescue Unit
  - Idaho Public Safety Answering Points Standards Committee
  - Idaho State Police
  - Idaho Statewide Interoperability Executive Council
  - Priority Dispatch Corporation
  - Rocky Mountain Poison and Drug Center

911/DISPATCH CENTERS

DESCRIPTION

The 911 and dispatch centers within the Treasure Valley are PSAPs that operate around the clock to manage emergency phone calls and dispatch the appropriate law enforcement, fire, and life safety services. They also coordinate with transportation management and operations agencies, as appropriate when dealing with emergency calls related to traffic incidents. The key 911/dispatch centers in the Treasure Valley include:

Ada County 911 Communications Center: Provides PSAP and dispatch services for law enforcement, fire, and medical services within Ada County.

Canyon County Communications Center: Provides PSAP and dispatch services for law enforcement, fire, and medical services within Canyon County except for within the incorporated limits of the City of Nampa.

Nampa Police Dispatch Center: Provides PSAP and dispatch services for the Nampa Police Department, Nampa Fire Department, and Upper Deer Flat Fire Department.

Idaho State Police Regional Communications Center (RCC) South: PSAPs route calls that fall within state jurisdiction to Idaho State Police, who then dispatches Idaho State Police resources as well as ITD's incident response vehicles. The RCC South, which is responsible for Idaho State Police Districts 3 through 6, is co-located with Idaho StateComm.

OPERATING AGENCY

- Ada County Sheriff's Office
- Canyon County Sheriff's Office
- Nampa Police Department
- Idaho State Police

STAFF FTES

- Ada 911: 40
- Canyon 911: 20+
- Nampa 911: 3 – 4
- RCC South: 28

GEOGRAPHIC COVERAGE

- ☒ Ada County
- ☒ Canyon County
- ☒ Statewide Idaho (Idaho State Police Districts 3 – 6)

FUNCTIONS

- Incident and emergency management
- Traveler information

ITS INFRASTRUCTURE

- Computer aided dispatch
- Automated vehicle location
- Automated text paging system
- Mobile communications center
- Mobile data terminals

PARTNERSHIPS

- **Ada County Sheriff's Office and Ada County Highway District:** ACHD and ACSO coordinate incident management activities. ACSO monitors and controls ACHD's cameras after hours.
- **Canyon County Communications Center and Nampa Police Dispatch Center:** Medical calls within the City of Nampa are coordinated through both centers due to overlapping medical jurisdiction.
- **Canyon County Sheriff's Office and City of Caldwell:** The Canyon County 911 center works with the city when traffic control support is needed. The sheriff's office also reports maintenance needs.
- **Nampa Police Department and City of Nampa:** The Nampa Police Dispatch Center works with the city traffic division when traffic control support is needed. The police department also reports maintenance needs.
- **Idaho State Police and Ada County Highway District:** ACHD and Idaho State Police coordinate incident management activities.
- **Idaho State Police and Idaho Transportation Department:** Idaho State Police dispatches ITD's incident response vehicles. ITD and Idaho State Police share fiber communications infrastructure.

TRANSIT DISPATCH/CALL CENTERS

DESCRIPTION

VRT is the regional public transportation authority for Ada and Canyon Counties and provides core transit services (ValleyRide). TVT provides rural community transit and Medicaid transportation. Transit centers used for public transportation management include:

- ValleyRide Dispatch Center in Boise
- ValleyRide Dispatch Center in Nampa
- VRT Meridian Call Center
- TVT Dispatch Center in Nampa

OPERATING AGENCY	• VRT • TVT	**STAFF FTES**	• VRT Transportation Division: 8 each • ValleyRide Dispatch: 9 each
GEOGRAPHIC COVERAGE	☒ Ada County	☒ Canyon County	☐ Statewide Idaho

FUNCTIONS	ITS INFRASTRUCTURE
• Public transportation management • Traveler information • Customer service (one-call center)	• Fixed-route fleets • Automated vehicle location (fixed-route) • Demand response fleets • In-vehicle mobile data devices • Transit operations software (RouteMatch and Fleet-Net) • 511 transit traveler information • valleyride.org • treasurevalleytransit.com • Transit trip planner (rideline.org, RideLine phone 345-RIDE, private websites)

PARTNERSHIPS

- **Valley Regional Transit and Ada County Highway District:** VRT and ACHD are currently working together to implement transit signal priority.
- **Community Transportation Association of Idaho (CTAI):** CTAI is both the transit association in Idaho, as well as the organization that implements mobility management in Idaho. CTAI works with transit providers in the Treasure Valley to ensure coordination is realized and general information is disseminated.

Existing Regional ITS Infrastructure and Programs

The existing ITS Infrastructure and programs are described in this section for each of the following service areas:

- Traffic Management, Road Weather Operations, and Maintenance and Construction Management
- Incident Management
- Emergency Management
- Public Transportation Management
- Traveler Information

Traffic Management, Road Weather Operations, and Maintenance and Construction Management

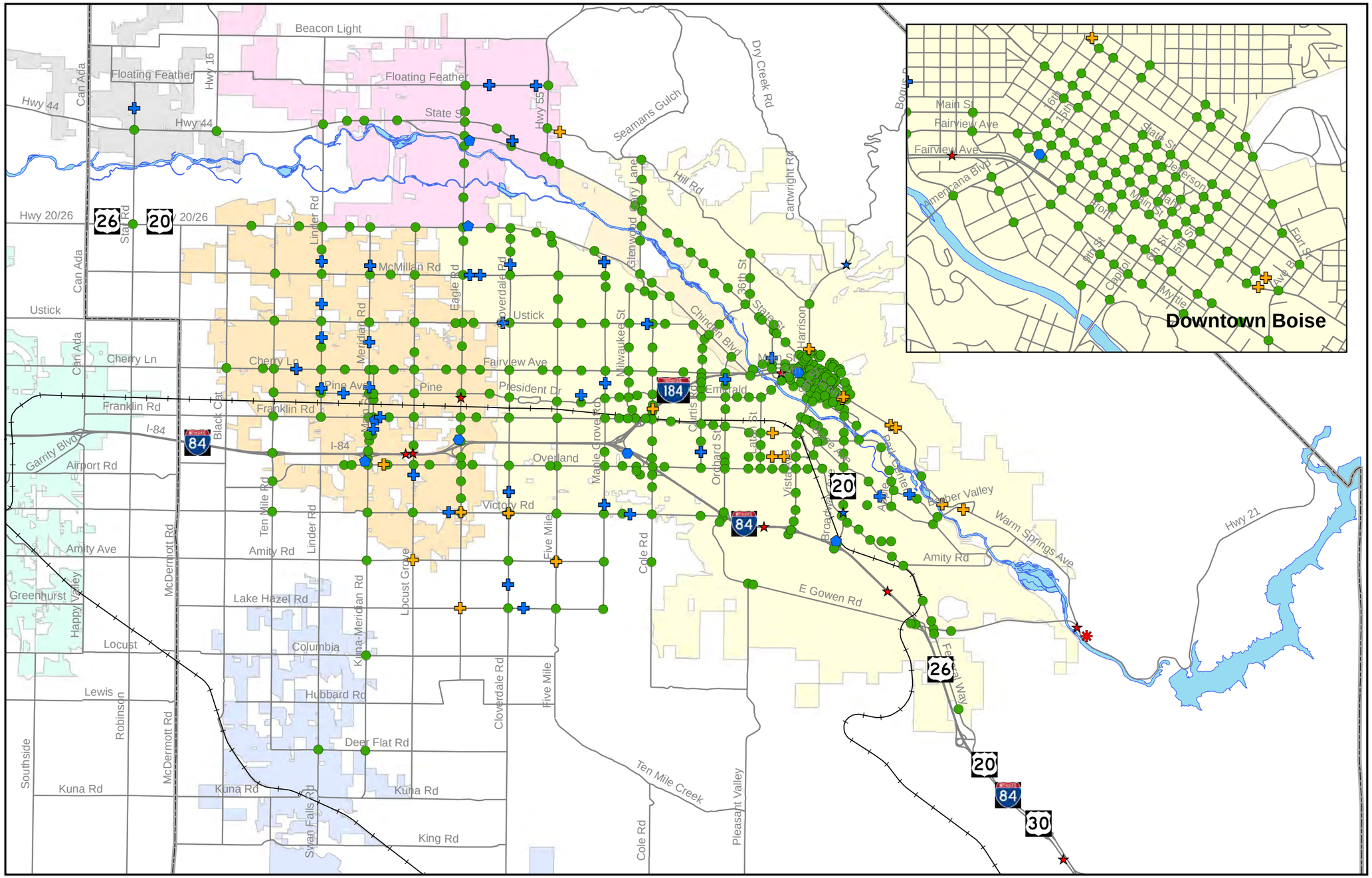
The existing ITS infrastructure for traffic management, road weather operations, and maintenance and construction management is listed by agency in Table 3–2. The following subsections describe the infrastructure in more detail. Additionally, Figures 3-2 through 3-5 show where ITS inventory is installed in the field. These figures also show the supporting communications infrastructure, which is described in detail in "Chapter 8: Communications Plan."

ITS INFRASTRUCTURE	ITD DISTRICT 3	IDAHO STATECOMM	ACHD	CANYON COUNTY	CITY OF CALDWELL	CITY OF NAMPA	BOISE STATE UNIVERSITY
ADVANCED TRAFFIC MANAGEMENT SYSTEM	●	★	●				★
TRAFFIC SIGNALS	●		●		●	●	
CENTRAL TRAFFIC SIGNAL SYSTEM	●		●		●	●	★
CCTV CAMERAS	●	★	●				★
DYNAMIC MESSAGE SIGNS	●	★	●				
HIGHWAY ADVISORY RADIO	●	★					
TRAFFIC DATA STATIONS	●		●			●	
WEATHER STATIONS	●		●	●			
ROAD WEATHER AND MAINTENANCE VEHICLE FLEET	●		●	●	●	●	

★ Agency has interface to another agency's system or devices

Table 3–2: Existing ITS Infrastructure for Traffic Management, Road Weather Operations, and Maintenance and Construction Management

Figure 3-2 Ada County Existing ITS Inventory - Traffic Signals and Traveler Information



Legend

- Signalized Intersection
- HAWK - ACHD
- Intersection Flasher
- Hub Building - ACHD
- Hub Cabinet - ACHD
- VMS - ACHD
- VMS - ITD
- HAR - ITD

0 0.7 1.4 2.1 2.8 Miles

November 2013

IBI GROUP
907 SW STARK STREET
PORTLAND, OREGON 97205
503 222 2045

DKS

McFARLAND MANAGEMENT, LLC

COMPASS COMMUNITY PLANNING ASSOCIATION of Southwest Idaho

Treasure Valley Transportation System:
Operations, Management and ITS

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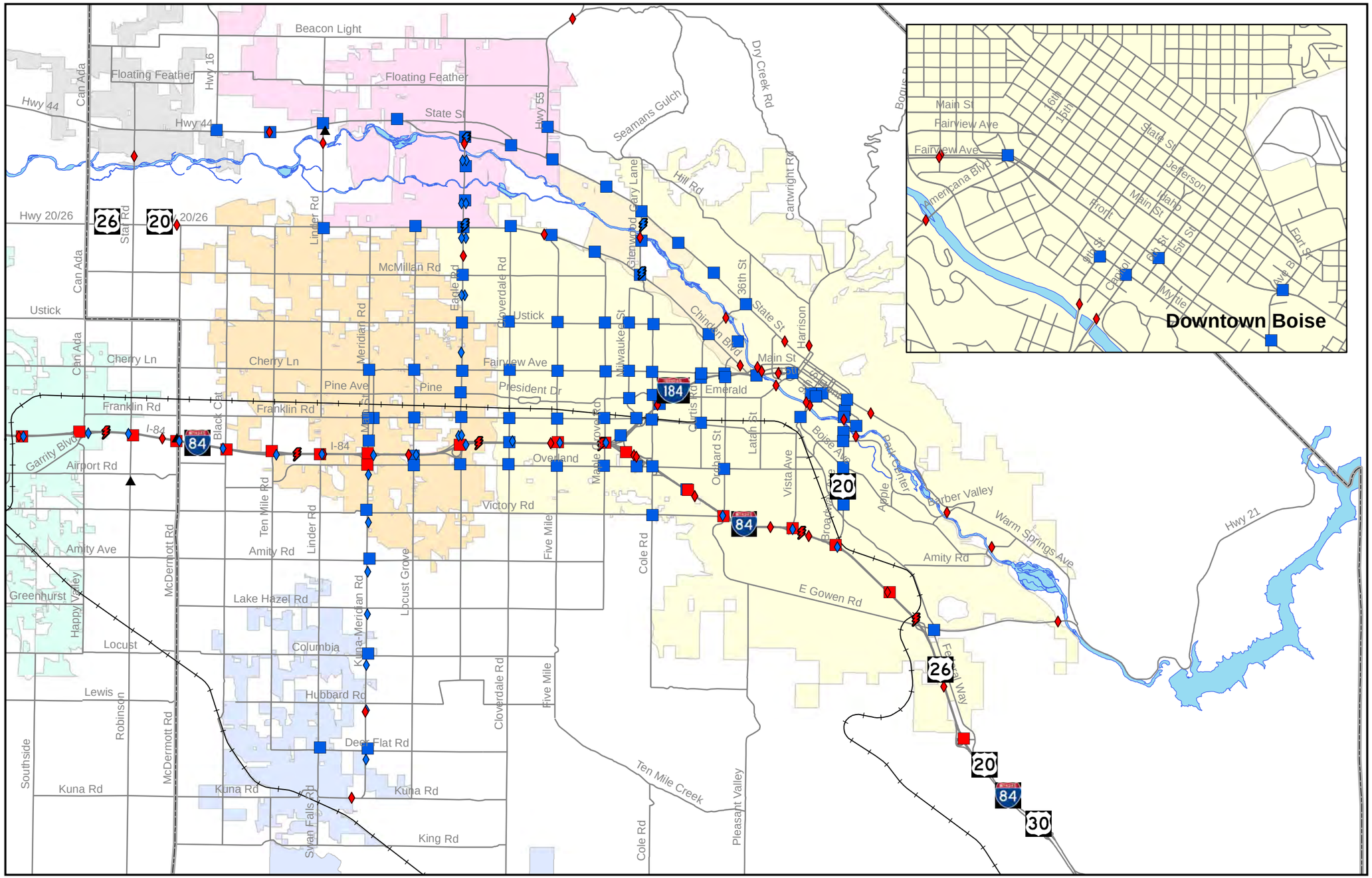
Figure 3-3 Ada County Existing ITS Inventory - Monitoring Devices



Legend

- Detector - ACHD
- Detector - ITD
- Bluetooth Reader - ACHD
- Bluetooth Reader - ITD
- Video Camera - ACHD
- Video Camera - ITD
- RWIS

0 0.7 1.4 2.1 2.8 Miles

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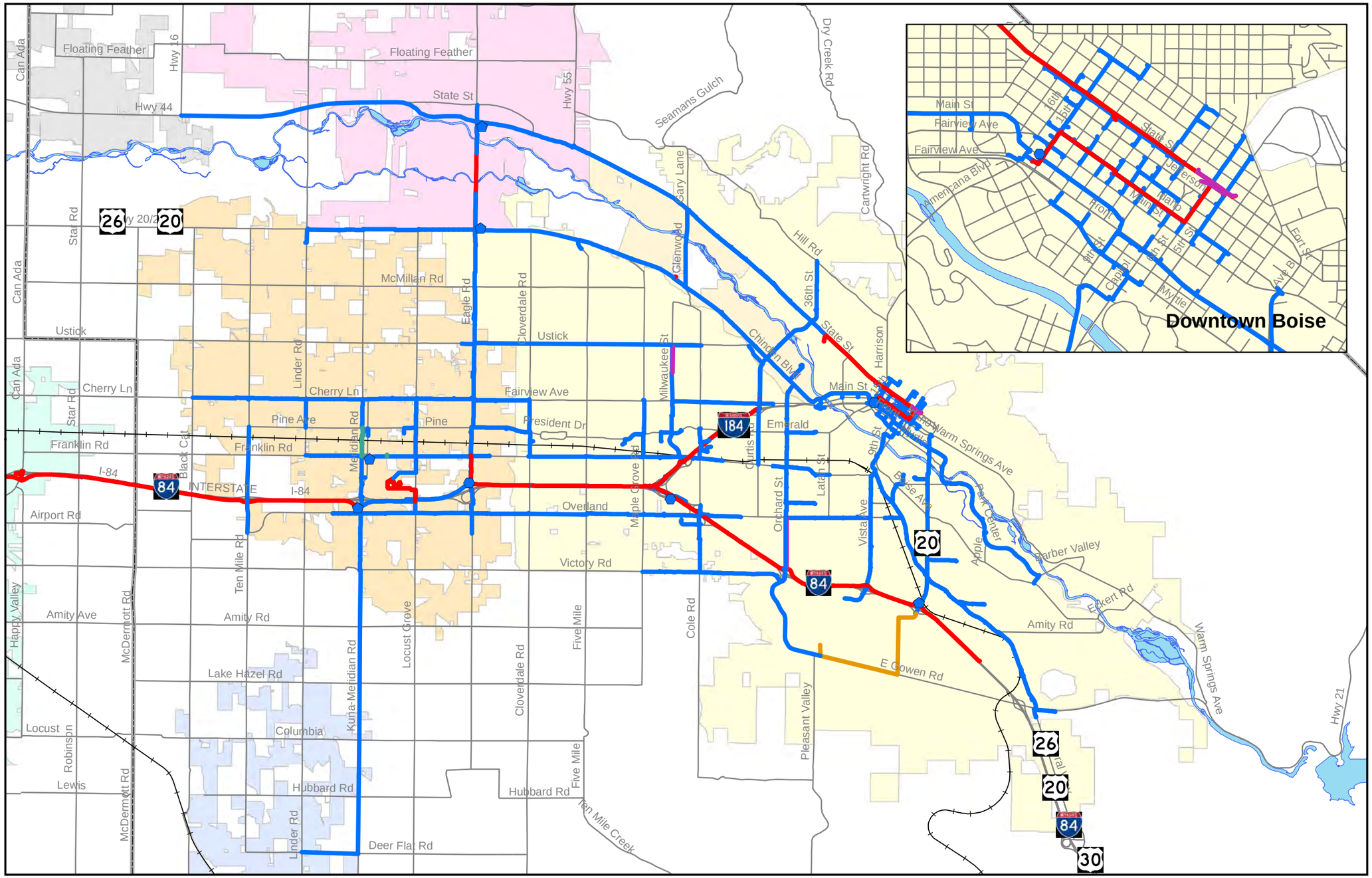
Figure 3-4 Ada County Existing ITS Inventory - Fiber Network



Legend

- Hub Building - ACHD
- Hub Cabinet - ACHD
- ACHD
- ITD
- Ada County Sheriff's Office
- Meridian City
- City of Boise
- Bureau of Homeland Security

0 0.6 1.2 1.8 2.4 Miles

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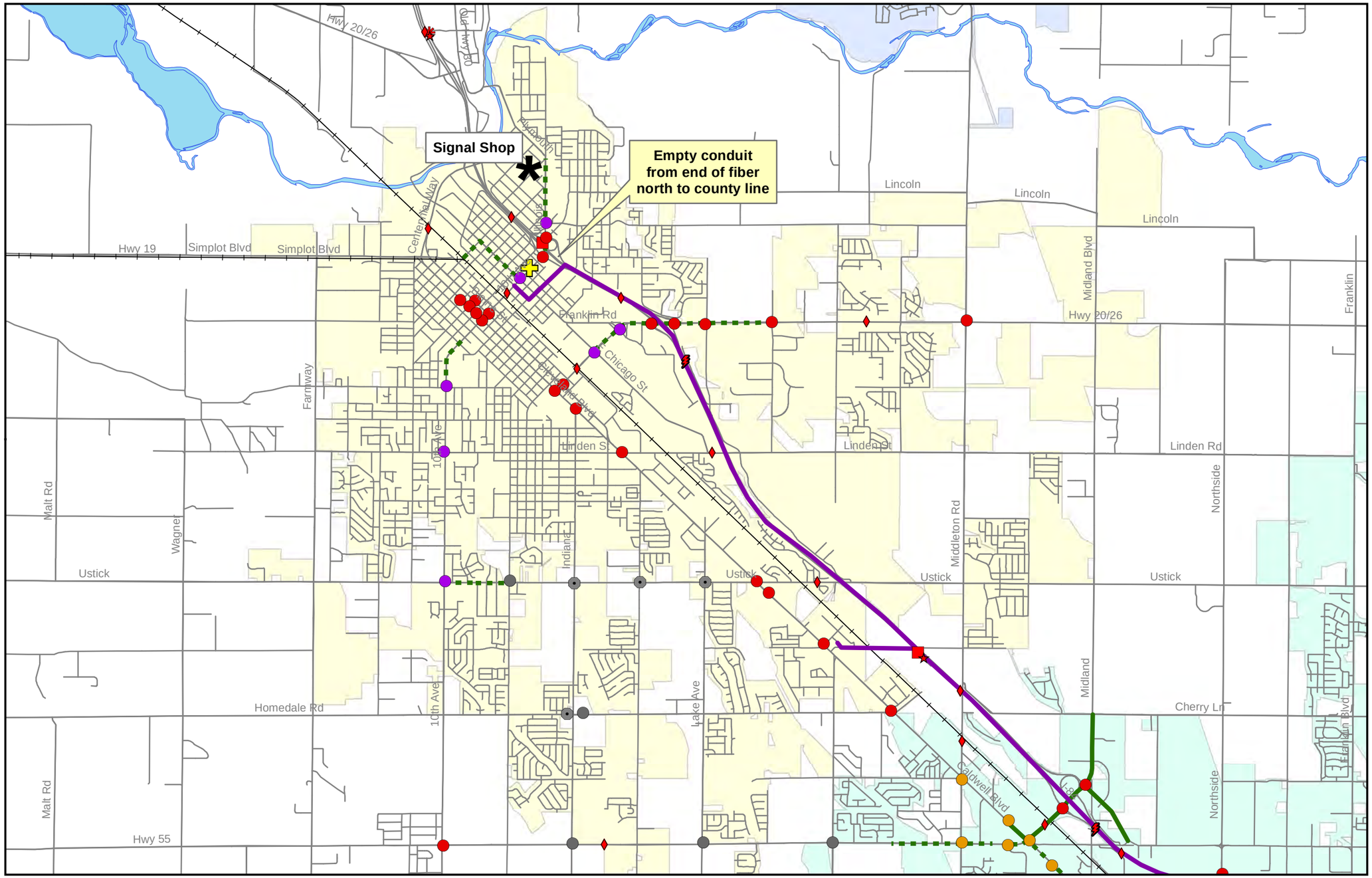
Figure 3-5 City of Caldwell Existing ITS Inventory



Legend

- Signal - Caldwell
- Signal - ITD
- Signal - Nampa
- Signal - ITD/Nampa
- Signal - Future
- HAWK - Caldwell
- Roundabout
- Detector - ITD
- Bluetooth Reader - ITD
- Video Camera - ITD
- RWIS
- VMS - ITD
- HAR - ITD
- Fiber - Canyon County Sheriff
- Fiber - Caldwell
- Existing Conduit

0 0.25 0.5 0.75 1 Miles

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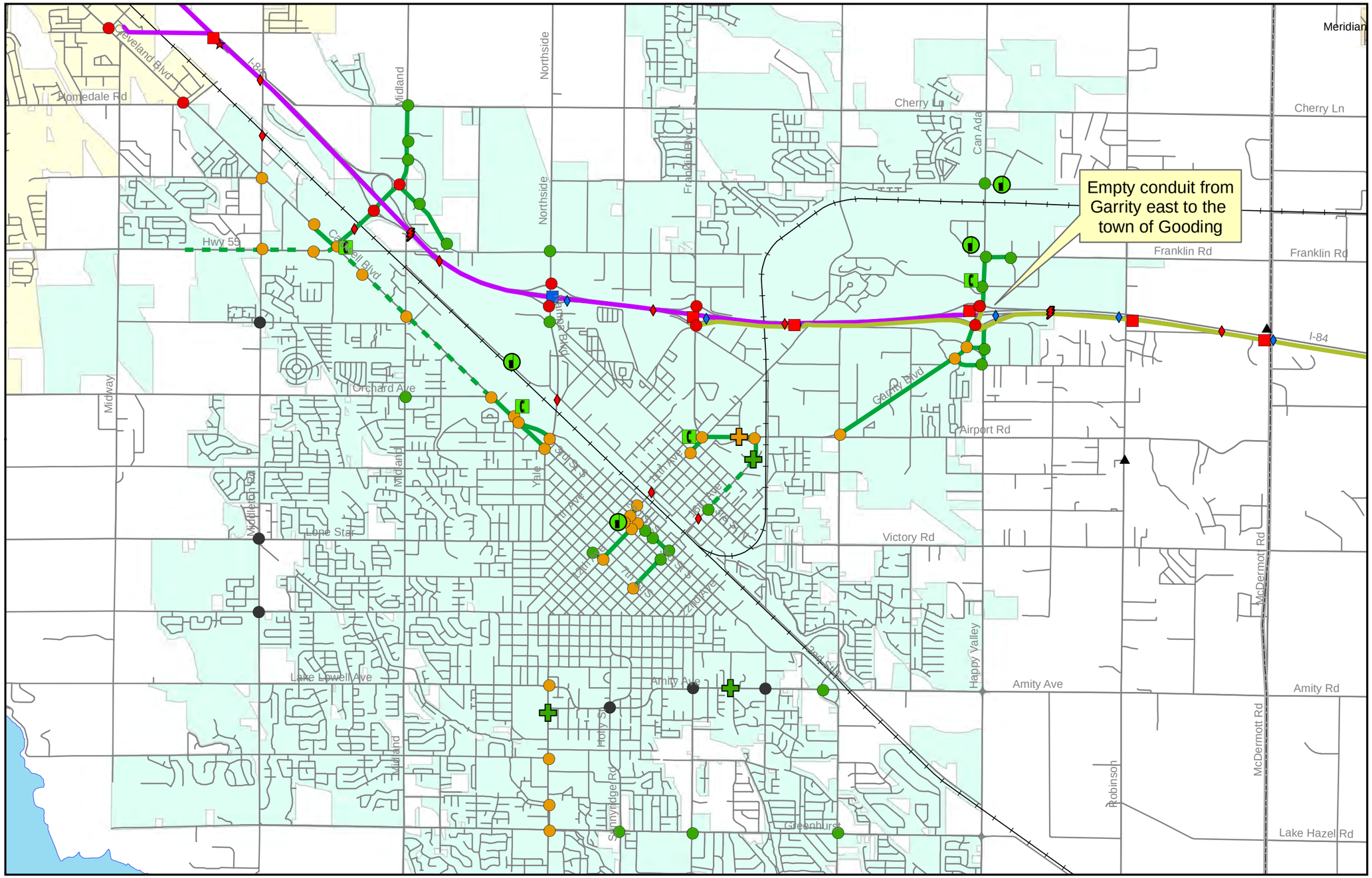
Figure 3-6 City of Nampa Existing ITS Inventory



Legend

- Signal - Nampa
- Signal - ITD
- Signal - ITD/Nampa
- Signal - Future
- HAWK - Nampa
- HAWK - ITD/Nampa
- Phone Drop
- Radio to Central
- VMS - ACHD
- VMS - ITD
- HAR - ITD
- Detector - ACHD
- Detector - ITD
- Bluetooth Reader - ITD
- Video Camera - ACHD
- Video Camera - ITD
- RWIS
- Fiber - ITD
- Fiber - Canyon County Sheriff
- Fiber - Nampa
- Existing Conduit

0 0.2 0.4 0.6 0.8 Miles

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Advanced Traffic Management System (ATMS) Software

ATMS software is used at TMCs to manage and control many field devices and supporting systems. Off-the-shelf ATMS software includes modules to perform numerous functions and custom software can also be developed to provide desired functionality. In the Treasure Valley, ATMS software is primarily used by ACHD and ITD.

ACHD installed ATMS software developed by the IBI Group in 2004. The ATMS software is installed on all operator consoles at the ACHD TMC and allows for monitoring and control of CCTV cameras, DMSs, and traffic data stations. The software also allows TMC operators to enter freeway and arterial incident and road work data into a GIS-based mapping system that is automatically displayed on ACHD's traveler information website and emailed to multiple agencies. Boise State University has an interface to ACHD's ATMS software that they use for research purposes. ACHD posted 3,200 incidents form the ATMS software to its web page in 2012.

Until recently, ITD also used IBI Group's ATMS software but just implemented ATMS software from Delcan statewide in 2013. ITD is implementing the software in phases. Initial functionality includes control of CCTV cameras, DMSs and highway advisory radio as well as data archiving and reporting. In the future, ITD would like to add functionality for center-to-center connectivity, automated vehicle location for snow plows, and travel time estimation.

Traffic Signals and Central Control Systems

Approximately 689 traffic signals are operated in the Treasure Valley as shown in Table 3–3. Most traffic signals are equipped to provide preemption for emergency vehicles. The use of central control systems allows agencies to remotely monitor and manage traffic signals. This means operators get alerts when field components such as detectors are not working properly, they can easily investigate any issues called in by the public, or they can adjust signal timings based on actual traffic demand (e.g., congestion caused by incidents or construction). As can be seen on Figures 3-2 through 3-5, only a portion of the region's traffic signals have communications in place to communicate with the central control systems. "Chapter 11: ITS Implementation Plan" includes projects to install communications to unconnected traffic signals.

JURISDICTION	APPROXIMATE NUMBER OF TRAFFIC SIGNALS OWNED	CONTROLLER TYPE	CENTRAL CONTROL SYSTEM
ACHD	499	Naztec	Naztec ATMS.now
ITD	155	Peek	-
City of Caldwell	10	Naztec, Peek	Naztec Streetwise
City of Nampa	25	M1, Peek	Northwest Signal NWSCentral
TOTAL	**689**		

Table 3–3: Traffic Signal Ownership by Jurisdiction

CCTV Cameras

CCTV cameras serve several purposes:

- Detect incidents and guide the management of those incidents
- Help emergency dispatchers route responders to an incident and in some cases help identify the most appropriate response

- Provide a means for monitoring the roadway network so actions can be taken to alleviate congestion (e.g., adjust traffic signal timing, post messages on DMSs)
- Provide travelers with traffic conditions

Existing cameras are installed on ITD and ACHD facilities. Links to the cameras are also provided to StateComm, Idaho State Police, Ada County Sheriff's Office, Boise State University, and local TV and radio stations. Still camera images are provided on the ITD 511 website and on ACHD's traveler information website.

Dynamic Message Signs

Dynamic message signs are installed on the freeways and some arterials in the Treasure Valley. These signs provide travelers with en-route messages regarding traffic conditions and incidents impacting travel. DMSs are controlled by ITD, ACHD, and StateComm. StateComm can control ITD's DMSs any time of day and can post amber alerts to signs.

HAR

ITD operates a highway advisory radio (HAR) system for the Treasure Valley. It allows travel condition information to be broadcast over a three- to five-mile radius. HAR sites are often supplemented with static or dynamic signs that alert drivers to tune into the appropriate radio station when important traveler information is being disseminated. In addition to ITD, StateComm also has the capability to activate the HAR system.

Traffic Data Stations

Traffic data stations generically include all detectors used to collect information about roadway conditions. Traffic loop detectors, radar, and Bluetooth readers are used by ITD to collect traffic volume, speed, and occupancy data. The City of Nampa and ACHD use video detection to collect the same data. ITD and ACHD are also starting to use Bluetooth readers to measure travel times. Traffic loop detectors are still in use in some locations but are being phased out. Traffic data is used to:

- Populate traffic flow maps on ITD's and ACHD's websites
- Alert operations personnel of incidents or congestion
- Support long-range planning efforts, including federal data collection requirements

Weather Stations

Road weather information systems (RWIS), also called weather stations, are currently used by ITD, ACHD, and Canyon County to support road weather operations and traveler information. Pavement and atmospheric data from the weather stations are used by maintenance forces to support winter maintenance resource allocation. ITD also provides weather station data to the Idaho 511 traveler information system. The 511 website includes still video images from each station along with a variety of data pertaining to air temperature, precipitation, and wind. The 511 system also provides road conditions information during the fall, winter, and spring.

Road Weather and Maintenance Vehicle Fleets

ITD, ACHD, Canyon County, City of Caldwell, and City of Nampa all operate vehicle fleets for road weather and maintenance activities. Keeping roadways clear of snow in the winter is particularly important for mobility and public safety. Canyon County currently uses automated vehicle location on their snow graders to support efficient winter operations.

Incident Management

The main incident management program in the Treasure Valley is ITD's incident response program, which has been operational since 1996. The program includes three roving trucks that operate on I-84 and I-184 from Caldwell to east Boise during the morning and evening commute periods. Incident response crews provide a variety of services mostly related to assisting stranded motorists and assisting Idaho State Police by providing traffic control at incident locations. The incident response trucks are dispatched by Idaho State Police. The program has been a tremendous success and has helped reduce secondary crashes, reduce congestion and associated vehicle emissions, and reduce the risk of injury to police, fire, EMS, and motorists at the scene of an incident. Incident trucks log more than 150,000 miles annually in the Treasure Valley and respond to approximately 5,200 incidents per year, which roughly equates to 100 incidents per week.

Although they do not have formal programs, ACHD, City of Caldwell, and City of Nampa also support incident management. These agencies use their maintenance crews and vehicle fleet to clear road debris or provide traffic control on arterial roadways when requested by local law enforcement. ACHD closely monitors their CCTV cameras and alerts Idaho State Police, StateComm, and Ada County Sheriff dispatch when they see an incident on camera. They make adjustments to traffic signal timings as needed when an incident disrupts traffic flow. ACHD also provides an interactive detour route website (www.idahodetours.com) that provides details for primary and secondary detour routes for all segments of I-84 and I-184 from Caldwell to east Boise. These routes were developed through regional efforts to assist with incident management and construction activities when full or multiple lane closures occur on the freeway.

Emergency Management

In this plan emergency management refers to regional emergencies such as natural disasters or terrorist attacks that exceed the scope of a traffic incident . The same ITS infrastructure used for day-to-day traffic management may also be used to support major emergencies but coordination is required with an expanded group of emergency management stakeholders. Some of the key infrastructure used for emergency management includes:

- Emergency Operations Centers (EOCs): Idaho Bureau of Homeland Security, Ada City-County Emergency Management, Canyon County Office of Emergency Management, and municipalities
- Emergency management system software (WebEOC)
- North American Warning Activation System (NAWAS)
- Emergency Alert System (EAS)

Public Transportation Management

Public transportation is managed in the Treasure Valley by VRT, TVT, and ACHD. VRT is the regional public transportation authority for Ada and Canyon Counties and provides services in the urban area of the Treasure Valley. TVT operates three community transit services and provides Medicaid transportation. Table 3–4 lists the existing ITS infrastructure used by VRT and TVT.

ACHD operates the Commuteride program, which works to reduce traffic congestion and improve air quality by promoting alternatives to driving alone. The program promotes vanpooling, carpooling, transit, park and rides, biking, walking, and employer incentives. Infrastructure associated with the program includes an interactive website and a vanpool fleet.

INFRASTRUCTURE	VALLEY REGIONAL TRANSIT	TREASURE VALLEY TRANSIT
FIXED-ROUTE FLEET	●	●
DEMAND RESPONSE FLEET	●	●
PARATRANSIT DEMAND RESPONSE FLEET	●	
FIXED-ROUTE MANAGEMENT SOFTWARE	Fleet-Net	RouteMatch
DEMAND RESPONSE DISPATCH/ SCHEDULING SOFTWARE	RouteMatch	RouteMatch
AUTOMATED VEHICLE LOCATION	Fixed-route	Fixed-route
IN-VEHICLE MOBILE DATA DEVICES	●	●
FARE BOX SYSTEM	●	●
TRANSIT SIGNAL PRIORITY	Design Phase	
511 TRANSIT TRAVELER INFORMATION	●	●
TRANSIT TRIP PLANNER	●	

Table 3–4: Existing Transit ITS Infrastructure

Traveler Information

Accurate and timely traveler information is a cornerstone of any successful ITS program and is provided in a variety of forms by traffic management agencies in the Treasure Valley. ITD and ACHD provide the most comprehensive traveler information while smaller agencies like City of Caldwell and City of Nampa focus on keeping travelers informed of maintenance and construction projects on their websites.

ITD, in partnership with many other agencies, provides a statewide 511 traveler information system. The system includes a website (511.idaho.gov), a telephone system, smart phone applications, email and text alerts, and social media feeds. The website and smart phone applications are the most comprehensive because they are map based and travelers can visually peruse travel speeds and other information on a map as well as view camera images. Key information provided by the 511 system includes road reports, incident information, construction impacts, weather station data, mountain pass travel conditions, and transit routes and schedules. The focus of the 511 system is the state highway system and the website includes a link to ACHD's traveler information website.

ACHD provides a traveler information website (ada911.net/traffic) that uses an interactive Google map that allows users to zoom in and out and turn layers on and off. Key real-time layers include travel speeds for the freeways and Eagle Road, camera images, incident information, construction information, chip seal zones, and message board content. Website users may also turn on overlays for city and county limits, bicycle lanes, and park and ride lot locations. ACHD averages 100,000 hits per month on this web page.

The Ada County Sheriff's office provides an incident and emergency management website (ada911.net/Maps/) that uses interactive GIS maps with zoom and layer manipulation features. It includes a real-time traffic incident map as well as a variety of emergency management maps such as live weather and warnings, flood sand bag locations, and hospital and public safety center locations.

Ada County Sheriff also has a website showing real time locations of all incidents.

Chapter 4: Needs Assessment

Chapter Highlights:

- Describes the outreach process to transportation and emergency agencies to gather operational needs.
- Summarizes the key findings of the needs assessment in terms of regional operations strengths, weaknesses, opportunities, and challenges.
- Provides a detailed list of needs gathered through the outreach process, organized by operational service.

Understanding the region's transportation-related operational needs by agency forms the basis for developing the regional operations vision as well as specific projects, or sets of projects, that address the needs. Additionally, these needs also are an important input to the ITS Architecture. This chapter defines the region's relevant needs within the following operational service categories:

- Regional Operations Coordination and Planning
- Regional Transportation Management
- Freeway Management
- Arterial Management
- Incident and Emergency Management
- Traveler Information
- Public Transportation Management
- Road Weather Operations
- Maintenance and Construction
- Regional Data Archiving
- Regional Communications Infrastructure Management

Stakeholder Outreach Process

The needs identified herein were developed through extensive outreach with regional stakeholders – both during the visioning and concept of operations workshops as well as during specific agency meetings with representatives of numerous public agencies at the state, regional, and local levels in Ada and Canyon Counties. The meetings typically consisted of approximately one hour of discussion on existing agency roles and responsibilities in transportation system management and operations, existing infrastructure and capabilities, and future opportunities and challenges.

Table 4–1 summarizes the stakeholder outreach meetings conducted.

AGENCY	PARTICIPANTS	MEETING DATE
ADA COUNTY-CITY EMERGENCY MANAGEMENT AND ADA COUNTY SHERIFF	Doug Hardman Ben Ealey	June 12, 2012
ADA COUNTY HIGHWAY DISTRICT	Jim Larsen	June 12, 2012
CITY OF CALDWELL	Brent Orton Jared Hale	June 12, 2012
CITY OF NAMPA	Ken Melton Ken Nutt Clair Bowman	June 12, 2012
IDAHO TRANSPORTATION DEPARTMENT – DISTRICT 3	Dave Jones	June 11, 2012
IDAHO TRANSPORTATION DEPARTMENT – DISTRICT 3	Dave Kuisti Jim Morrison Dan Bryant Kevin Sablan Mike Shine	June 13, 2012
IDAHO TRANSPORTATION DEPARTMENT - HEADQUARTERS	Bob Koeberlein Greg Laragan	June 11, 2012
ITD EMERGENCY MANAGEMENT	Bryan Smith	June 29, 2012
ITD TRAVELER SERVICES	Tony Ernest	June 25, 2012
NAMPA HIGHWAY DISTRICT AND CANYON HIGHWAY DISTRICT	Eric Shannon Chris Hopper	June 12, 2012
STATE COMMUNICATIONS CENTER	Michele Carreras	June 11, 2012
VALLEY REGIONAL TRANSIT	Bruce Sackron Adalberto Sosa	June 13, 2012

Table 4–1: Summary of Stakeholder Meetings to Discuss Operational Needs

Key Findings

During the stakeholder outreach meetings, the project team categorized the outcomes into strengths (existing), weaknesses (existing), opportunities (future), and challenges (future). A high-level summary of this input is provided in Table 4–2 and Table 4–2. The detailed needs expressed by the agencies are discussed in the next section.

Some key Treasure Valley **STRENGTHS** include the extensive Ada County ITS infrastructure across numerous technology areas, the Canyon County planning and readiness to deploy ITS infrastructure in the near future, and innovative agency partnerships in place to ensure improved operational coordination.

A few noted Treasure Valley **WEAKNESSES** include complex ownership, responsibilities, and operational arrangements for ITS equipment; lack of communication infrastructure in Canyon County; Canyon County signal systems not integrated into a central platform; and operations not perceived as a core agency business for some agencies.

Looking to the future, some primary related **OPPORTUNITIES** include improved operations coordination (including emergency response) across counties, modes, and roadway facilities; recognized potential of a "virtual" management center approach to share information and manage facilities; emergence of operations-focused interest groups; the growing role and potential impact of operations in Canyon County; and growing public transportation management capabilities.

Finally, some **CHALLENGES** still exist including a lack of formal interagency agreements, limited capital funding and competition from other transportation needs, the need for a Canyon County communications plan to meet future needs, the need for agency staff capabilities to be brought in line with operational responsibilities, and generally limited policy and management understanding of benefits of operations to the region.

STRENGTHS (EXISTING)	WEAKNESSES (EXISTING)
• Extensive existing deployment of ITS and communications infrastructure, including public/ private fiber partnerships	• Complex ownership and operational arrangements for ITS equipment due to historical factors
• Strong integration of transportation and emergency management, and a high perceived value of CCTV among emergency responders	• Lines of responsibility/jurisdiction across the region are not always clear – particularly among StateComm, ITD, and ACHD
• Track record of innovative partnerships across agencies and levels of government, e.g., StateComm	• Adherence to operational protocols for shared ITS equipment has been contentious and difficult to audit (e.g., DMS use)
• Proactive in implementing ITS deployment and in operations	• Operations personnel at StateComm are trained in transportation management, but may have over-riding emergency management priorities
• Recent investments in traffic signal infrastructure and timing plans in Nampa and Caldwell on the local and state systems	• Lack of communications connectivity in Canyon County
• Regional multimodal traveler information platform in the ITD 511 system, with potential to add additional local agencies	• Challenges in local agency funding reimbursement for traffic signal maintenance from ITD in Canyon County
• Significant investments in VRT operations and traveler information ITS, with more to come	• Ad hoc management and usage agreements of the existing fiber optic communications network
• Precedent for state/local cooperation on traffic signals maintenance and resource sharing	• Operations not perceived as a core agency business at ITD
• Greater emphasis on of performance measures by ITD	• Lack of interoperability among disparate ITS systems
• Interagency Communications Business Meetings (ICBM) created a precedent for ongoing interagency coordination (currently suspended pending the ITS planning process)	• ITS equipment deployment not always sited appropriately compared to operational needs
	• Traffic signal systems in Canyon County not integrated into a central platform for coordination and incident management
	• No established performance measure for the effectiveness of traffic incident management, which contributes to the “invisibility” of regional operations programs

Table 4–2: Stakeholder Outreach Meetings Outcomes: Strengths and Weaknesses

OPPORTUNITIES (FUTURE)	CHALLENGES (FUTURE)
• Growing role and potential impact of operations in Canyon County, particularly for signal systems	• Lack of formal interagency agreements, which undermines effective delivery of operations/ITS services
• Potential larger role for local jurisdictions as ITD divests urban arterial corridors	• Uncertainty in the future role of ITD in arterial operations of state routes (currently operated by ACHD)
• Opportunities to improve operations coordination across counties, modes, and roadway facility types	• Limited capital funding and competition from other transportation needs
• Opportunity to better coordinate state, county, and local emergency responders to improve incident response	• Lack of stable operation and maintenance (O&M) funding to support devices already deployed
• Recognized potential for a "virtual" IROC to better integrate agency operations without the expense of a new physical center	• Limited staff resources and/or staff lack the training and availability for operations duties, especially Canyon County and 24/7
• Substantial potential cost savings in developing shared interagency fiber communications infrastructure	• Limited policy and management understanding of benefits of operations to the region
• Emergence of operations-focused interest groups, (i.e., Opticom users and a proposed regional fiber optic consortium)	• ITS and communications infrastructure not incorporated into roadway capital projects when opportunities arise
• Support for expanded 24/7 regional ITS operations	• Transition of ITS responsibility away from ITD headquarters will require capacity building and leadership mandate at District 3
• Broad regional interest in RWIS	• Agency and staff capabilities lag behind operational responsibilities
• Growing public transportation management capabilities and opportunities to integrate with other agencies	• Lack of ability to harness operations data for regional planning and operations performance management purposes (to justify further investment)
• Opportunity to leverage successful implementation of the statewide Traffic Incident Management plan, as has been done in ITD District 4	• Lack of a Canyon County communications plan to meet future needs
	• Demands of an aging population (e.g., audible pedestrian signals, transit accommodations)
	• Lack of succession planning and subsequent training

Table 4–3: Stakeholder Outreach Meetings Outcomes: Opportunities and Challenges

Detailed Needs by Operational Service

It was important to document the needs (by operational service) in as much detail as possible to help guide the development of specific projects and the architecture. The following pages describe the needs within each operational service and include the following:

- Regional operations objective
- Participating agencies
- Associated ITS infrastructure
- Participating management centers
- Identified needs within related descriptive categories

Needs by Operational Service

Regional Operations Coordination and Planning

REGIONAL OPERATIONS COORDINATION AND PLANNING	
REGIONAL OPERATIONS OBJECTIVES	**PARTICIPATING AGENCIES**
Manage the regional operations infrastructure – ITS systems, personnel, facilities, policies, and procedures – in a manner that provides the greatest effectiveness and return on investment. Provide the framework for ongoing interagency coordination on operations matters including capital project planning, asset sharing, operations coordination, establishing protocols, and measuring performance. Coordinate with COMPASS to share operations data and integrate operations into regional transportation planning as a keystone strategy in a low-cost transportation toolkit.	• All agencies owning, operating, and/or maintaining ITS infrastructure • COMPASS • Other regional public/private partners
ASSOCIATED ITS INFRASTRUCTURE	**PARTICIPATING MANAGEMENT CENTERS**
• All infrastructure	• All regional centers

NEEDS IDENTIFIED – REGIONAL OPERATIONS COORDINATION AND PLANNING	
NEED	**DESCRIPTION**
IMPROVED VISIBILITY OF OPERATIONS/ITS BENEFITS AND NEEDS AMONG DECISION MAKERS	Currently, operations is an 'invisible' transportation strategy, not widely understood by decision makers without direct involvement, nor comprehensively reflected in regional planning documents or project development/ranking criteria. ITS/operations is not universally recognized as a core business function (especially in Canyon County, where there is less experience), and relies on individual champions to promote investment and sustained operations. Furthermore, there is a need to create higher visibility and more formal linkages with the regional transportation planning process.
DECLINING FUNDING LEVELS FOR ITS CAPITAL INVESTMENT – BASED ON AN UPDATED ITS IMPLEMENTATION PLAN	Across the region, there are declining levels of funding for ITS investment—particularly at ITD—in light of other competing needs. ITS infrastructure is built incrementally and opportunistically, increasingly through smaller projects. This demands an overall "roadmap" in the updated ITS implementation plan that can be used to coordinate investment priorities and provide leverage for collaborative grant applications.

NEEDS IDENTIFIED – REGIONAL OPERATIONS COORDINATION AND PLANNING	
NEED	**DESCRIPTION**
UNSTABLE FUNDING FOR ITS OPERATIONS AND MAINTENANCE (O&M)	With the increasing level of ITS devices in the field and staff required to sustain operations services, O&M funding for ITS is more important than ever. This funding, however, is increasingly unstable, creating ongoing challenges for agencies in delivering operations functions. That said, the region has realized extensive cost savings in the past by coordinating ITS deployment and providing joint operations services. Given the operations-intensive cost structure of ITS, O&M funding is a critical ongoing need for every agency in the region.
FORMALIZING EXISTING AD HOC INTERAGENCY AGREEMENTS	Based on existing or modified roles and responsibilities, existing ad hoc agreements between operating agencies should be documented in formal interagency agreements or memoranda of understanding. Development of an ITD-ACHD agreement has been attempted over the past ten years without success. ACHD's proactive role on freeway infrastructure/operations has filled a need but also blurs lines of responsibility for ITD owned equipment and facilities.
ONGOING INTERAGENCY OPERATIONS COORDINATION COMMITTEE	The ICMB is a coordination initiative among StateComm, ITD, Idaho State Police, and ACHD. The intent of the ICBM is to provide a forum for ongoing coordination among agencies; however, the committee is currently inactive and does not cover the full range of interested ITS parties in the Treasure Valley, particularly Canyon County.
INCORPORATING PERFORMANCE MEASURES	Performance measures are seen as a means of providing operational accountability among partner agencies as well as demonstrating the benefits of operations to decision makers. ACHD and ITD in particular are moving toward greater use of performance measurement across the agency to demonstrate outcomes and justify future investments. Similar emphasis on performance measurement is anticipated from Federal Highway Administration (FHWA) and Federal Transportation Agency (FTA) in the future.
ADAPTING TO EVOLVING ROLE OF ITD IN ITS/ OPERATIONS	The role of ITD in ITS and operations is evolving, with ITS responsibility shifting from ITD Headquarters to the district level. The Treasure Valley must adapt to this shift by establishing the role of ITD Headquarters and District 3 relative to other agencies. District 3 is currently not staffed to perform ongoing operations functions outside of non-technical maintenance functions and capital projects, although the district has expressed its intent to perform a more hands-on role in ITS operations on the freeways and state highway arterials.
UPDATE / DEVELOP STANDARD SPECIFICATIONS FOR ITS AND COMMUNICATIONS EQUIPMENT	There is a need to update ITD's standard ITS design specifications, fiber installation standards, and other technical documentation to guide deployment regionally in a consistent, quality, and cost-effective manner.
IMPROVING ITS COORDINATION BETWEEN PROJECT ENGINEERING AND OPERATIONS	Within ITD in particular, ITS equipment location decisions are not necessarily coordinated with ITD operations to ensure optimal placement of devices for their intended use.

Regional Transportation Management

REGIONAL TRANSPORTATION MANAGEMENT	
REGIONAL OPERATIONS OBJECTIVES	**PARTICIPATION AGENCIES**
Promote the functional and technical interoperability of regional transportation management centers, so that they can effectively and efficiently deliver regional transportation operations services. This includes future expansion of regional transportation management capabilities beyond Ada County into Canyon County.	• StateComm • ITD • ITD District 3 • ACHD • City of Nampa • City of Caldwell • VRT • Emergency Management Agencies
ASSOCIATED ITS INFRASTRUCTURE	**PARTICIPATING MANAGEMENT CENTERS**
• Regional transportation management centers • ITS field equipment and systems (multiple types) • Regional interagency communication systems	• StateComm • ACHD TMC

NEEDS IDENTIFIED – FREEWAY TRAFFIC MANAGEMENT	
NEED	**DESCRIPTION**
VIRTUAL REGIONAL TRAFFIC MANAGEMENT CAPABILITIES	Given the number of agencies involved with, and impacted by, regional event and traffic management, virtual sharing of regional traffic management capabilities across agencies and centers is seen as a means to promote improved systems interoperability and effectiveness.
DIRECT CONTROL OF ITS EQUIPMENT USE FOR RESPONSE/SYSTEMS INTEGRATION	Based on clarified roles and responsibilities, there is a need for authorized agencies to have direct control of ITS equipment. For example, currently StateComm has to call ACHD to pan-tilt-zoom CCTV cameras.
CLEAR, AUDITABLE PROTOCOLS FOR SHARED ITS EQUIPMENT	Adherence to existing protocols for use of shared ITS equipment, including DMS signs and CCTV, has been problematic among the partner agencies. Even where protocols exist, adherence to those protocols and the ability to verify adherence has been lacking. This erodes confidence of partner agencies and the ability to effectively coordinate use of shared agency devices.
EXPANSION TO 24/7 OPERATIONS	StateComm operates 24/7 and can implement traffic management measures based on established protocols overnight. However, many of the incident management capabilities of the region, particularly those housed at ACHD or which vary from scripted protocols, are not available on a 24/7 basis. As the operational needs of the region grow, it may be beneficial to have full traffic management capabilities available in the region on a 24/7 basis.

Freeway Traffic Management

FREEWAY TRAFFIC MANAGEMENT	
REGIONAL OPERATIONS OBJECTIVES	**PARTICIPATION AGENCIES**
Ensure the effective operation of I-84 and I-184 for both local urban and long-distance through traffic passing through the Treasure Valley. Due to recent capacity expansions in these corridors, most traffic congestion is due to incident-related backups, with potential spillover effects onto state and local arterial roadways. Therefore, proactive incident management is an important element of Freeway Traffic Management in the region.	• StateComm • ACHD • ITD District 3 (Maintenance and Incident Response) • Idaho State Police
ASSOCIATED ITS INFRASTRUCTURE	**PARTICIPATING MANAGEMENT CENTERS**
• CCTV cameras • Freeway DMS • RWIS • Traffic detection/count stations	• StateComm • ACHD TMC

NEEDS IDENTIFIED – FREEWAY TRAFFIC MANAGEMENT	
NEED	**DESCRIPTION**
CLEAR OPERATIONAL JURISDICTION FOR ROADWAY FACILITIES AND ITS EQUIPMENT	Based on the operational history of the region, lines of responsibility and jurisdiction for ITS devices and operational functions among regional agencies is often unclear. For example, both ACHD and StateComm participate in incident management on the freeways, and ACHD maintains ITD ITS equipment on the freeways. This could be rectified though the development of a Regional Concept for Transportation Operations (RCTO) and associated agreements clearly outlining roles and responsibilities for each operational function.

Arterial Traffic Management

ARTERIAL TRAFFIC MANAGEMENT	
REGIONAL OPERATIONS OBJECTIVES	**PARTICIPATION AGENCIES**
Provide for effective and efficient operation of arterial roadways in the Treasure Valley, particularly through the operation and maintenance of coordinated traffic signal systems. Arterial traffic management is multimodal in nature, including transit operations and future transit signal priority systems and accommodations for pedestrian and bicycle movement at intersections and crosswalks.	• ACHD • Local cities in Canyon County • ITD District 3 (Maintenance) • VRT
ASSOCIATED ITS INFRASTRUCTURE	**PARTICIPATING MANAGEMENT CENTERS**
• ACHD central traffic signal management software • ITD traffic signals • Local city traffic signal systems (e.g., Nampa, Caldwell) • Arterial DMS • Arterial CCTV • Traffic detection/count stations/Bluetooth • Transit Signal Priority (in deployment)	• ACHD TMC • Ada County Sheriff (911)

NEEDS IDENTIFIED – ARTERIAL TRAFFIC MANAGEMENT	
NEED	**DESCRIPTION**
ADAPTIVE SIGNAL CONTROL OPPORTUNITIES IN ADA COUNTY	ACHD has identified a number of corridors with the potential for introduction of adaptive signal control systems to improve throughput of constrained arterial corridors. A pilot project is underway involving 20 intersections on SH-44, US-20/26, Easle Road and Glenwood Road.
ARTERIAL TRAFFIC FLOW DATA/DETECTION	ACHD is trying to remain on the cutting edge of technology with evaluation of Bluetooth for detection at each of its 420 intersections. The expansion of arterial flow data enables more robust management of the traffic signal network and, potentially, arterial traffic flow mapping.
TRAFFIC SIGNAL MANAGEMENT CAPABILITIES IN CANYON COUNTY	While ACHD has a central traffic signal control system, traffic signal systems in Canyon County, particularly in the Cities of Nampa and Caldwell and key I-84 diversion routes and feeders such as Nampa-Caldwell Boulevard are not connected to central traffic management systems to allow adjustments to traffic signal timings based on occurrence of incidents. There may be a need to find partner agencies to assist Canyon County cities with signal operations, particularly during off-peak hours.
IMPROPER USE OF EMERGENCY VEHICLE PRE-EMPTION	Existing Opticom emergency signal preemption systems are not subject to an interagency agreement with ACHD or other parties. There have been reports of improper use by EMS (e.g., travel when the vehicles light bar/sirens are not in use). Being an encoded system, misuse by the general public has not been identified.
RELIABLE REIMBURSEMENT OF LOCAL SIGNAL MAINTENANCE EXPENSES	A precedent for local/state cooperation in joint maintenance signal maintenance exists; however, reimbursement for maintenance expenses of ITD signals is not always promptly received from local agencies. This concern was primarily expressed by the Cities of Caldwell and Nampa.

Incident and Emergency Management

INCIDENT AND EMERGENCY MANAGEMENT	
REGIONAL OPERATIONS OBJECTIVES	**PARTICIPATION AGENCIES**
Maintain the reliability and safety of the regional transportation network by managing traffic-related incidents (e.g., accidents and weather) and other emergency situations that impact the transportation system (e.g., hazardous materials, natural and man-made disasters). Regional incident and emergency management also includes planned events such as construction, road closures, sporting, and other events that impact the transportation system.	• ITD • ACHD • StateComm • Ada County-City Emergency Management • Bureau of Homeland Security • Idaho State Police • Local police and fire/first responders in Ada and Canyon Counties
ASSOCIATED ITS INFRASTRUCTURE	**PARTICIPATING MANAGEMENT CENTERS**
• CCTV Cameras • Freeway DMS • ACHD and local central traffic control systems • Idaho 511 Traveler Information • RWIS	• StateComm • ACHD TMC • Ada County-City Emergency Management Center • Bureau of Homeland Security – Idaho Emergency Operations Center • Other local emergency management centers, based on the location and nature of the incident

NEEDS IDENTIFIED – INCIDENT AND EMERGENCY MANAGEMENT	
NEED	**DESCRIPTION**
IMPROVED COORDINATION WITH LOCAL FIRST RESPONDERS (POLICE/ FIRE)	Local police, fire, and ambulance services are often involved in response to regional traffic incidents. As such, it is important that these responders have training and capabilities in appropriate coordination with traffic management personnel at the region's traffic management centers. This includes notification of incident clearance so that traveler information systems and traffic control systems can be updated as congestion clears.
COORDINATED BI-COUNTY INCIDENT AND EVENT MANAGEMENT	With the increasing urbanization of the Treasure Valley, there is a growing need to coordinate incident and event management between Ada and Canyon Counties. Events at the Idaho Center in Nampa were cited as an example of an event type with impacts across the two counties.
CCTV SHARING AND MANAGEMENT PROTOCOLS	Public safety agencies acknowledge the high value in access to traffic cameras for incident verification, special events, and emergency response; however, lead agencies need to have the ability to temporarily block camera access in particular situations, especially to prevent public or media dissemination of incident camera feeds.
COMPETING EMERGENCY AND TRAFFIC MANAGEMENT RESPONSIBILITIES	Because protection of life and property are the undisputed highest priorities of StateComm in incident response, the dispatchers on duty may not be able to address traffic management/traffic incident response needs quickly when emergency response needs (related to the traffic incident or a different incident all together) take priority.
IMPLEMENTATION OF REGIONAL INCIDENT MANAGEMENT PROTOCOLS	ITS District 4 (South central ID/Twin Falls area) has been identified as a region that has effectively implemented a traffic incident management plan based on 2008 state guidelines. This involved buy-in and responsiveness from regional incident management partners including local first responders. It was suggested that the Treasure Valley needs to reach this level of coordination. There is also high turnover among dispatchers, which erodes the institutional knowledge among traffic incident responders in the absence of clear protocols.
PROVISION OF INCIDENT INFORMATION TO VALLEY REGIONAL TRANSIT	VRT operates express routes on I-84 and other arterial corridors that can be impacted by regional traffic incidents. The ability to provide incident information through video surveillance or regional event reporting/alerts would allow VRT to make real-time responses to incident situations, including diversions and customer information updates.
CONSISTENT EVENT REPORTING STANDARDS	There is a need for consistent guidelines and protocols for incident event reporting, particularly between StateComm and ACHD, which track incidents separately and differently. This would assist in operations performance measurement as well as regional planning for operations.
MEDIA PARTNERSHIPS	Dissemination of the incident information through media partners–for example, ACHD's current fiber feeds to two television stations and four radio stations.

Traveler Information

TRAVELER INFORMATION	
REGIONAL OPERATIONS OBJECTIVES	**PARTICIPATION AGENCIES**
Provide accurate, timely information to motorists and public transportation riders regarding travel conditions on the freeways, major arterials, and bus routes. Information includes major incidents causing delays, construction/maintenance activities, images, speed/flow indicators, weather conditions, DMS messages, and bus routes, stops, and schedules. Motorists and riders use this information (if necessary, based on conditions) to adjust their trip routing and/or schedule to successfully achieve their travel objectives. As a group, these adjustments can improve the efficiency of the overall transportation network.	• ITD • ACHD • StateComm
ASSOCIATED ITS INFRASTRUCTURE	**PARTICIPATING MANAGEMENT CENTERS**
• ACHD website • ITD statewide traveler services website and 511 phone system • Detection devices, including: ▸ CCTV (Interstate and arterials) ▸ RWIS ▸ Speed/volume detectors • Communication network (fiber optic) • Signal control hardware/software • DMS • Device and system control management software	• StateComm • ACHD Traffic Management Center

NEEDS IDENTIFIED – TRAVELER INFORMATION	
NEED	**DESCRIPTION**
ENHANCED AND EXPANDED TRAVELER INFORMATION IN CANYON COUNTY	Enhance the information on the existing traveler information system, or perhaps develop a regional traveler information system, to include major arterials in the Cities of Nampa and Caldwell and the relationship to the events on freeways.
IMPROVE COORDINATION OF INFORMATION ON THE ITD AND ACHD TRAVELER INFORMATION WEBSITES	ITD, StateComm, and ACHD establish and follow protocols for display of consistent information on the two websites.
SHARING EXISTING INFORMATION DIRECTLY WITH AGENCIES NOT YET RECEIVING THE INFORMATION	Where appropriate and useful, ACHD and ITD share important information (such as CCTV images) with other agencies for their use in managing their operations. This could include providing traffic incident information to emergency responders and/or transit operators.
PROVIDE AGENCY DATA TO THIRD-PARTY TRAVELER INFORMATION PROVIDERS	With the growth of smart phones and in-vehicle devices, the role of third-party information providers such as Google is expected to increase exponentially. Public agencies have a vested interest in broad dissemination of accurate traveler information; establishing data feeds to third-party services would provide the broadest possible reach of traveler information across devices and delivery methods. ACHD has a Facebook page and posts construction and incident information. Also, Twitter is used for ACHD real-time incidents posts. ITD maintains a third-party data feed open to any commercial entity.
CANYON COUNTY USE OF CARS 511 SYSTEM TO INTERNALLY TRACK AND ORGANIZE CONSTRUCTION/ MAINTENANCE ACTIVITIES	A new module of the CARS 511 website has been developed (but not yet implemented) to allow Canyon County public works projects to be posted (internally). This new module will help the Canyon County highways districts and others to better coordinate and track the various roadway construction and maintenance projects. Need to ensure all parties are trained and using the system to input complete and consistent information.

Public Transportation Management

PUBLIC TRANSPORTATION MANAGEMENT	
REGIONAL OPERATIONS OBJECTIVES	**PARTICIPATION AGENCIES**
Provide coordinated, effective/efficient fixed route and demand response public transportation services in the Treasure Valley. Additionally, utilize available traffic operations information to facilitate timely services and informed travelers.	• VRT • TVT
ASSOCIATED ITS INFRASTRUCTURE	**PARTICIPATING MANAGEMENT CENTERS**
• Demand Response dispatch software • AVL • On-board mobile data devices • Fixed route management software • Data sharing and coordination • TSP • Electronic fare box/fare media • Video camera systems • 511 traveler information	• None currently • Potentially obtain traffic incident/ congestion information from any future management center

NEEDS IDENTIFIED – PUBLIC TRANSPORTATION MANAGEMENT	
NEED	**DESCRIPTION**
AUTOMATE DEMAND RESPONSE DISPATCH/ SCHEDULING FOR MEDICAID TRIPS	Integrate demand response dispatch/schedule software, RouteMatch, with American Medical Response (AMR) Medicaid broker database, to improve dispatcher effectiveness in scheduling Medicaid trips. Project was completed in 2012.
VRT FIXED ROUTE AVL AND ON-BOARD MOBILE DATA	Install AVL and mobile data devices on VRT fixed route vehicles. Project was completed in 2012.
TRANSIT SIGNAL PRIORITY FUNCTIONALITY ON KEY CORRIDORS	Install TSP for transit vehicles in key corridors throughout the valley to improve on-time performance of fixed route services. The State Street corridor has been selected as the initial implementation (funded). Other corridors should be identified and future implementations planned.
IMPROVED USE OF FARE MEDIA	Capability to use electronic fare media to improve ridership tracking, transit use programs, fare collection/reconciliation, and enhance riders experience.
SYSTEMS TO ASSIST ELDERLY AND MOBILITY IMPAIRED USERS	Install on-board systems such as electronic stop annunciators on transit buses and auditory signal crossings near bust stops.
COORDINATE SERVICES WITH OTHER PROVIDERS	Enhance existing services with hardware and software to facilitate volunteer driver programs, demand response web-reservations for regular users and major facilities, and demand response web-portals for smaller providers (was completed spring 2013). This system will improve operations through more efficient and accurate trip scheduling.
DEMAND RESPONSE USER NOTIFICATION SYSTEM	Implement an Interactive Voice Response system for demand response providers/users to provide notifications of upcoming trips. This system will enhance operations through reduced no-shows and increased customer satisfaction. Project was completed in 2012.
INTEGRATE AVL DATA WITH 511 TRANSIT DATABASE	Improve accuracy of bus arrival time information to fixed route transit system users by updating the 511 transit database with actual AVL bus location information. This effort will integrate AVL and 511 transit databases. Project was completed in 2013.
ENHANCE 511 TRAVELER INFORMATION FOR TRANSIT USERS	Implement 511 transit traveler information enhancements including timing of bus arrivals by stop through smart phone formatted website and mobile phone applications (using the same information on 511 phone system) integrating trip planning capability, and providing transit alerts through texting and email. These efforts will improve customer satisfaction and increase ridership.
IMPROVED ASSET MANAGEMENT CAPABILITY FOR CAPITAL PLANNING	Install an asset management system with capability to track inventory and analyze information for purposes of future capital planning. Such a system was completed in 2013.
TRAFFIC INCIDENT/ CONGESTION INFORMATION TO PUBLIC TRANSPORTATION OPERATOR DISPATCH/ HELP LINES	Provide traffic incident and congestion information to public transportation providers to improve operations and on-time performance. A communication link to one or more traffic management centers to provide such information should be part of this effort.
IMPROVED CONNECTION TO EMERGENCY SERVICES	Provide a more effective method of communicating with emergency service agencies when needed on a public transportation vehicle or facility.

Road Weather Operations

ROAD WEATHER OPERATIONS	
REGIONAL OPERATIONS OBJECTIVES	**PARTICIPATION AGENCIES**
Collect, analyze, and disseminate information on localized road weather conditions to support traveler information, winter road maintenance, and incident/emergency management.	• ITD • ACHD • StateComm • Idaho State Police • Other emergency management agencies
ASSOCIATED ITS INFRASTRUCTURE	**PARTICIPATING MANAGEMENT CENTERS**
• RWIS	• ITD – District 3 • ACHD • StateComm

NEEDS IDENTIFIED – ROAD WEATHER OPERATIONS	
NEED	**DESCRIPTION**
EXPANDED COVERAGE OF RWIS WEATHER DETECTION INFRASTRUCTURE	Microclimates, elevation
SHARING OF ROADWAY WEATHER INFORMATION SYSTEMS AMONG AGENCIES	There is potential to share RWIS infrastructure between state and other interested agencies. RWIS is an ITS application that has broad support in the more rural portions of the region. RWIS is being deployed statewide by ITD and ACHD is deploying RWIS infrastructure in the urbanized areas. RWIS data can improve winter road maintenance functions as well as traveler information services.

Maintenance and Construction

MAINTENANCE AND CONSTRUCTION	
REGIONAL OPERATIONS OBJECTIVES	**PARTICIPATION AGENCIES**
Promote coordination among agencies and private contractors undertaking maintenance and construction activities that impact the regional transportation system. Through proactive scheduling and coordination of these activities, avoid unnecessarily severe impacts on travelers such as extensive road closures and excessive delays.	• All agencies involved in construction and maintenance activities (e.g., ITD, ACHD, cities)
ASSOCIATED ITS INFRASTRUCTURE	**PARTICIPATING MANAGEMENT CENTERS**
• Work zone traveler information systems (e.g., portable DMS) • Work zone safety systems	• ITD – District 3 • ACHD • StateComm

NEEDS IDENTIFIED – MAINTENANCE AND CONSTRUCTION	
NEED	**DESCRIPTION**
MAINTENANCE AND CONSTRUCTION COORDINATION	Development of a method or system for collecting information on scheduled construction and maintenance activities from multiple parties throughout the region so that conflicts can be identified and mitigated. May be tied to existing processes such as construction permitting.
WINTER MAINTENANCE MANAGEMENT	Allow agencies and the general public to track the status of road winter maintenance activities, such as road plowing status and road conditions.
WORK ZONE SAFETY	Use ITS systems to promote work zone safety, such as speed warning/ enforcement systems and DMS.

Regional Data Archiving

REGIONAL DATA ARCHIVING	
REGIONAL OPERATIONS OBJECTIVES	**PARTICIPATION AGENCIES**
Collect and store operations data derived from many ITS systems and agency sources for use in transportation analysis, planning, performance measurement.	• All agencies with field ITS systems that generate and/or store field ITS data
ASSOCIATED ITS INFRASTRUCTURE	**PARTICIPATING MANAGEMENT CENTERS**
• ITS systems that individually generate useful operations data, such as count stations, traffic signal systems, RWIS, and transit dispatch systems	• ITD – District 3 • ACHD • StateComm • VRT Dispatch

NEEDS IDENTIFIED – REGIONAL DATA ARCHIVING	
NEED	**DESCRIPTION**
REGIONAL CONSOLIDATION AND ARCHIVING OF FIELD DATA FOR PLANNING AND PERFORMANCE MEASUREMENT	ITS systems generate large amounts of data that can be used for performance measurement, planning analysis, and operations program evaluation. If managed effectively across multiple source agencies and ITS platforms, there are a number of potential applications for this data in regional planning (e.g., Congestion Management Process), before-after studies, and performance measurement. Currently, disparate systems make it difficult to extract operations data for regional planning purposes (e.g., ACHD and StateComm event data that could be used for the COMPASS annual report).
IMPROVED OPERATIONAL DATA REPORTING CAPABILITY FOR TRANSIT	Install on-board automated passenger counters (APC) to assist in counting passengers boarding and alighting fixed route vehicles. Also, develop an interface between transit operator data collection systems and statewide data collection and reporting systems. This effort will ensure accurate and timely reporting of required data reporting to FTA.

Regional Communications Infrastructure Management

REGIONAL COMMUNICATIONS INFRASTRUCTURE MANAGEMENT	
REGIONAL OPERATIONS OBJECTIVES	**PARTICIPATION AGENCIES**
The regional communications infrastructure for ITS provides the backbone for center-to-center (C2C), center-to-field (C2F), and field-to-field (F2F) transmission of data to support ITS networks and operational functions. A reliable, redundant communications backbone with adequate capacity is essential to the effective use of ITS equipment. In recent years, informal sharing of fiber optic communications infrastructure among agencies, as well as public-private partnerships for fiber deployment, has provided substantial benefits to participating agencies. Other public sector agencies in including schools, police, and fire also have a stake in the regional communications network, although certain critical emergency management infrastructure may be isolated from ITS networks for security reasons.	• ITD • ACHD • StateComm • Bureau of Homeland Security • Ada and Canyon County sheriffs • Local Police and fire/first Responders in Ada and Canyon Counties • Local cities in Canyon County • Other public agencies (e.g., school districts) • Private communications partners (e.g., Syringa Networks) • Boise State University
ASSOCIATED ITS INFRASTRUCTURE	**PARTICIPATING MANAGEMENT CENTERS**
• Public agency fiber optic infrastructure • Privately-owned fiber optic infrastructure • Short-hop wireless infrastructure • Regional radio frequency communications systems (e.g., VRT, emergency responders)	• StateComm • ACHD TMC • Ada County-City Emergency Management Center • Bureau of Homeland Security – Idaho Emergency Operations Center • Other local emergency management centers and PSAPs • Other public agency communications centers

NEEDS IDENTIFIED – REGIONAL COMMUNICATIONS INFRASTRUCTURE MANAGEMENT	
NEED	**DESCRIPTION**
ESTABLISHMENT OF CLEAR OWNERSHIP AND MAINTENANCE RESPONSIBILITIES	Historically, the deployment of fiber optic infrastructure has been ad hoc and opportunistic—for example, the Canyon County Sheriff owns fiber optic infrastructure in ITD's I-84 right of way. There is a need for better understanding of ownership and maintenance responsibilities for the region's fiber optic infrastructure to manage both available capacity and upkeep.
WORK GROUP FOR REGIONAL FIBER OPTIC COMMUNICATIONS	Stakeholders identified a need for a collaborative body to promote ongoing interagency coordination on fiber optic infrastructure deployment, operations, and maintenance.
FORMALIZE PROCESSES FOR FIBER INFRASTRUCTURE SHARING	Rather than the existing "handshake" agreements, stakeholders noted the need for clearer and more formalized procedures for fiber sharing agreements through a regional process.
FIBER MAINTENANCE SERVICE LEVEL AGREEMENTS	Agencies that rely on another agency's fiber for critical functions need the assurance through a written service level agreement that the host agency will promptly address maintenance responsibilities (e.g., if a fiber optic cable is cut or switching equipment required replacement). service level agreements should be part of any new formalized agreements.
NEED FOR FIBER CONNECTIVITY IN CANYON COUNTY	Currently, there is a lack of fiber communications connectivity in Canyon County between centers and to field devices. As ITS deployment and opportunities grow, so must the fiber backbone and provisioning for future expansion of the system (e.g., installing conduit).
CONSIDERATION OF THE COMMUNICATIONS NEEDS OF OTHER REGIONAL PARTNERS	To maximize the value of public investment in fiber infrastructure, transportation agencies should reach out to other stakeholders (e.g., school districts, law enforcement, colleges and universities, private fiber providers) to identify opportunities to coordinate fiber construction and/or take advantage of existing "dark" fiber.
PARTNERSHIPS FOR ONGOING FIBER OPTIC OPERATIONS AND MAINTENANCE	The City of Boise IT department and other stakeholders have explored the possibility of a contracted fiber optic maintenance service paid for by a pooled fund from participating agencies. Such an arrangement is one means of ensuring adequate resources and service level standards for ongoing fiber optic communications maintenance needs.
ITS POLICY ON FIBER OPTIC SHARING AND MAINTENANCE	Stakeholders noted the desirability of an ITD statewide fiber policy to provide guidance on use and maintenance of the agency's fiber infrastructure.
DOCUMENTATION OF THE SAVINGS OF REGIONAL FIBER OPTIC SHARING	To promote further cooperation and demonstrate the benefits of fiber sharing to decision makers, the cost savings and other benefits (e.g., redundant paths) of shared fiber optic infrastructure should be documented. A consortium of transportation agencies in Vancouver, WA has been able to demonstrate savings on the order of $10 million versus a "go it alone" approach.

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Chapter 5: Regional ITS Operations Strategies and Corridors

Chapter Highlights:

- Describes the regional transportation operations strategies that are part of the Treasure Valley's TSMO "toolkit."
- Assesses the existing state of practice for each strategy in the region today, as well as future implementation targets.
- Maps TSMO strategies to the ITS field infrastructure necessary to support those strategies.
- Describes strategies that are applicable to different roadway facility types in the Treasure Valley.
- Identifies "Operational Priority Corridors" in the Treasure Valley that are candidates for implementation of TSMO strategies and ITS deployment.

This chapter describes a "toolkit" of TSMO strategies that use operational and technology-based approaches to improve transportation operations and system performance in the Treasure Valley. It also discusses the regional corridors that have been identified as operationally significant for the region.

Regional TSMO Strategies Toolkit

Many of the TSMO strategies in the toolkit, such as traveler information systems, use ITS as "enabling technologies". However, even highly technological strategies rely heavily on institutional cooperation, policy support, and trained personnel to make them effective and sustainable. Other regional TSMO strategies are less technological in nature, addressing institutional opportunities such as interagency coordinated response to roadway incidents and events.

Table 5–1 lists the strategies in the TSMO Toolkit identified for the Treasure Valley. The TSMO Toolkit is organized into the following categories:

- **Regional Operations Coordination and Planning:** Establishes planning strategies and communication channels to encourage regional cooperation and coordination.
- **Regional Transportation Management:** Involves multi-jurisdictional cooperation to implement regional system management programs.
- **Freeway Management:** Seeks to increase safety, efficiency, and reliability through active management of a regional freeway; requires multi-jurisdictional coordination depending on the corridor.
- **Arterial Management:** Advances management practices and operational strategies of arterial roadway corridors; requires coordination where corridors cross jurisdictional boundaries.
- **Incident and Emergency Management:** Aims to efficiently coordinate response and recovery in the event of traffic incidents and emergencies.
- **Traveler Information:** Strives to provide travelers with personalized information to support informed travel choices.
- **Public Transportation Management:** Seeks to improve transit operations and performance and to enhance passenger convenience.
- **Road Weather Operations:** Attempts to monitor and predict roadway weather conditions and mitigate the impacts of adverse conditions.
- **Maintenance and Construction:** Involves multi-jurisdictional cooperation in the coordination of construction projects and planning of maintenance responsibilities.
- **Regional Data Archiving:** Unifies regional data collection, storage, and access processes.
- **Regional Communications Infrastructure Management:** Unifies communications infrastructure strategies among agencies and across jurisdictional boundaries.

Regional TSMO Toolkit

REGIONAL OPERATIONS COORDINATION AND PLANNING

- Multi-Agency Operations Coordination and Planning

REGIONAL TRANSPORTATION MANAGEMENT

- Traffic Surveillance
- Regional Traffic Management
- Transportation Demand Management
- Roadside Lighting
- Railroad Grade Crossings

FREEWAY MANAGEMENT

- Ramp Metering
- Active Traffic Management

ARTERIAL MANAGEMENT

- Enhanced Traffic Signal Operations
- Pedestrian and Bicycle Operations and Safety

INCIDENT AND EMERGENCY MANAGEMENT

- Regional Incident and Emergency Management
- Emergency Vehicle Routing and Signal Preemption
- Regional Alert System

TRAVELER INFORMATION

- Roadside Traveler Information Dissemination
- Regional Traveler Information
- Trip Planning and Routing Website
- Parking Availability Information and Guidance

PUBLIC TRANSPORTATION MANAGEMENT

- Advanced Transit Operations Management
- Regional Transit Fare Integration
- Transit Surveillance and Security
- Multi-Modal Travel Coordination
- Real-time Transit Information
- Transit Signal Priority

ROAD WEATHER OPERATIONS

- Road Weather Information Systems
- Weather-Adaptive Traffic Management
- Winter Roadway Maintenance

MAINTENANCE AND CONSTRUCTION

- Maintenance and Construction Management
- Work Zone Management

REGIONAL DATA ARCHIVING

- Regional Transportation Data Archive

REGIONAL COMMUNICATIONS INFRASTRUCTURE MANAGEMENT

- Communications Infrastructure Coordination

Table 5–1: Regional TSMO Toolkit Strategies

TSMO Strategies – Current Practice and Future Targets

Many of the TSMO strategies identified in the toolkit are in use in the Treasure Valley today. Some of these are anticipated to continue at similar levels of intensity and geographic coverage. Other strategies are anticipated to increase in geographic scope or intensity over the next ten years. Still other strategies are emerging, and may not be practiced in the region at all today, yet they are seen as important areas for growth in the future.

Figure 5–1 and Figure 5–2 illustrate the current state of practice and future deployment targets for each strategy in the TSMO toolkit. Separate diagrams are presented for Ada and Canyon Counties, given the differences in existing state of practice, levels of ITS deployment, and implementation goals over the next ten years.

The ranking criteria used to identify current practices and future targets are as follows:

Level 1 – The strategy is non-existent in the region today

Level 2 – The strategy is implemented on a very limited or trial basis

Level 3 – The strategy is implemented with limitations in geographic scope or agency involvement

Level 4 – The strategy is widely implemented in a regional, multi-agency manner

Level 5 – The strategy is implemented to the fullest, using leading state of practice techniques and strong multi-agency coordination

As the diagrams shows, TSMO current practice and future objectives are more pronounced in Ada County. This is largely attributable to the more urbanized character of northern Ada County (and hence, the operational need), and the significant ITS infrastructure investments that have been made over the last 10-15 years that can be leveraged to advance the regional operations program even further. The focus in Canyon County is more about "building the basics" such as interconnected signal systems and set up of municipal traffic management center capabilities. Nonetheless, in both Ada and Canyon Counties, there is clear room for application of TSMO strategies to meet the Treasure Valley's transportation needs.

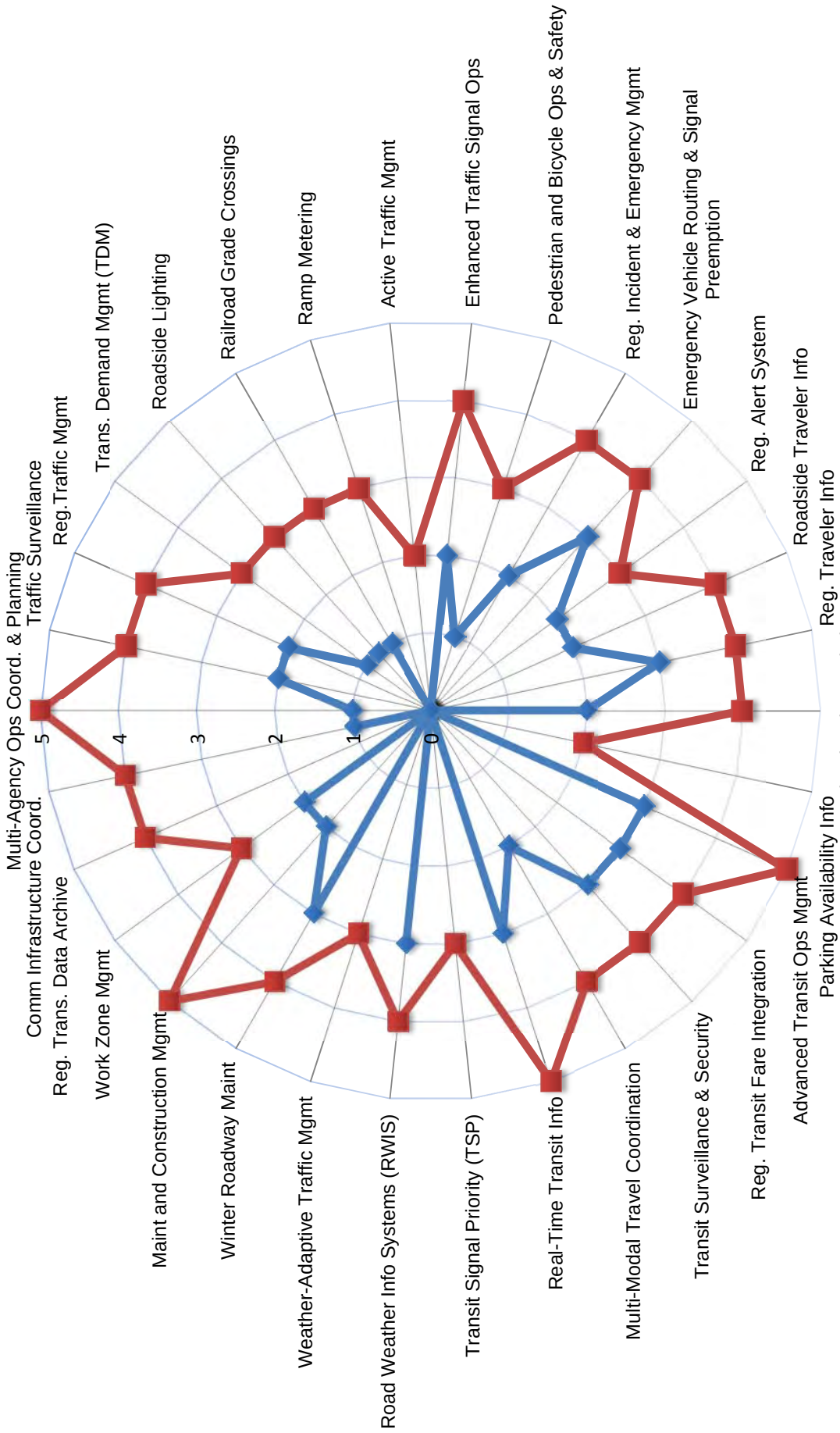


Figure 5–1: Canyon County TSMO Strategies – Current Practice and Future Targets

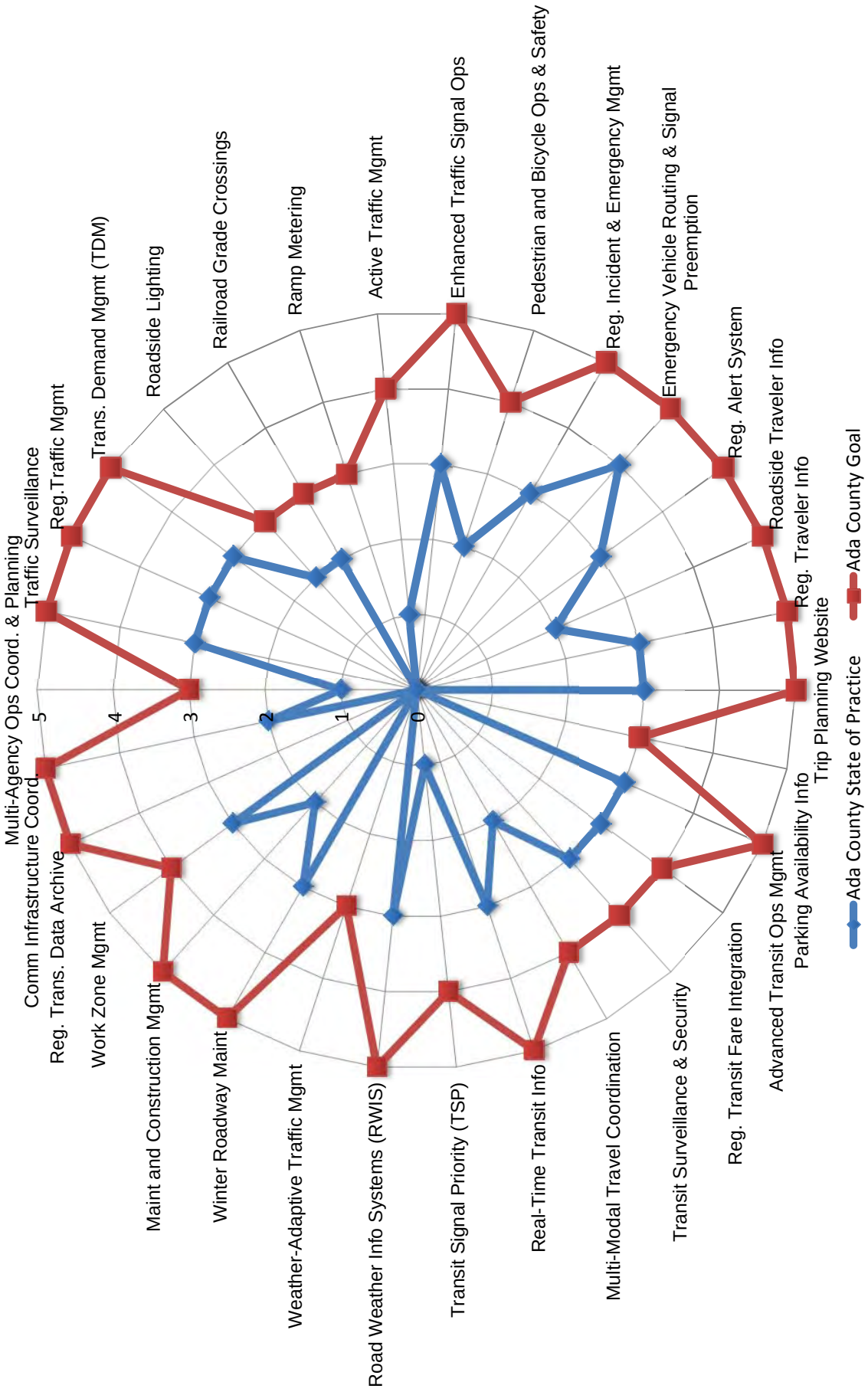


Figure 5–2: Ada County TSMO Strategies – Current Practice and Future Targets

Description of the TSMO Strategies in the Regional Toolkit

The next pages (Table 5–2) provide a brief description of each of the strategies in the Treasure Valley TSMO toolkit, organized by category. For each strategy listed, there is a corresponding description of how the strategy could be applied to the region and a snapshot of the anticipated benefits of each strategy.

TSMO STRATEGY	DESCRIPTION OF REGIONAL APPLICABILITY	WHY APPLY STRATEGY TO THE REGION?	EXPECTED BENEFITS
REGIONAL OPERATIONS COORDINATION AND PLANNING			
MULTI-AGENCY OPERATIONS COORDINATION AND PLANNING	Involves the creation of multi-jurisdictional committees to identify regional needs, plan ITS solutions, coordinate implementation, evaluate project success, and foster interagency cooperation.	Solving regional congestion and transportation issues requires a collaborative effort. Coordination between impacted agencies and other stakeholders is necessary to successfully address these problems.	• Supports coordination and operation of the region's transportation systems • Collaboration between traffic emergency agencies • Resource sharing • Improves competitiveness for project funding

Table 5–2: TSMO Strategies Description

TSMO STRATEGY	DESCRIPTION OF REGIONAL APPLICABILITY	WHY APPLY STRATEGY TO THE REGION?	EXPECTED BENEFITS
REGIONAL TRANSPORTATION MANAGEMENT			
TRAFFIC SURVEILLANCE	Add video and detection equipment (e.g., detectors, vehicle/cell phone probes) for more complete network coverage.	Traffic surveillance has been used successfully in the region to support the management of traffic, transit, incidents, and emergencies as well as provide traveler information and data for planning. Technologies such as Bluetooth are making it possible to collect traffic flow information on arterial roadways with minimal public agency infrastructure improvements.	• Improves incident detection and verification • Reduces incident response times • Provides real-time and historic system operations and information • Supports the dissemination of real-time traveler information • Improves visual information for decision makers and travelers.
REGIONAL TRAFFIC MANAGEMENT	Establish standards and plans to share traffic information and control among jurisdictions, including the real-time traffic signal control systems and freeway operations and traffic signal coordination.	Numerous locations exist in the region where transportation corridors cross jurisdictional lines or meet corridors managed by another agency. Sharing traffic information, control and management strategies allows seamless passage along these corridors.	• Promotes corridor coordination across boundaries • Reduces delay and potential for congestion where independently operated corridors meet
TRANSPORTATION DEMAND MANAGEMENT (TDM)	Develop recommended courses of action to traffic operations based on current and forecasted network performance. Coordinate among transit, parking, tolling, and ramp metering management.	TDM actions such as increased parking costs, tolling and subsidizing transit fares reduce congestion and energy consumption, increases accessibility of people, and freight.	• Reduces congestions on freeways and arterials • Increases parking capacity • Encourages transit and alternative mode choice
ROADSIDE LIGHTING	Establish standards and plans for managing electrical lighting systems to vary amount of light provided along roadside.	Effective lighting strategies and real-time adjustment capabilities provide agencies simple tools to increase safety and reduce energy consumption.	• Increases roadway safety • Conserves energy required for street lighting
RAILROAD GRADE CROSSINGS	Manage traffic at railroad grade crossings for both passive (e.g., cross buck sign) and active warning systems (e.g., flashing lights and gates).	At grade railroad crossings present safety and delay issues for agencies. Management and performance monitoring can increase safety and prevent undue traffic delay for travelers.	• Improves safety at railroad grade crossings • Reduces unnecessary crossing delay

Table 5-2: TSMO Strategies Description (continued)

TSMO STRATEGY	DESCRIPTION OF REGIONAL APPLICABILITY	WHY APPLY STRATEGY TO THE REGION?	EXPECTED BENEFITS
FREEWAY MANAGEMENT			
RAMP METERING	Meter traffic flow rate on freeway on-ramps.	Ramp metering is most applicable at on-ramps adjacent to freeway sections with recurrent congestion.	• Reduces mainline travel delay during peak periods • Increases freeway speed by 10 to 25% • Improves freeway capacity by 10% • Reduces congestion duration • Reduces vehicle conflicts by 25 to 50% • Potential to improve travel time reliability
ACTIVE TRAFFIC MANAGEMENT	Manage congested corridors with lane use control, reversible lanes, or variable speed limits (Seattle, Portland, and San Francisco are implementing now).	Locations with recurring congestion are candidates for active traffic management, which can improve safety and reduce driver frustration. This strategy has been effective in Europe.	• Reduces crashes by 5 to 50% • Increases average throughput during congested periods by up to 5%
ARTERIAL MANAGEMENT			
ENHANCED TRAFFIC SIGNAL OPERATIONS	Improve existing signals through re-timing/ optimization, 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.	• Reduces travel time by 10 to 25% with the potential to improve travel time reliability • Reduces fuel consumption and vehicle emissions • Benefit-to-cost ratio can range from 15:1 to 40:1
PEDESTRIAN AND BICYCLE OPERATIONS AND SAFETY	Manage the detection and warning systems that interact with pedestrians, bicyclists, and other mixed-use road users.	When more users choose to walk or bicycle to destinations, congestion is decreased on the entire system. ITS systems such as pedestrian or bike traffic signals provide safer and more convenient travel for these users.	• Improves safety for pedestrians and bicyclists • Improves pedestrian and bicyclist conditions on mixed use facilities

Table 5-2: TSMO Strategies Description (continued)

TSMO STRATEGY	DESCRIPTION OF REGIONAL APPLICABILITY	WHY APPLY STRATEGY TO THE REGION?	EXPECTED BENEFITS
INCIDENT AND EMERGENCY MANAGEMENT			
REGIONAL INCIDENT AND EMERGENCY MANAGEMENT	Expand on current incident response program to support quick clearance (e.g., multi-agency program, more responders, staged towing, outreach, training). Many other roadway and traveler information strategies in the toolbox also support incident management.	The 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% • Reduces secondary crashes by 25 to 70% • Reduces delay by facilitating quicker incident response • Potential to improve travel time reliability • Improves travel time and less congestion during an evacuation.
EMERGENCY VEHICLE ROUTING AND SIGNAL PREEMPTION	Existing technology allows emergency vehicles to preempt traffic signals.	Signal preemption improves emergency vehicle reliability and response time.	• Significant reduction of traffic signal delay for emergency responders • Improves emergency response times.
REGIONAL ALERT SYSTEM	Leverage existing and future traveler dissemination systems to alert public in emergency situations,such as child abductions, sever weather events, and other civil emergencies.	In the event of emergencies, it is necessary to provide the public with real-time information to maintain safety and security.	• Provides information for travelers • Provides advance warning to travelers in emergency situations • Increases safety and security in the transportation network.

Table 5-2: TSMO Strategies Description (continued)

TSMO STRATEGY	DESCRIPTION OF REGIONAL APPLICABILITY	WHY APPLY STRATEGY TO THE REGION?	EXPECTED BENEFITS
TRAVELER INFORMATION			
ROADSIDE TRAVELER INFORMATION DISSEMINATION	Add DMS and HAR for more complete network coverage.	ITD has successfully used DMSs and HAR in the region to provide en-route traveler information.	• Provides information for travelers to make informed choices • Reduces delay • Has the 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 that provides a third party gateway.	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 modes.	• Reduces delay by up to 20% • Reduces the number of stops and vehicle emissions by up to 5% • 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.
TRIP PLANNING AND ROUTING WEBSITE	COMPASS ITS plan includes a project for regional trip planning.	Transit trip planning tools enable travelers to make informed travel decisions both pre-trip and en-route.	• Increases attractiveness of transit • Enhances passenger convenience.
PARKING AVAILABILITY INFORMATION AND GUIDANCE	Provide real-time information about parking availability for high demand parking areas.	Parking information supports traveler decisions related to route and mode choice, which in turn helps the overall transportation system operate more efficiently.	• Provides a more efficient use of roadway capacity adjacent to high demand parking areas • Improves traffic flow • Increases attractiveness of transit

Table 5-2: TSMO Strategies Description (continued)

TSMO STRATEGY	DESCRIPTION OF REGIONAL APPLICABILITY	WHY APPLY STRATEGY TO THE REGION?	EXPECTED BENEFITS
PUBLIC TRANSPORTATION MANAGEMENT			
ADVANCED TRANSIT OPERATIONS MANAGEMENT	Enhance transit operations and management through the use of CAD, AVL, and APC.	CAD/AVL/APC technologies allow system managers to better understand current operations and make real time adjustments to improve transit services.	• Improves transit reliability and efficiency • Improves transit user experience.
REGIONAL TRANSIT FARE INTEGRATION	Use smart cards or magnetic stripe technologies to collect transit fare payments for Ada and Canyon Counties.	A variety of transit services are available within the COMPASS region. Regional fare integration allows travelers to use the same transit fare to access public transportation across jurisdictional boundaries.	• Enhances passenger convenience • Improves money handling efficiencies.
TRANSIT SURVEILLANCE AND SECURITY	Provide for the physical security of transit passengers and operators. Utilizes on board cameras, audio, event recorders, and operator activated silent alarm systems.	Enabling audio and visual monitoring of transit vehicles allows management to review and address any hazardous events.	• Increases safety and security • Improves emergency event monitoring.
MULTI-MODAL TRAVEL COORDINATION	Seek to improve connections between transit and other modes, such as pedestrian, bicycling, park and ride, and especially other transit services.	Transferring between transit services and other modes creates extra delay on any transit trip. Coordination between agencies can reduce long transfer times and decrease the transit travel to single occupancy vehicle travel ratio, thus making transit a more attractive choice.	• Reduces delay and missed connections • Improves transit user experience.
REAL-TIME TRANSIT INFORMATION	Provide real-time transit arrival information by a variety of means such as wayside signs, in-vehicle systems, and interactive online/personal device applications.	Real-time transit information provides passengers with greater visibility into the scheduling and arrival of transit vehicles, and reduces perception of unreliability.	• Enhances passenger convenience • Passengers spend less time waiting at stops

Table 5-2: TSMO Strategies Description (continued)

TSMO STRATEGY	DESCRIPTION OF REGIONAL APPLICABILITY	WHY APPLY STRATEGY TO THE REGION?	EXPECTED BENEFITS
TRANSIT SIGNAL PRIORITY	Utilize existing emergency vehicle preemption technology to provide extra green time at traffic signals for transit vehicles.	The use of TSP will reduce delay to transit buses to improve travel time reliability and increase passenger throughput at signalized intersections.	• Reduces delay at traffic signals by up to 45% • Reduces transit travel time by 5 to 25% • Improves travel time reliability • Increases passenger throughput • Reduces system operational costs if fleet can be reduced
ROAD WEATHER OPERATIONS			
ROAD WEATHER INFORMATION SYSTEMS (RWIS)	Monitor and predict roadway conditions to mitigate impacts of adverse conditions.	Adverse winter weather in the region requires additional maintenance resources to provide a safe and accessible transportation network. RWISs can help plan for and support resource allocation.	• Potential to improve travel time reliability • Provides information for decision-makers and travelers • Improves maintenance resource allocation
WEATHER-ADAPTIVE TRAFFIC MANAGEMENT	Establish courses of action, given adverse weather conditions, to manage traffic in real-time through DMS and other systems.	Actively managing traffic speeds and flow in hazardous winter conditions promotes safe and reliable travel.	• Reduces vehicle speed by up to 5 mph during adverse weather • Improves safety by reducing crashes up to 15%
WINTER ROADWAY MAINTENANCE	Involves multi-jurisdictional agreement on scope of winter roadway maintenance, (e.g., snow plowing, road salting, etc).	Winter weather brings harsh travel conditions to the region that must be dealt with to promote safe and reliable travel.	• Improves safety during winter driving conditions • Promotes better allocation of winter weather resources (e.g., snow plows)

Table 5-2: TSMO Strategies Description (continued)

TSMO STRATEGY	DESCRIPTION OF REGIONAL APPLICABILITY	WHY APPLY STRATEGY TO THE REGION?	EXPECTED BENEFITS
MAINTENANCE AND CONSTRUCTION			
MAINTENANCE AND CONSTRUCTION MANAGEMENT	Establish plans and best practices for the coordination of scheduled and unscheduled roadway maintenance.	Maintenance and construction are inevitable pieces of a roadway's lifecycle. Planning and coordination among agencies can prevent unsafe working situations and reduce traveler delay due to these activities.	• Reduces construction and maintenance delay on corridors • Improves safety during maintenance and construction activities
WORK ZONE MANAGEMENT	Use variable speed limits, automated enforcement, and traveler information dissemination for work zones that impact regional mobility and safety.	Most injuries and deaths in work zones are caused by rear-end collisions and 99% of people injured or killed are drivers and their passengers[1].	• Reduces travel speed across work zone by 10 miles-per-hour • Improves safety Reduces delay by 45 to 55% • Potential to improve travel time reliability Improves freight route planning
REGIONAL DATA ARCHIVING			
REGIONAL TRANSPORTATION DATA ARCHIVE	Create a regional data archive for the collection, storage, and analysis of multi-jurisdictional transportation facility data.	Limited data is currently available to support benefit-to-cost ratio analysis for TSMO improvements. Other systems produce data that needs to be archived. In addition, tools are needed to analyze the data in a cost-effective manner.	• Ability to identify effectiveness of TSMO investments and to better target future policies and system improvements • Supports regional planning efforts
REGIONAL COMMUNICATIONS INFRASTRUCTURE MANAGEMENT			
COMMUNICATIONS INFRASTRUCTURE COORDINATION	Coordinate the use and installation of communications infrastructure (e.g., fiber, conduit, etc).	Fiber and conduit installations can be costly projects for an agency. Coordination and resource sharing across jurisdiction can reduce installation costs and prevent redundant service.	• Improves fiber coverage • Reduces redundant fiber installations • Promotes sharing of infrastructure

Table 5-2: TSMO Strategies Description (continued)

1 WSDOT Give 'em a Brake

ITS Infrastructure to Support TSMO Strategies

As mentioned previously, ITS technologies are often the "enabling tools" that allow TSMO strategies to be implemented. For example, roadway surveillance cameras, a field ITS device, can be used to support diverse operations functions ranging from incident detection/verification, to public traveler information, to emergency management functions.

Table 5–3 illustrates the ITS field equipment that is typically deployed in support of TSMO strategies. This information should be kept in mind when determining the type of instrumentation that needs to be available to support the TSMO strategy on a given corridor. The development of the ITS implementation plan as discussed in "Chapter 11: ITS Implementation Plan" was based in part on a consideration of the existing and new ITS infrastructure required to support the operational strategies envisioned in particular corridors.

Note that some TSMO strategies, like web-based traveler information or regional data archiving, are non-spatial in nature and do not necessarily require field ITS devices.

ENABLING ITS FIELD INFRASTRUCTURE		VIDEO MONITORING	TRAFFIC SIGNAL SYSTEMS	TRANSIT SIGNAL PRIORITY	EMERGENCY VEHICLE SIGNAL PRIORITY	TRAFFIC FLOW MONITORING	ROADSIDE TRAVELER INFORMATION	DYNAMIC TRAFFIC MANAGEMENT DEVICES	RAMP METERING	ROADWAY WEATHER INFORMATION SYSTEMS	PARKING MANAGEMENT SYSTEMS	BIKE PEDESTRIAN ENHANCEMENTS	FIELD COMMUNICATIONS
REGIONAL OPERATIONS COORDINATION AND PLANNING	Multi-Agency Operations Coordination and Planning												
REGIONAL TRANSPORTATION MANAGEMENT	Traffic Monitoring	✓											✓
	Regional Traffic Management	✓	✓	✓	✓	✓	✓	✓	✓				✓
	Transportation Demand Management	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓
	Roadside Lighting												✓
	Railroad Grade Crossings	✓	✓					✓				✓	✓
FREEWAY MANAGEMENT	Ramp Metering		✓			✓	✓	✓	✓				✓
	Active Traffic Management	✓				✓	✓	✓					✓
ARTERIAL MANAGEMENT	Enhanced Traffic Signal Operations	✓	✓	✓	✓	✓			✓				✓
	Pedestrian and Bicycle Operations and Safety	✓	✓					✓				✓	✓
INCIDENT AND EMERGENCY MANAGEMENT	Regional Incident and Emergency Management	✓	✓			✓	✓	✓					✓
	Emergency Vehicle Routing and Signal Preemption		✓		✓								✓
	Regional Alert System						✓						✓

Table 5–3: ITS Field Infrastructure Required to support TSMO Strategies

ENABLING ITS FIELD INFRASTRUCTURE		VIDEO MONITORING	TRAFFIC SIGNAL SYSTEMS	TRANSIT SIGNAL PRIORITY	EMERGENCY VEHICLE SIGNAL PRIORITY	TRAFFIC FLOW MONITORING	ROADSIDE TRAVELER INFORMATION	DYNAMIC TRAFFIC MANAGEMENT DEVICES	RAMP METERING	ROADWAY WEATHER INFORMATION SYSTEMS	PARKING MANAGEMENT SYSTEMS	BIKE PEDESTRIAN ENHANCEMENTS	FIELD COMMUNICATIONS
TRAVELER INFORMATION	Roadside Traveler Information Dissemination					✓	✓				✓		✓
	Regional Traveler Information	✓				✓					✓		✓
	Trip Planning and Routing Website												✓
	Parking Availability Information and Guidance	✓									✓		✓
PUBLIC TRANSPORTATION MANAGEMENT	Advanced Transit Operations Management	✓		✓		✓							✓
	Regional Transit Fare Integration												✓
	Transit Surveillance and Security	✓											✓
	Multi-Modal Travel Coordination					✓	✓					✓	✓
	Real-Time Transit Information						✓						✓
	Transit Signal Priority		✓	✓		✓							✓

Table 5-3: ITS Field Infrastructure Required to support TSMO Strategies (continued)

ENABLING ITS FIELD INFRASTRUCTURE		VIDEO MONITORING	TRAFFIC SIGNAL SYSTEMS	TRANSIT SIGNAL PRIORITY	EMERGENCY VEHICLE SIGNAL PRIORITY	TRAFFIC FLOW MONITORING	ROADSIDE TRAVELER INFORMATION	DYNAMIC TRAFFIC MANAGEMENT DEVICES	RAMP METERING	ROADWAY WEATHER INFORMATION SYSTEMS	PARKING MANAGEMENT SYSTEMS	BIKE PEDESTRIAN ENHANCEMENTS	FIELD COMMUNICATIONS
ROAD WEATHER OPERATIONS	Road Weather Information Systems									✓			✓
	Winter Roadway Maintenance	✓				✓	✓						✓
MAINTENANCE AND CONSTRUCTION	Maintenance and Construction Management	✓					✓						✓
	Work Zone Management		✓		✓								✓
REGIONAL DATA ARCHIVING	Regional Transportation Data Archive	✓	✓			✓	✓			✓	✓		✓
REGIONAL COMMUNICATIONS INFRASTRUCTURE MANAGEMENT	Communications Infrastructure Coordination												✓

Table 5-3: ITS Field Infrastructure Required to support TSMO Strategies (continued)

Application of TSMO Strategies to Roadway Facilities

Determining which TSMO strategies (and thus, supporting ITS investments) are applicable to a given corridor requires consideration of that corridor's operational needs, urban context, traffic characteristics, jurisdiction, and many other factors. For example, a roadway that parallels I-84, is a designated detour route, and has frequent transit service may have very different operational and ITS needs from a semi-rural, low-volume road on the outskirts of the region that only experiences operational issues during winter weather emergencies.

A thorough analysis of a specific corridor's needs, and the applicable TSMO strategies, should be conducted during detailed project planning and/or engineering design.

Table 5–4 provides general guidelines on the application of TSMO strategies to different corridor types in the region.

ENABLING ITS FIELD INFRASTRUCTURE		REGIONAL OR CORRIDOR APPLICATION		APPLICATION TO SPECIFIC CORRIDOR TYPE							
		STRATEGY IMPLEMENTED REGIONALLY	STRATEGY IMPLEMENTED BY CORRIDOR	FREEWAY	STATE HIGHWAY	PRINCIPAL ARTERIAL	ARTERIAL	COLLECTOR	LOCAL	FREEWAY DETOUR ROUTE	TRANSIT ROUTE
REGIONAL OPERATIONS COORDINATION AND PLANNING	Multi-Agency Operations Coordination and Planning	✓									
REGIONAL TRANSPORTATION MANAGEMENT	Traffic Surveillance	✓									
	Regional Traffic Management	✓									
	Transportation Demand Management		✓	✓	✓	✓					
	Roadside Lighting	✓									
	Railroad Grade Crossings		✓		✓	✓	✓				

Table 5–4: TSMO Strategy Applicability by Facility Classification

ENABLING ITS FIELD INFRASTRUCTURE		REGIONAL OR CORRIDOR APPLICATION		APPLICATION TO SPECIFIC CORRIDOR TYPE							
		STRATEGY IMPLEMENTED REGIONALLY	STRATEGY IMPLEMENTED BY CORRIDOR	FREEWAY	STATE HIGHWAY	PRINCIPAL ARTERIAL	ARTERIAL	COLLECTOR	LOCAL	FREEWAY DETOUR ROUTE	TRANSIT ROUTE
FREEWAY MANAGEMENT	Ramp Metering		✓	✓							
	Active Traffic Management		✓	✓	✓	✓				✓	
ARTERIAL MANAGEMENT	Enhanced Traffic Signal Operations		✓		✓	✓	✓				✓
	Pedestrian and Bicycle Operations and Safety		✓		✓	✓	✓	✓	✓		
INCIDENT AND EMERGENCY MANAGEMENT	Regional Incident and Emergency Management	✓									
	Emergency Vehicle Routing and Signal Preemption	✓									
	Regional Alert System	✓									
TRAVELER INFORMATION	Roadside Traveler Information Dissemination		✓	✓	✓	✓				✓	✓
	Regional Traveler Information	✓									
	Trip Planning and Routing Website	✓									
	Parking Availability Information and Guidance	✓									

Table 5-4: TSMO Strategy Applicability by Facility Classification (continued)

ENABLING ITS FIELD INFRASTRUCTURE		REGIONAL OR CORRIDOR APPLICATION		APPLICATION TO SPECIFIC CORRIDOR TYPE							
		STRATEGY IMPLEMENTED REGIONALLY	STRATEGY IMPLEMENTED BY CORRIDOR	FREEWAY	STATE HIGHWAY	PRINCIPAL ARTERIAL	ARTERIAL	COLLECTOR	LOCAL	FREEWAY DETOUR ROUTE	TRANSIT ROUTE
PUBLIC TRANSPORTATION MANAGEMENT	Advanced Transit Operations Management	✓									
	Regional Transit Fare Integration	✓									
	Transit Surveillance and Security	✓									
	Multi-Modal Travel Coordination	✓									
	Real-Time Transit Information	✓									
	Transit Signal Priority		✓		✓	✓					✓
ROAD WEATHER OPERATIONS	Road Weather Information Systems (RWIS)		✓	✓	✓					✓	
	Weather-Adaptive Traffic Management	✓	✓	✓	✓	✓				✓	✓
MAINTENANCE AND CONSTRUCTION	Winter Roadway Maintenance	✓									
	Maintenance and Construction Management	✓									
REGIONAL DATA ARCHIVING	Work Zone Management	✓									
REGIONAL COMMUNICATIONS INFRASTRUCTURE MANAGEMENT	Regional Transportation Data Archive	✓									
	Communications Infrastructure Coordination	✓									

Table 5-4: TSMO Strategy Applicability by Facility Classification (continued)

Regional Operations Priority Corridors

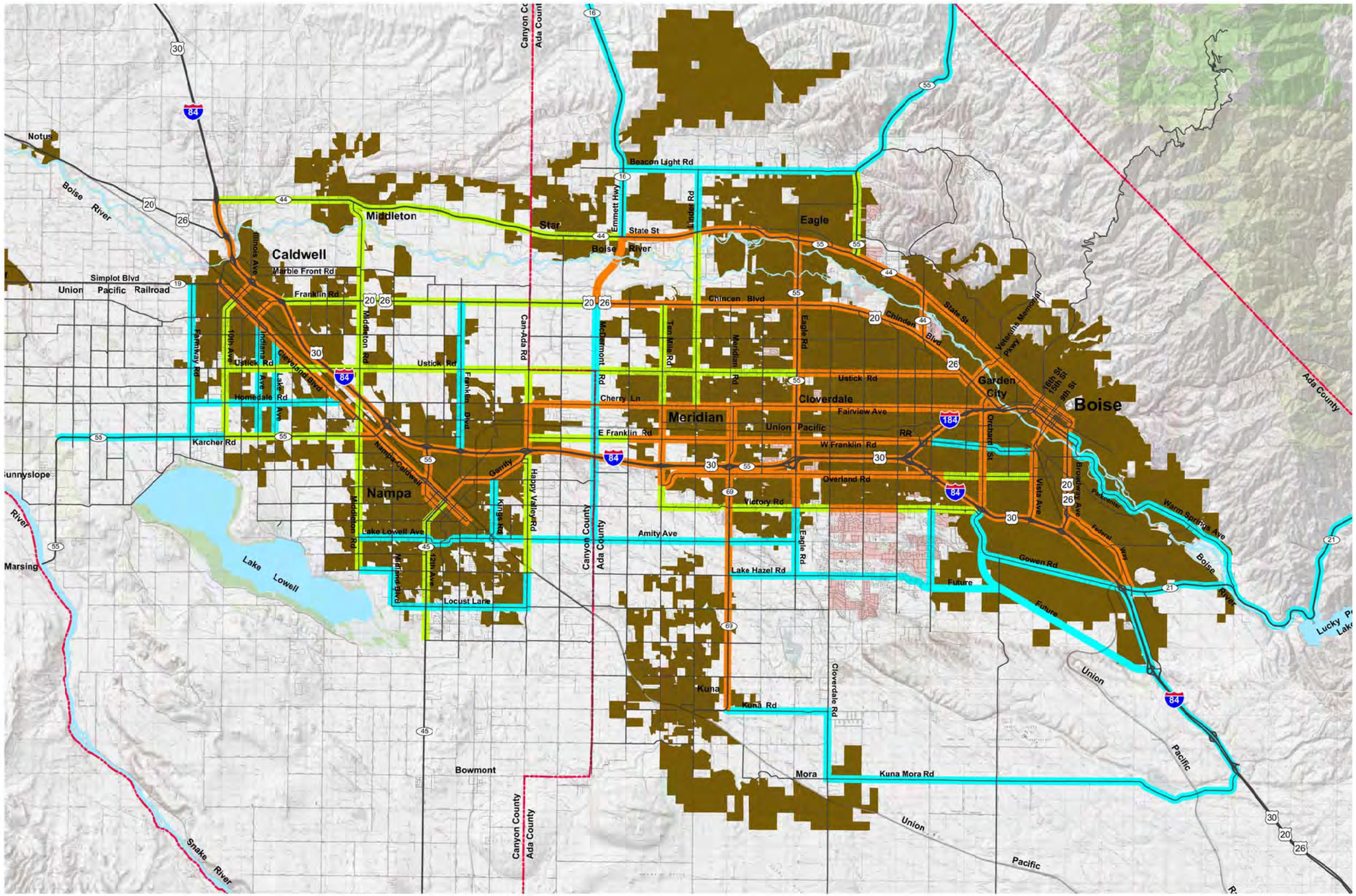
As part of the development of this plan, stakeholder agencies identified corridors across the Treasure Valley that they deemed "operationally significant". Regional Operations Priority Corridors are freeways and arterials where TSMO strategies and ITS investments may be applicable to the transportation needs of the corridors.

Figure 5–3 through Figure 5–6 illustrate the identified Operations Priority Corridor for Ada and Canyon Counties. As the maps show, there are three categories of corridors included in total footprint of Operational Priority Corridors.

Note that the footprint of the Operations Priority Corridors includes the entire COMPASS Congestion Management System network (in addition to other corridors of operational interest).

- **Short Term Corridors –** These are corridors of immediate concern and priority, where operations issues are of significant concern, and where often significant ITS investments have been made in the past. They are the primary focus of much of the region's ITS investment, due to factors such as congestion, traffic volumes, and limited options to expand these facilities. Note that the entire regional freeway network is in this category.
- **Medium Term Corridors –** These are corridors where operations needs exist today, and may be expanding over time due to population and traffic growth. Some of these corridors are evolving from rural to urban arterials. Opportunities to employ TSMO strategies and/or deploy ITS instrumentation to support future operations should be investigated during corridor studies and corridor upgrade projects.
- **Emerging Corridors –** These corridors are generally on the fringes of the urban region, and may be anticipated to evolve from rural to urban corridors (e.g., implementation of traffic signals is anticipated). Operational needs may not be significant at the present time, but it is anticipated that operations will become a major concern within the next ten years. It is critically important that opportunities to consider TSMO strategies and proactively deploy or provision for ITS infrastructure in order to keep pace with the evolving needs of these emerging corridors.

Figure 5-3 Treasure Valley Operations Priority Corridors



Legend

- City Lands
- County Line
- Highway
- Arterial
- Collector/Local
- Rail Road

Operations Priority Corridors (2013)

- Short Term
- Medium Term
- Future Corridors

0 .75 1.5 3 4.5 6
miles

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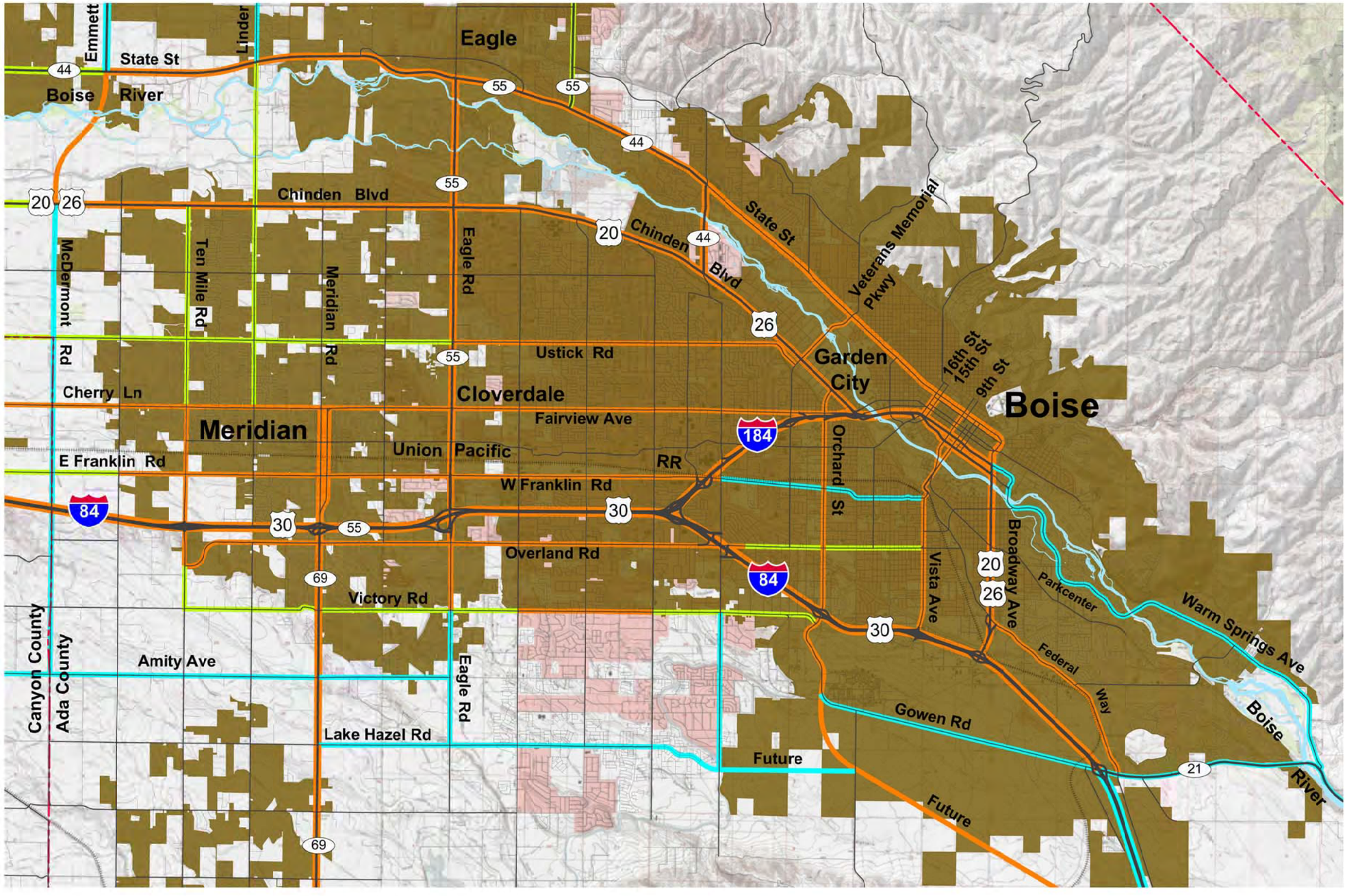
Figure 5-4 Central Ada County Operations Priority Corridors



Legend

- City Lands
- County Line
- Highway
- Arterial
- Collector/Local
- Rail Road

Operations Priority Corridors (2013)

- Short Term
- Medium Term
- Future Corridors

0 .75 1.5 2.25 3
miles

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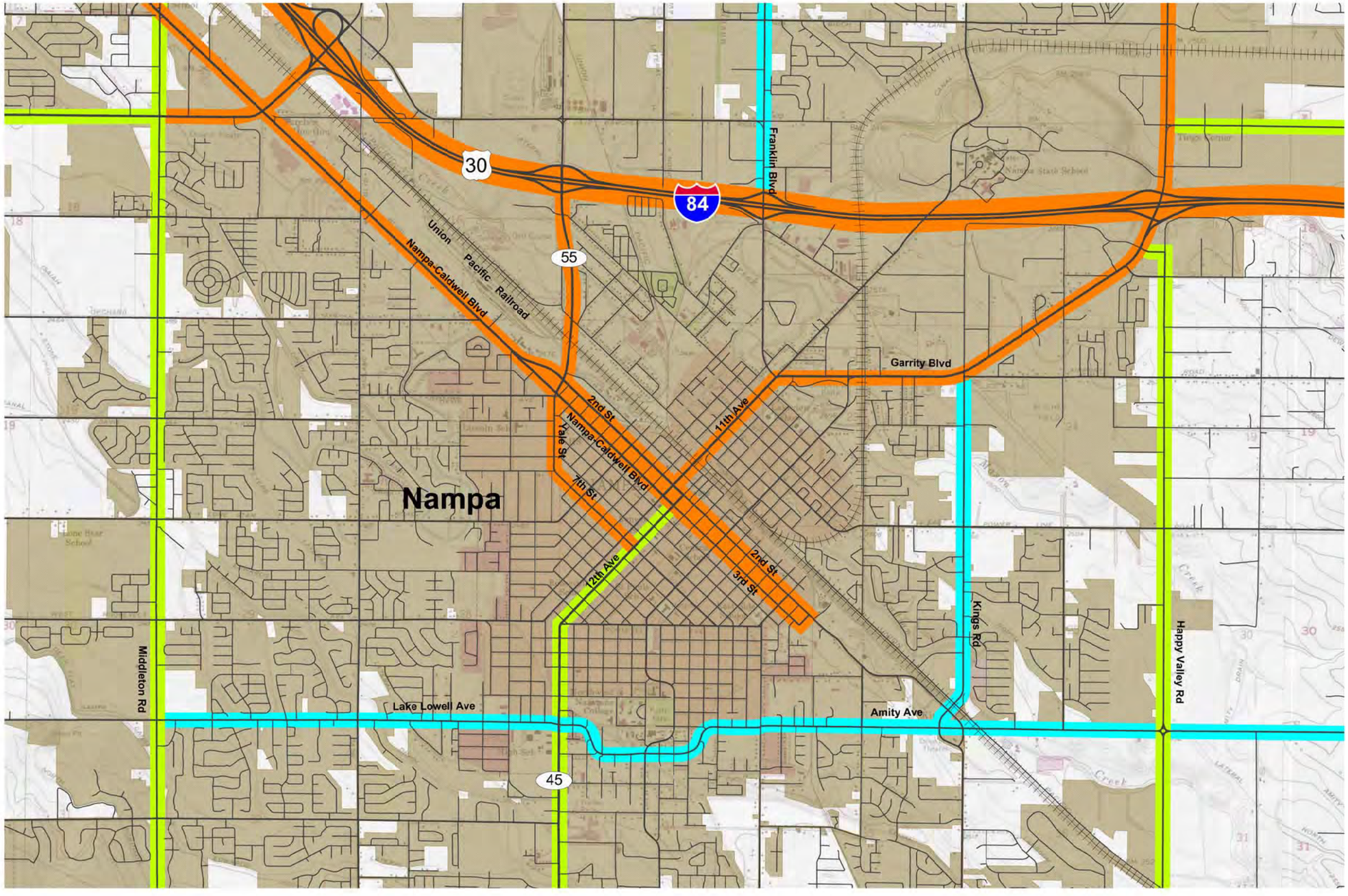
Figure 5-5 Nampa Operations Priority Corridors



Legend

- City Lands
- County Line
- Highway
- Arterial
- Collector/Local
- Rail Road

Operations Priority Corridors (2013)

- Short Term
- Medium Term
- Future Corridors

0 .25 .50 .75 1
mile

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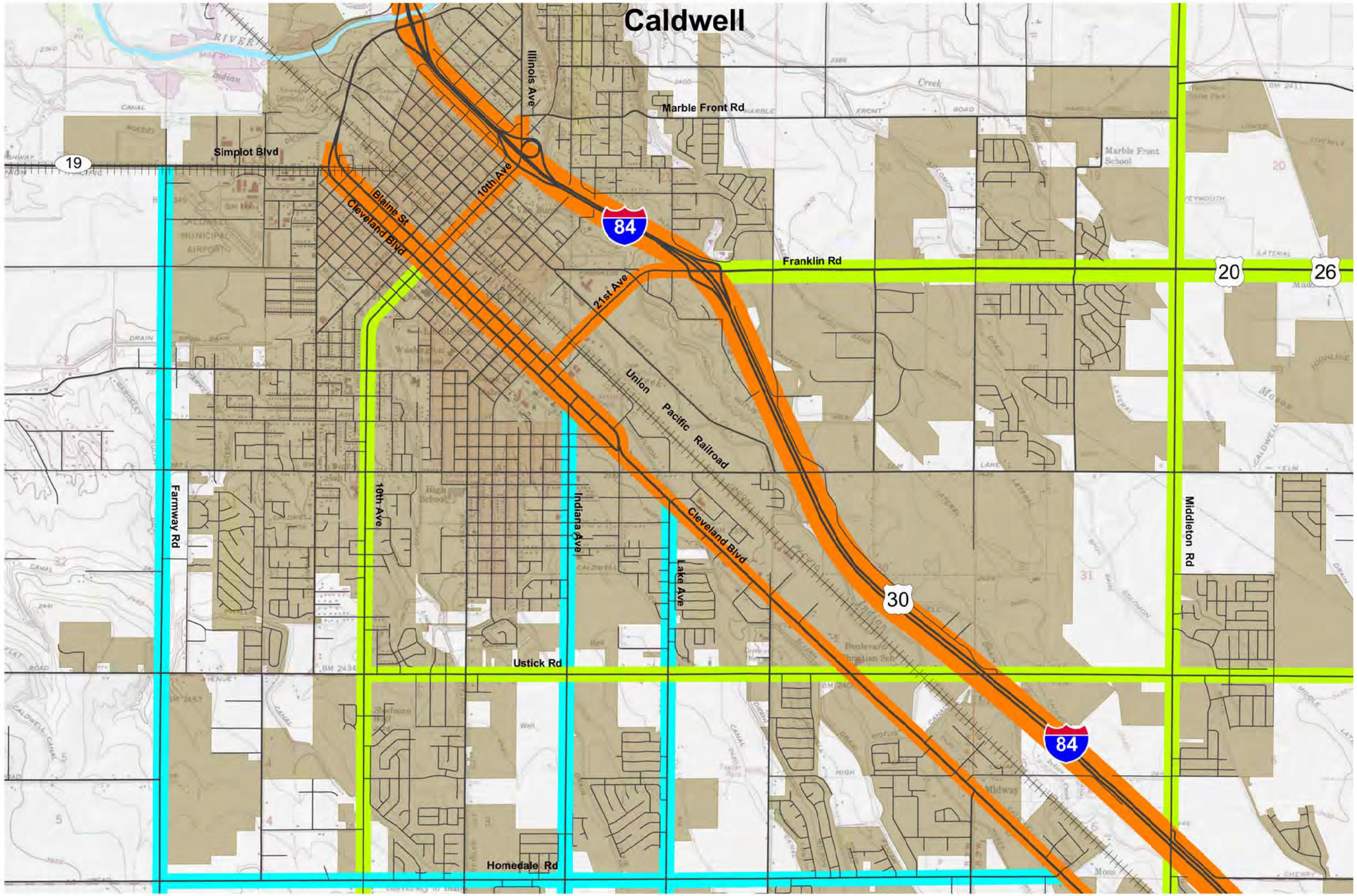
Figure 5-6 Caldwell Operations Priority Corridors



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Chapter 6: Operational Concept

Chapter Highlights:

- Describes how regional agencies work together to deliver regional TSMO services.
- Provides an overview of the future functions of the region's transportation and emergency management centers.
- Describes agency roles and responsibilities for delivering TSMO strategies, organized by Operational Service.
- Shows, in diagrammatic form, the relationship of regional stakeholders, ITS systems, and management centers as a basis for the Regional ITS Architecture.

The operational concept describes how regional TSMO strategies will be implemented in the Treasure Valley, with an emphasis on defining existing and future agency roles and responsibilities.

The operational concept lays the groundwork for future agency agreements to support regional interoperations. It also provides a starting point for development of in-depth RCTOs) for specific topic areas in the future, as well as project-level Concepts of Operations during implementation.

By describing how agency personnel, ITS systems, and other resources interact, the operational concept also forms the basis for developing the Treasure Valley Regional ITS Architecture.

Organization and Contents of the Operational Concept

Like other sections of this plan, the operational concept is organized according to Operational Services (Table 6–1):

OPERATIONAL SERVICE	DESCRIPTION
REGIONAL OPERATIONS COORDINATION AND PLANNING	Describes regional processes for coordination of operating agencies and integration with the regional planning process, such as long-range planning, project development, and performance measurement.
REGIONAL TRANSPORTATION MANAGEMENT	Describes the major functions and interaction of TMCs across the region and the principal ways in which these centers interact.
FREEWAY MANAGEMENT	Describes routine monitoring and operations of the regional freeway system.
ARTERIAL MANAGEMENT	Describes operation of the arterial network (state, county, and local roadways) including arterial corridors that are operationally coordinated among one or more agencies.
INCIDENT AND EMERGENCY MANAGEMENT	Describes interagency response to planned and unplanned roadway events impacting the regional transportation system, including implementation of detour routes and coordinated incident response plans. Also describes the interface between transportation and emergency response agencies, including large-scale emergencies and non-transportation incidents affecting transportation operations.
TRAVELER INFORMATION	Describes the generation and dissemination of coordinated, consistent, multimodal traveler information through local ITS systems, the statewide 511 traveler information system, third-party information service providers, and the media.
PUBLIC TRANSPORTATION MANAGEMENT	Describes ITS services supporting public transportation operations, including coordination among public transportation providers, with other modes, and with regional TMCs.
ROAD WEATHER OPERATIONS	Describes the collection and dissemination of RWIS and predictive weather data to support winter road maintenance and other weather-responsive traffic management strategies.
MAINTENANCE AND CONSTRUCTION MANAGEMENT	Describes processes to coordinate the reporting and sharing of planned construction and road closure information among agencies and with the public, as well as other applications that support work zone traffic management, safety, and enforcement.
REGIONAL DATA ARCHIVING	Describes how data will be collected from discrete ITS systems and made available to regional users for planning and performance measurement purposes.
REGIONAL COMMUNICATIONS INFRASTRUCTURE MANAGEMENT	Describes a framework for management of regional communications infrastructure to support interagency fiber communications sharing.

Table 6–1: Operational Services in the Operations Concept

For each Service Area, the operational concept describes the following:

- Overall Service Area Description (based on Operational Vision)
- Regional ITS Strategies being implemented
- Context Diagram (showing links between Systems, Agencies, and Interconnects)
- List of Participating Agencies
- Agency Roles and Responsibilities, including Status (Existing/Future)

ITS Architecture Context Diagrams

The Operational Services described below include a "Context Diagram" that illustrates key connections among TMCs, field ITS systems, and other entities. These diagrams form a basis for concepts that are further documented in the Regional ITS Architecture.

Detailed Operational Concept by Operations Services

Regional Operations Coordination and Planning

OPERATIONAL SERVICE	DESCRIPTION
REGIONAL OPERATIONS COORDINATION AND PLANNING	Describes regional processes for coordination of operating agencies and integration with the regional planning process, such as long-range planning, project development, and performance measurement.
REGIONAL OPERATIONS STRATEGIES	• Regional interagency operations coordination • Planning for operations • Interagency agreements • Regional performance measurement
CURRENT FUNCTIONS	**FUTURE ADDITIONAL FUNCTIONS**

• Informal or project-based coordination
• Existing interagency agreements:
  ○ ITD/StateComm traffic management
  ○ Local signal maintenance agreements (ITD, ACHD, cities)
	• Provide ongoing coordination through a regional operations working group
	• Develop and execute regional interagency operations/ITS agreements
	• Develop regional operations performance measures
	• Coordinate with regional planning, performance measurement, and project development
	• Develop regional standard specifications/guidelines for ITS devices (District 3/ACHD)

CURRENT STAKEHOLDERS	**FUTURE ADDITIONAL STAKEHOLDERS**
• ITD Headquarters • ITD District 3 • StateComm • ACHD • City of Nampa • City of Caldwell	• COMPASS (lead agency) • All regional agencies involved in transportation operations and emergency management • Other regional/state coordinating committees

Regional Transportation Management

Regional transportation management describes the major functions and interaction of TMCs across the region, and the principal ways in which these centers interact.

OPERATIONAL SERVICE	DESCRIPTION
REGIONAL TRANSPORTATION MANAGEMENT	Describes the major functions and interaction of TMCs across the region, and the principal ways in which these centers interact.
REGIONAL OPERATIONS STRATEGIES	• Freeway management • Arterial management • Regional traveler information coordination • Incident/event traveler information • Public transportation management • Multimodal traveler information
CURRENT FUNCTIONS	**FUTURE ADDITIONAL FUNCTIONS**
• Interagency coordination to manage planned and unplanned incidents on the transportation network • Implementation of freeway detour routes • Dispatch of maintenance response vehicles (e.g., StateComm dispatch for ITD District 3) • Dissemination of coordinated traveler information to ITD 511 systems and the media • Joint control/sharing of ITS field devices (e.g., CCTV cameras) • Coordination between transportation and emergency management agencies for incident response and emergency situations • TMC redundancy through backup capabilities at the StateComm control center	• Implementation of a regional “virtual TMC” (or “virtual IROC”) that allows seamless integration of ITS • Expanded joint control functionality for field ITS equipment through integration of ATMS platforms • Provision of real-time traffic information, camera feeds, and incident information for use by public transportation dispatchers • Expansion of TMC coordination functions in Canyon County through the addition of TMC in the cities of Nampa and Caldwell • 24/7 availability of traffic management capabilities through expanded TMC hours • Off-hours coverage of TMC functions of smaller centers by larger TMCs operating on a 24/7 basis • Expanded control center redundancy through additional backup functionality for all TMCs.
CURRENT STAKEHOLDERS	**FUTURE ADDITIONAL STAKEHOLDERS**
• StateComm • ITD District 3 • ACHD • VRT • TVT • Boise State University • Ada City-County EOC • Canyon County EOC • Ada County Sheriff	• City of Nampa - TMC • City of Caldwell - TMC • County sheriffs and local law enforcement • Boise Airport • TVT • Municipal EOCs • Capital City Development Corporation (parking)

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Roadway Infrastructure

- Cameras
- Traffic Data Sensors
- Weather Stations
- Traffic Signals
- Ramp Meters
- Dynamic Message Signs
- Highway Advisory Radio

traffic signal preemption request

StateComm control of DMS, HAR

device control

video, data (traffic flow, signal status, weather, etc.)

Emergency Response Vehicles

Incident Response Vehicles

incident information, incident response status

request service

vehicle location

Transportation Management

Traffic Management: Regional Virtual TMC

- ITD District 3
- Idaho StateComm
- ACHD
- Canyon County
- City of Caldwell
- City of Nampa
- Boise Airport
- Boise State Univ.

Traffic/Event Management

Road Weather & Maintenance Operations

Incident/Emergency Management

Regional Transportation Data Archive

- COMPASS

Archived Data

Data Mining & Analysis

data

data

Emergency Management

Incident/Emergency Management

- Idaho StateComm
- 911
- Idaho State Police
- County Sheriff/Local Law
- Fire
- Medical

Emergency Management (day-to-day)

Incident Command

Road Weather & Maintenance Vehicles

operations status

request service

vehicle location

Public Transportation Management

- Valley Regional Transit
- Treasure Valley Transit
- Other Public
- Private

Transit Management

Dispatch

incident/emergency information, response status, request service

road network conditions, video, virtual TMC interface

Emergency Management

- Idaho Bureau of Homeland Security State EOC
- Ada City-County EOC
- Canyon County EOC
- Municipal EOCs

Emergency Management (major emergencies)

Incident Command

EVACUATION ROUTE

traveler information, video

traveler information

schedule info, route assignment, road network conditions

vehicle location, schedule performance, on-board systems data

Traveler Information

- 511 system
- Websites
- Phone Systems
- Alert Systems
- Social Media Feeds
- Mobile Apps
- Regional Trip Planner
- Media

parking information

Parking Management

- Valley Regional Transit
- Capital City Development Corp.
- Boise Airport
- Universities

P

transit signal priority request

Fixed-Route Vehicles

Demand Response Vehicles

Commuteride

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REGIONAL TRANSPORTATION MANAGEMENT OPERATIONAL CONCEPT FOR YEARS 2014-2024

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Freeway Management

OPERATIONAL SERVICE	DESCRIPTION
FREEWAY MANAGEMENT	Describes routine monitoring and operations of the regional freeway system.
REGIONAL OPERATIONS STRATEGIES	• Freeway traffic monitoring and management • Freeway traveler information • Traffic data collection
CURRENT FUNCTIONS	**FUTURE ADDITIONAL FUNCTIONS**
• Monitor ongoing freeway traffic flow and performance • Coordinate freeway maintenance and construction activity • Collect freeway traffic flow/count/ classification information from freeway data count stations • Provide freeway traveler information through freeway DMS, HAR, and statewide 511 web/mobile tools	• Operate regional ramp metering system • Coordinate freeway ramp flows with adjacent traffic signal systems • Coordinate operations of freeways with adjacent/feeder arterials (integrated corridor management) • Provide estimated freeway travel time information on DMS signs • Provide backup locations/capabilities for the StateComm TMC and ITD District 3 • Active traffic management
CURRENT STAKEHOLDERS	**FUTURE ADDITIONAL STAKEHOLDERS**
• StateComm • ITD District 3 • ACHD (network maintenance)	• ACHD • City of Nampa • City of Caldwell • Third-party traffic data providers

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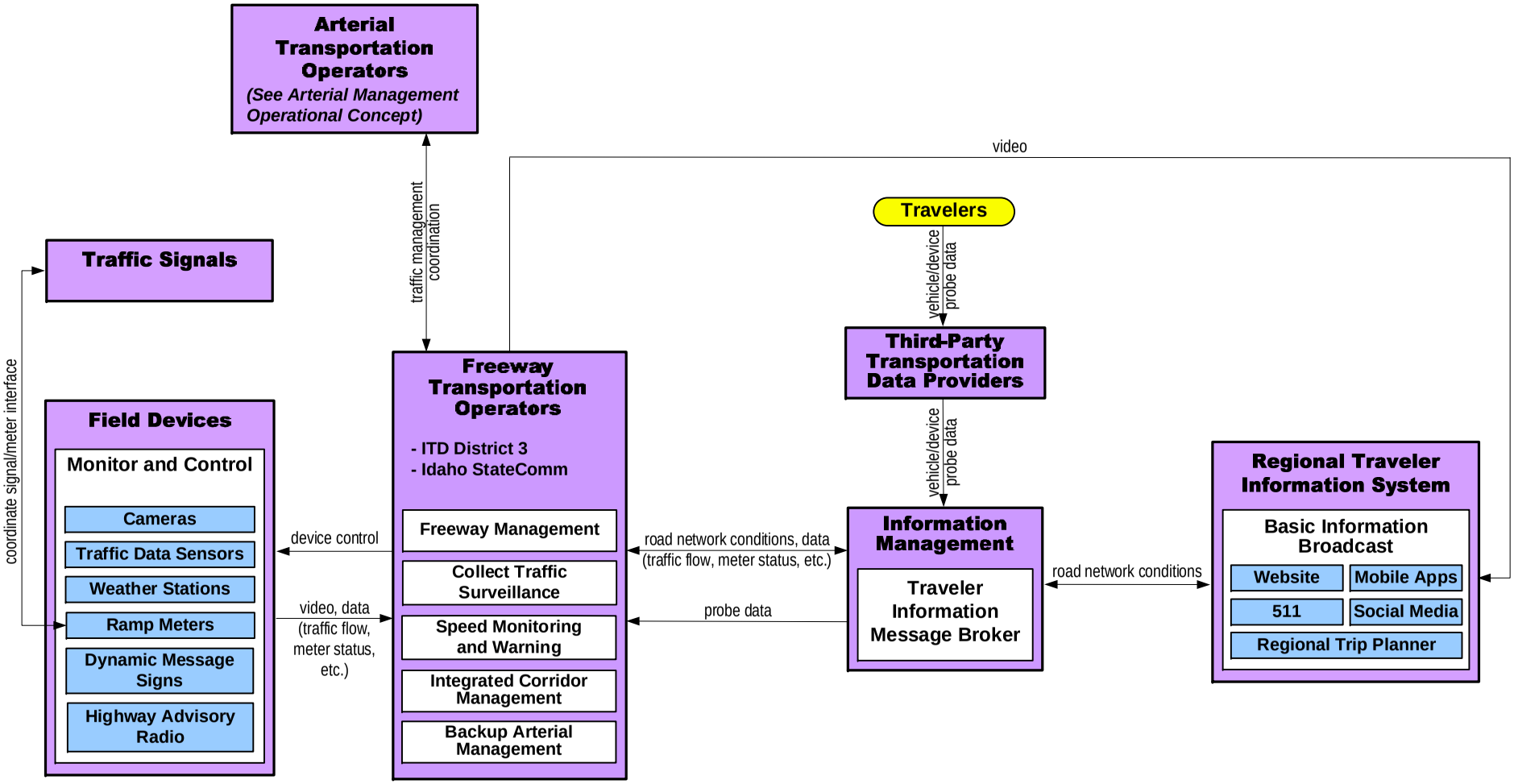

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FREEWAY MANAGEMENT OPERATIONAL CONCEPT YEARS 2014-2024

Arterial Management

OPERATIONAL SERVICE	DESCRIPTION
ARTERIAL MANAGEMENT	Describes operation of the arterial network (state, county, and local roadways) including arterial corridors that are operationally coordinated among one or more agencies.
REGIONAL OPERATIONS STRATEGIES	• Arterial traffic monitoring and management • Regional traffic signal coordination • Arterial traveler information • Traffic data collection • Transit signal priority • Transportation asset management
CURRENT FUNCTIONS	**FUTURE ADDITIONAL FUNCTIONS**
• Operate and maintain regional arterial traffic signal infrastructure (e.g., perform periodic signal updates and adjustments) • Operate and maintain arterial DMS • Operate and maintain emergency signal pre-emption systems • Monitor arterial operations through the use of CCTV cameras and detection • Collect and monitor arterial traffic flow and travel time data • Operate and maintain pedestrian/ bicycle crossing, safety, and detection devices	• Implement central traffic signal system monitoring and control capabilities in Canyon County (Nampa and Caldwell) • Implement remote traffic signal monitoring and management capability for ITD District 3 signals • Expand implementation of adaptive traffic signal control systems • Implement and operate arterial travel time detection • Implement and operate transit signal priority • Implement alternative signal timing plans and arterial DMS information to support freeway incident management, detours, diversions, construction, and events (integrated corridor management) • Implement and operate an Ada County arterial ITS asset management system to support maintenance, lifecycle analysis, and budgeting • Provide 24/7 operations of the region's full integrated freeway and arterial management capabilities • Provide backup locations/capabilities for the ACHD, Nampa, and Caldwell TMCs
CURRENT STAKEHOLDERS	**FUTURE ADDITIONAL STAKEHOLDERS**
• ITD District 3 • ACHD • City of Nampa • City of Caldwell • Emergency Responders (signal pre-emption participants) • Ada County Sheriff	• VRT • Third-party traffic data providers

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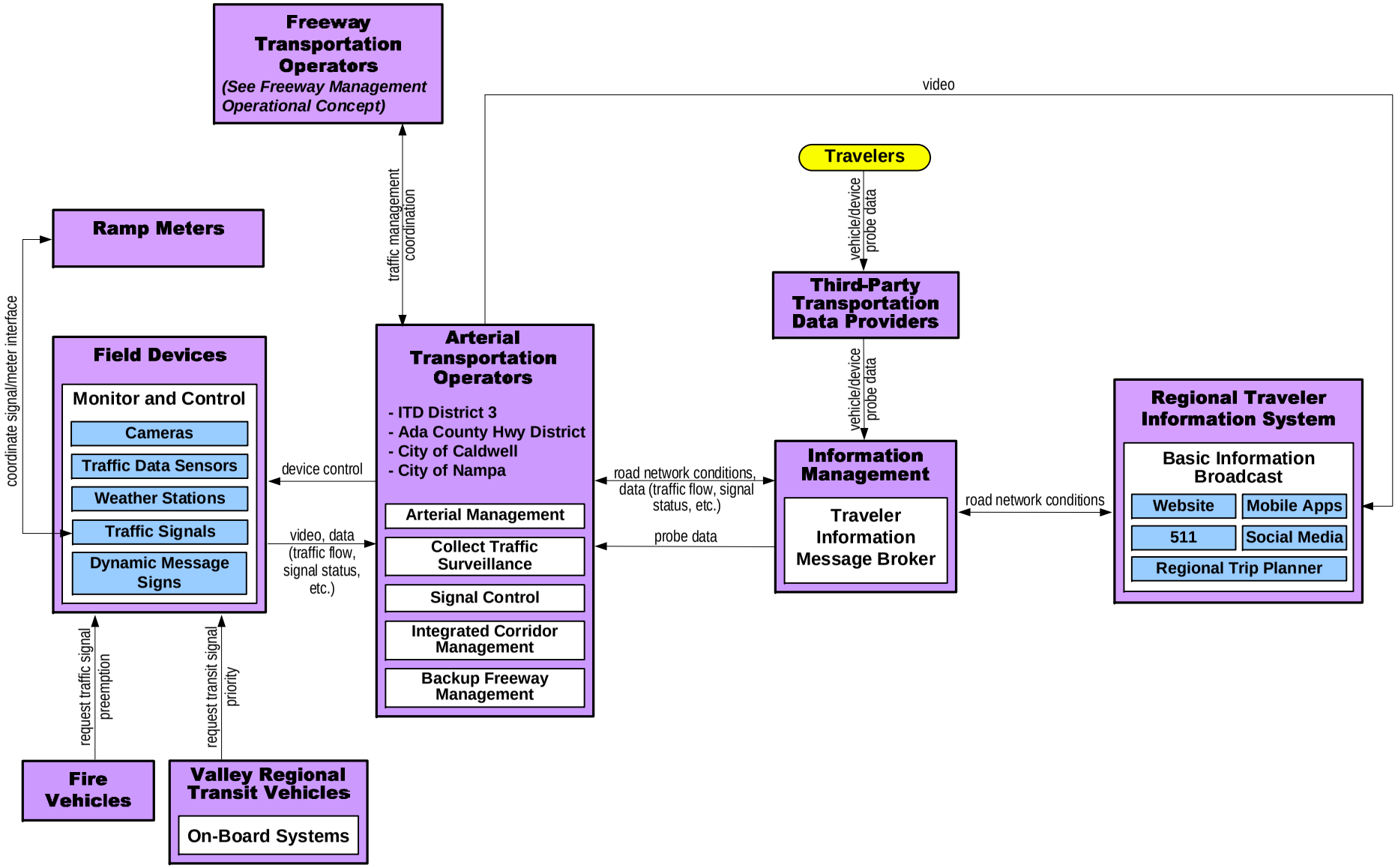

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ARTERIAL MANAGEMENT OPERATIONAL CONCEPT YEARS 2014-2024

Incident and Emergency Management

OPERATIONAL SERVICE	DESCRIPTION
INCIDENT AND EMERGENCY MANAGEMENT	Describes interagency response to planned and unplanned roadway events impacting the regional transportation system, including implementation of detour routes and coordinated incident response plans. Also describes the interface between transportation and emergency response agencies, including large-scale emergencies and non-transportation incidents affecting transportation operations.
REGIONAL OPERATIONS STRATEGIES	• Regional incident management • Transportation/emergency management coordination • Event logging and performance measurement • Transportation/emergency management coordination • Transportation infrastructure security • Emergency traveler information
CURRENT FUNCTIONS	**FUTURE ADDITIONAL FUNCTIONS**
• Detect and respond to freeway and arterial traffic incidents • Receive mayday alerts (e.g., OnStar) • Coordinate with event/construction personnel for management of pre-planned events • Disseminate traveler information as required per management plans • Implement detour/diversion plans as required • Coordinate with emergency response agencies on incident evaluation/response and traffic control • Coordinate with ITD District 3 or other partners as required for maintenance/towing services • Monitor incident clearance and coordinate restoration of normal operations • Log incident/event information and details, including start and clearance times • Provide emergency management response to incidents impacting the regional transportation system (e.g., collisions, medical emergencies, fires, etc.) • Coordinate with TMCs to provide emergency messages to travelers during emergency scenarios (e.g., storms, hazardous materials, evacuations)	• Integrate emergency management CAD information into regional TMCs to support coordinated traffic and emergency response • Record incident/event log information for freeway and arterial events in consistent format and in a single location for ease of performance monitoring and analysis • Provide incident information and virtual TMC capabilities (e.g., CCTV camera feeds, traffic flow information) to emergency responders, transit providers, and Canyon County jurisdictions to support coordinated incident response and efficient multimodal operations • Develop and implement a strategy for ongoing transportation-emergency management coordination, establishing objectives, functions, roles, and infrastructure • Integrate emergency management CAD information into regional TMCs to support coordinated traffic and emergency response • Provide virtual traffic management center capabilities (video feeds, traffic information, etc.) to emergency management dispatch centers • Provide real-time traffic management information to mobile first responders through the vehicles' mobile data terminals • Develop a transit-focused emergency management plan (e.g., evacuations, terrorist incidents) • Develop interoperable communications channels and protocols between transportation and emergency management agencies, within the State Interoperability Governance Board framework

CURRENT STAKEHOLDERS	FUTURE ADDITIONAL STAKEHOLDERS
• StateComm • ITD District 3 • ACHD • Idaho State Police • Ada County Sheriff • Canyon County Sheriff • Boise State University • Other event managers • Local police, fire, and EMS	• VRT • TVT • Third-party traffic data providers • Canyon County Sheriff (including Canyon County emergency management coordination) • State Interoperability Governance Board and ITD District 3 Interoperability Governance Board (DIGB)

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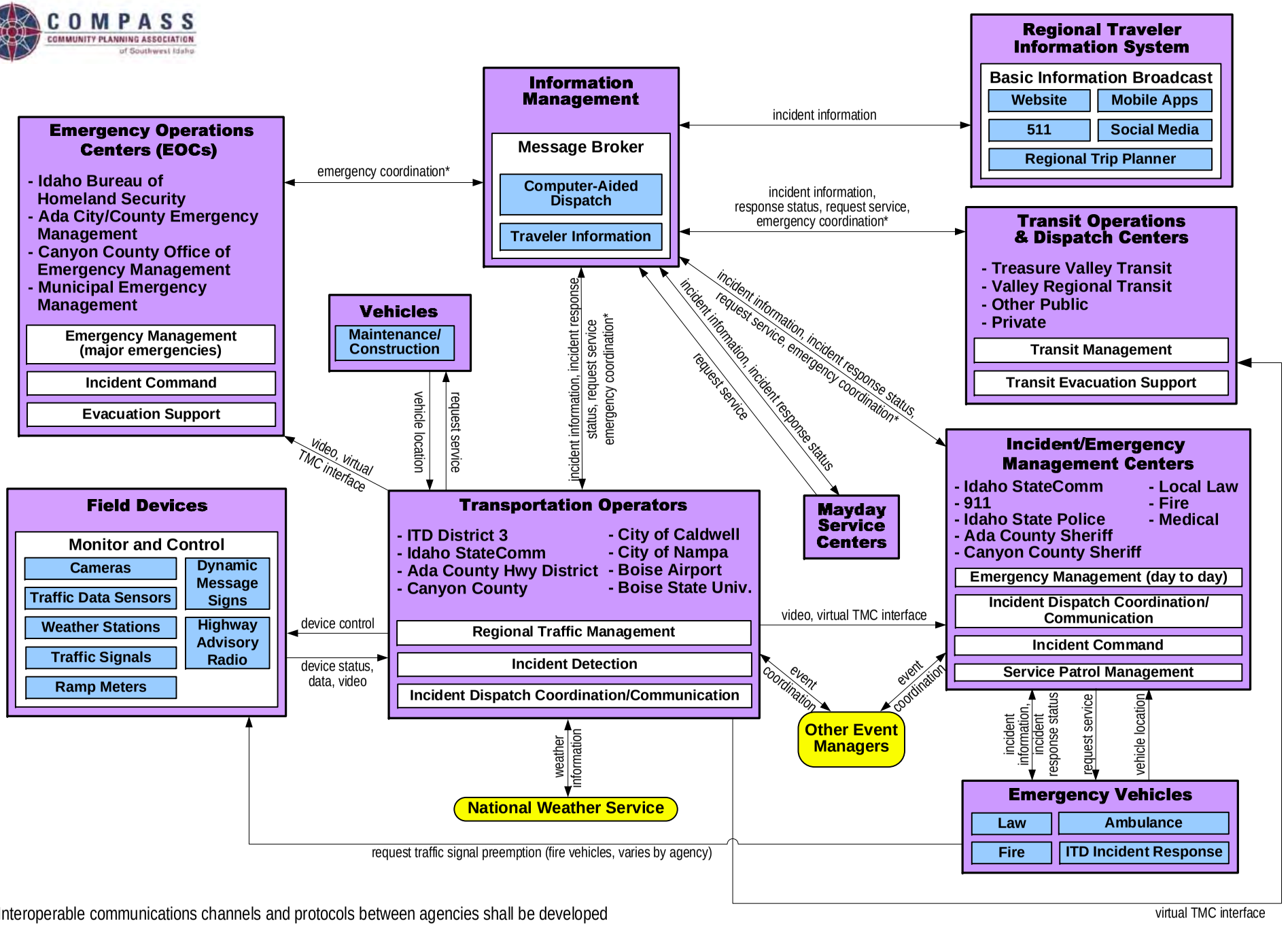

* Interoperable communications channels and protocols between agencies shall be developed within the framework of the Idaho Statewide Interoperability Executive Council (SIEC) and the Idaho District 3 Interoperability Governance Board (DIGB3).

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INCIDENT AND EMERGENCY MANAGEMENT OPERATIONAL CONCEPT YEARS 2014-2024

Traveler Information

OPERATIONAL SERVICE	DESCRIPTION
TRAVELER INFORMATION	Describes the generation and dissemination of coordinated, consistent multimodal traveler information through local ITS systems, the statewide 511 traveler information system, third-party information service providers, and the media.
REGIONAL OPERATIONS STRATEGIES	• Regional traveler information coordination • Travel time estimation • Incident/event traveler information • Multimodal traveler information
CURRENT FUNCTIONS	**FUTURE ADDITIONAL FUNCTIONS**
• Provide multi-modal traveler information through the ITD statewide 511 system • Provide en-route traveler information through freeway and arterial DMS • Provide incident, event, and weather information through the 511 system and DMS • Provide transit traveler information through websites and customer service telephone lines • Provide traveler information to third-party dissemination sources (e.g., media, web services, in-vehicle GPS information)	• Develop and implement a regional strategy for providing consistent, timely, and reliable traveler information across the Treasure Valley • Provide real-time freeway travel time information through DMS signs and web/mobile applications • Provide real-time arterial travel time information through DMS signs and web/mobile applications • Provide integrated freeway and arterial traveler information across jurisdictions to inform traveler route choice decisions • Provide improved incident/event management information, (e.g., across the Ada-Canyon County line and for Boise State University Events) • Operate a shared pool of portable dynamic message signs (PDMS) for flexibility in providing traveler information • Provide traveler information through the regional HAR network • Provide landside traveler information at Boise Airport • Provide parking availability information at key event centers • Develop and operate a multi-modal trip planning tool including transit, bike, and pedestrian options • Incorporate “two-way” traveler information, using feedback from the public to inform freeway, arterial, and incident management activities
CURRENT STAKEHOLDERS	**FUTURE ADDITIONAL STAKEHOLDERS**
• StateComm • ITD District 3 • ACHD • VRT • TVT	• City of Nampa • City of Caldwell • Boise Airport • Boise State University

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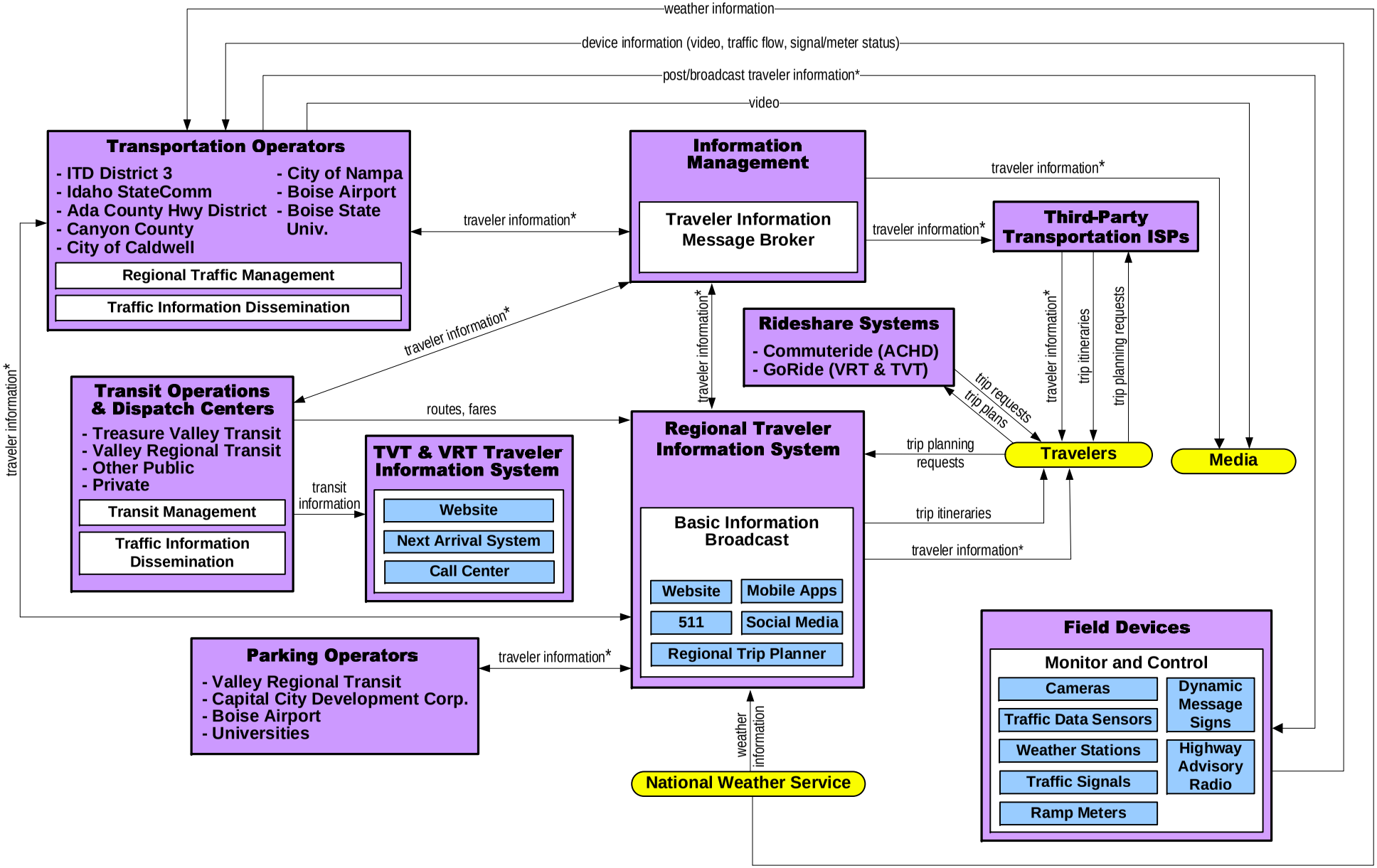

* Traveler information includes, but is not limited to, information about road/traffic conditions, weather, transit, heavy rail, parking, incidents, major emergencies, maintenance and construction activities, special events, and traveler services.

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TRAVELER INFORMATION OPERATIONAL CONCEPT YEARS 2014-2024

Public Transportation Management

OPERATIONAL SERVICE	DESCRIPTION
PUBLIC TRANSPORTATION MANAGEMENT	Describes ITS services supporting public transportation operations, including coordination among public transportation providers, with other modes, and with regional TMC.
REGIONAL OPERATIONS STRATEGIES	• Fixed-route transit management • Demand-responsive reservations and management • Transit traveler information • Electronic fare collection • Transit signal priority • Multimodal coordination • Transportation asset management
CURRENT FUNCTIONS	**FUTURE ADDITIONAL FUNCTIONS**
• Dispatch and operate fixed-route transit services • Track transit vehicle locations in real time (automatic vehicle location) • Dispatch and operate demand-responsive transit services • Manage sales and collection of transit passes and fares • Operate onboard and facilities security and surveillance systems • Provide scheduled transit traveler information to the ITD statewide 511 system • Provide transit traveler information through customer service representatives • Operate and maintain transit radio communications systems	• Provide real-time information at transit centers, park and rides, and other key stops • Provide real-time transit information through ITD 511 and other web/mobile sources • Operate transit signal priority • Operate transfer connection protection • Electronic collection of onboard passenger counts (APCs) • Operate GoRide reservations/dispatch software • Coordinate/consolidate VRT/TVT customer service at off-peak times • Operate dispatch and vehicle tracking capabilities for VRT • Incorporate real-time traffic information into transit dispatch • Operate regional smartcard fare medium supporting multi-modal users and employer pass programs • Operate regional bike sharing management and payment system for Boise City • Operate a transit asset management system • Develop a transit emergency management response plan and capabilities
CURRENT STAKEHOLDERS	**FUTURE ADDITIONAL STAKEHOLDERS**
• VRT • TVT • ITD – Public Transportation Division • ACHD Commuteride	• ITD (real-time traffic feeds, TSP) • ACHD (real-time traffic feeds, TSP) • Boise State University (events) • Boise City (multi-use smart card) • Emergency responders (transit emergency management plan) • Regional radio communications consortium members (possible pending radio system replacement decisions) • Electronic fare payment partners

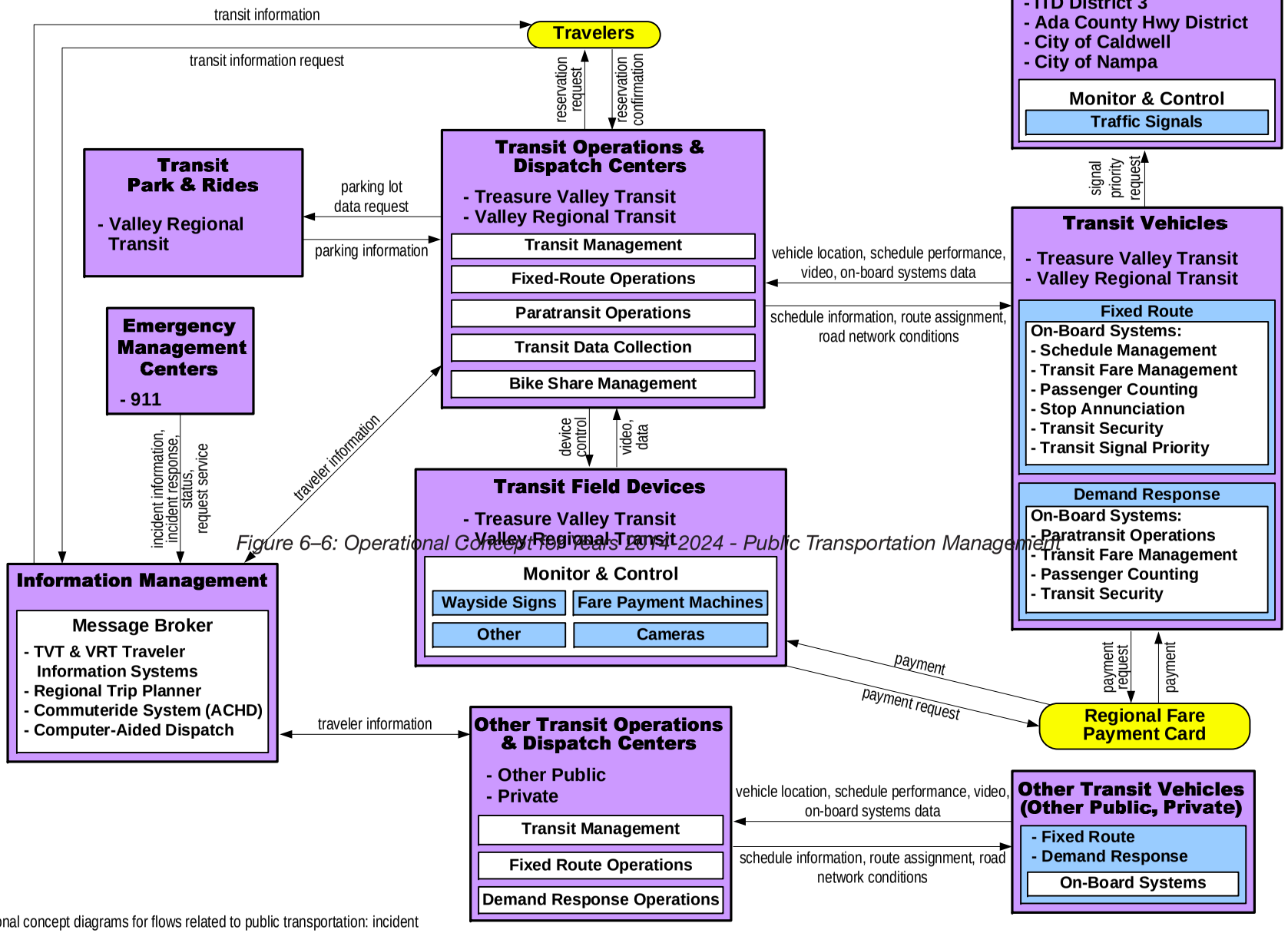

Figure 6–6: Operational Concept for Years 2014-2024 - Public Transportation Management

See other operational concept diagrams for flows related to public transportation: incident and event management, emergency management coordination, traveler information, road weather operations, maintenance and construction management, and data archiving.

PUBLIC TRANSPORTATION MANAGEMENT
OPERATIONAL CONCEPT YEARS 2014-2024

Road Weather Operations

OPERATIONAL SERVICE	DESCRIPTION
ROAD WEATHER OPERATIONS	Describes the collection and dissemination of RWIS and predictive weather data to support winter road maintenance and other weather-responsive traffic management strategies.
REGIONAL OPERATIONS STRATEGIES	• Road weather monitoring and data collection • Coordinated winter road maintenance • Road conditions traveler information • Weather-responsive traffic management
CURRENT FUNCTIONS	**FUTURE ADDITIONAL FUNCTIONS**
• Operate and maintain statewide RWIS infrastructure (ITD) • Operate and maintain Ada County RWIS infrastructure (ACHD) • Third-party weather forecast feeds received by TMCs to support operations and maintenance dispatch	• Implement FHWA's Weather Responsive Traffic Management (WRTM) strategies into regional TMC operations at StateComm, ITD District 3, and ACHD • Develop pilot weather-responsive safety, warning, and/or signal systems for accident hotspots (e.g., State Highway 16) • Provide access to state/county RWIS to local jurisdictions, rural highway districts, and emergency management agencies • Implement and operate ITD snowplow tracking and materials utilization data
CURRENT STAKEHOLDERS	**FUTURE ADDITIONAL STAKEHOLDERS**
• StateComm • ITD District 3 • ACHD • National Weather Service • Third-party weather data providers	• City of Nampa • City of Caldwell • Rural highway districts • Emergency management agencies • Other road weather data users

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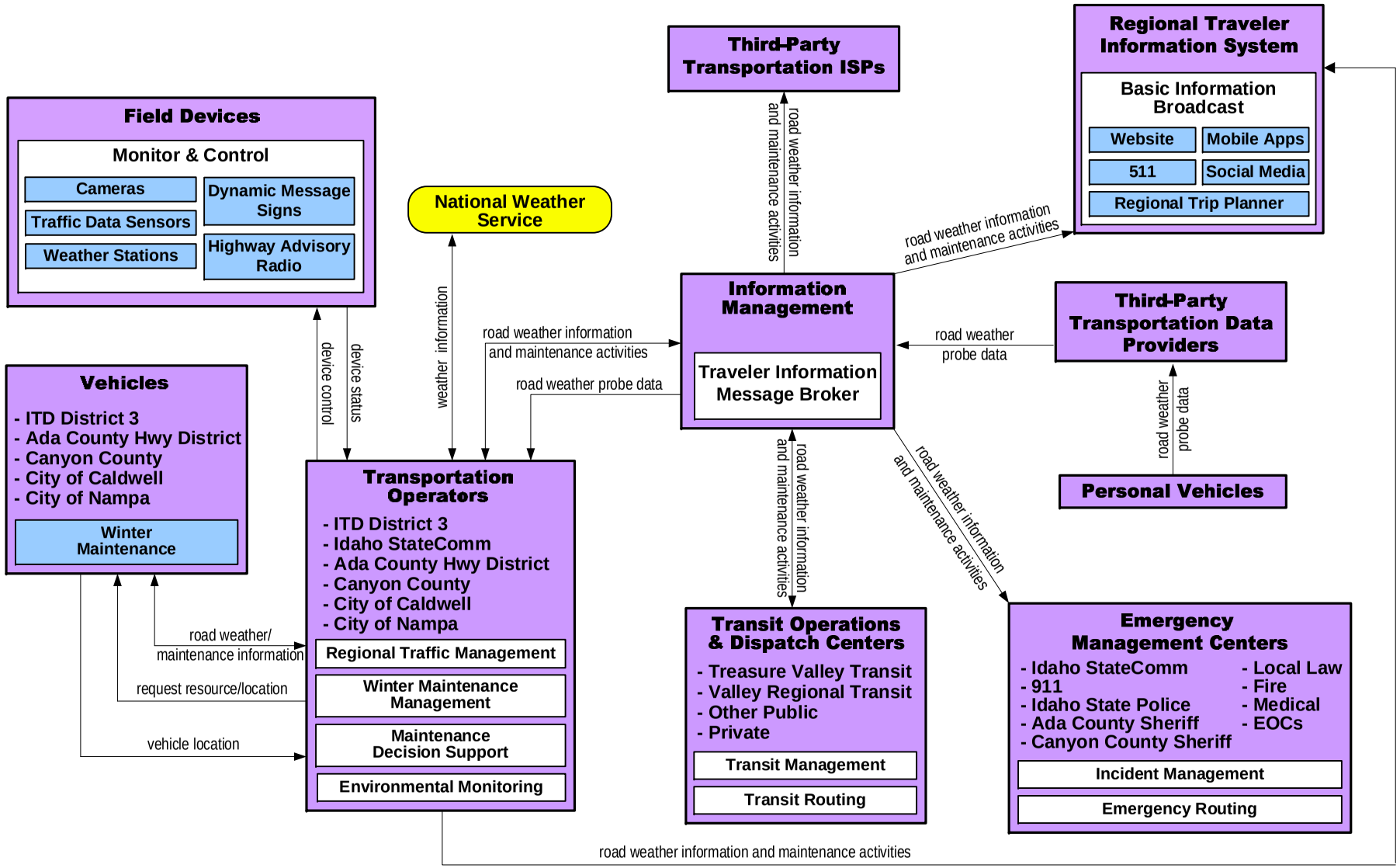

Typical road weather maintenance includes activities such as snow plow operations, roadway treatments (e.g. anti-icing material applications), and other snow and ice control activities.

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ROAD WEATHER OPERATIONS
OPERATIONAL CONCEPT YEARS 2014-2024

Maintenance and Construction Management

OPERATIONAL SERVICE	DESCRIPTION
MAINTENANCE AND CONSTRUCTION MANAGEMENT	Describes processes to coordinate the reporting and sharing of planned construction and road closure information among agencies and with the public, as well as other applications that support work zone traffic management, safety, and enforcement.
REGIONAL OPERATIONS STRATEGIES	• Regional maintenance and construction coordination • Regional event management • Construction/event traveler information • Work zone safety
CURRENT FUNCTIONS	**FUTURE ADDITIONAL FUNCTIONS**
• Provide construction and event information for state highways through the ITD statewide 511 system (CARS) • Provide ACHD construction and events information through the ACHD public website	• Develop a single regional database for construction and maintenance incident/event information • Incorporate Canyon County construction and event information into 511 (in progress) • Improve coordination of bi-county construction/event management • Implement work zone management ITS systems (e.g., CCTV, speed monitoring, PDMS)
CURRENT STAKEHOLDERS	**FUTURE ADDITIONAL STAKEHOLDERS**
• StateComm • ITD District 3 • ACHD	• City of Nampa • City of Caldwell • Rural highway districts

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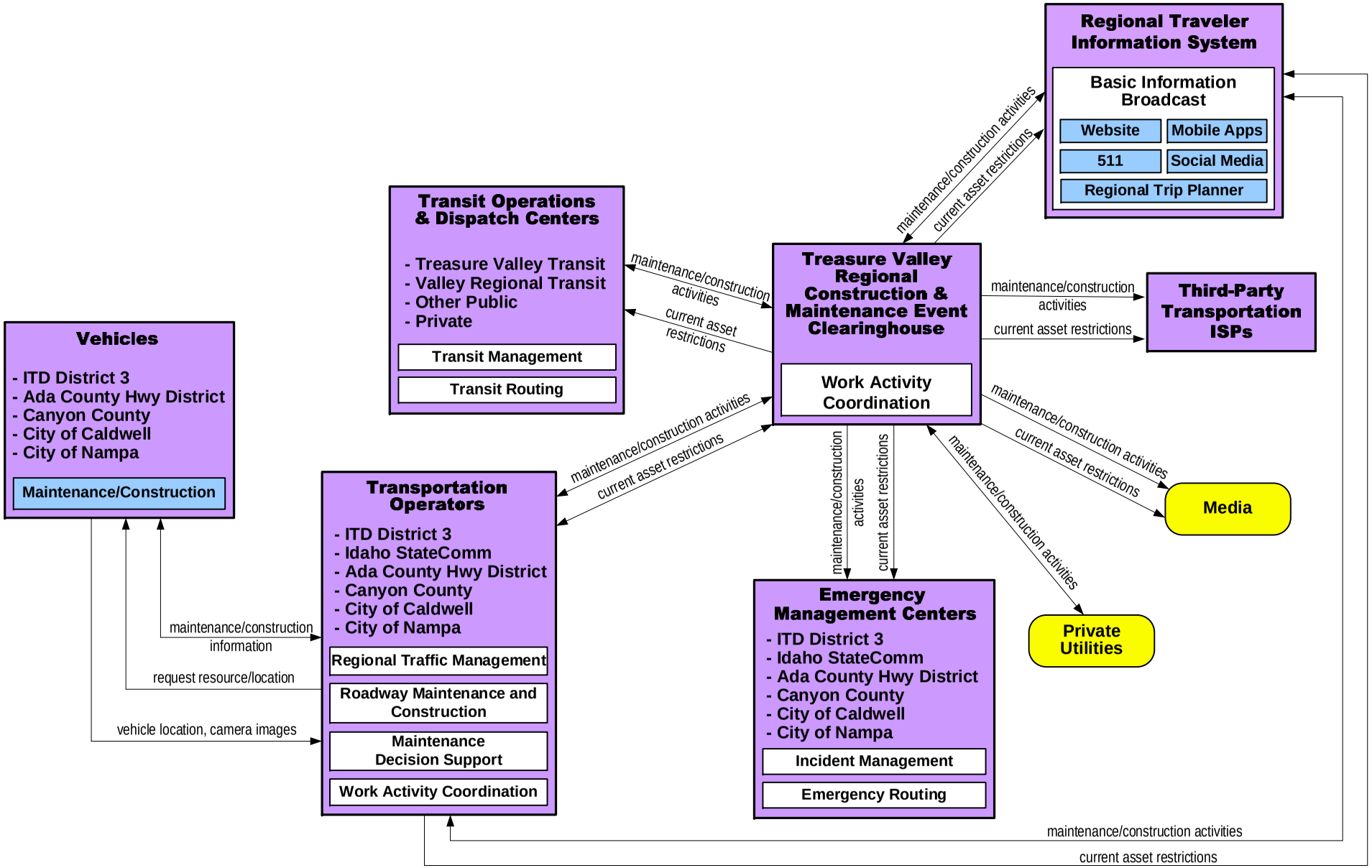

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MAINTENANCE AND CONSTRUCTION MANAGEMENT OPERATIONAL CONCEPT YEARS 2014-2024

Regional Data Archiving

OPERATIONAL SERVICE	DESCRIPTION
REGIONAL DATA ARCHIVING	Describes how data will be collected from discrete ITS systems and made available to regional users for planning and performance measurement purposes.
REGIONAL OPERATIONS STRATEGIES	• Regional data archiving • Regional performance measurement • Planning analysis with operations data
CURRENT FUNCTIONS	**FUTURE ADDITIONAL FUNCTIONS**
• Collect and store ITS/operations data within disparate ITS systems or field devices • Log event information at the agency/TMC level • Create informal partnerships for data sharing based on specific planning or project needs	• Develop and maintain a regional, multi-modal data archive linked to individual agency ITS systems • Develop analytical/business intelligence and reporting tools tailored to end user and regional data analysis needs • Develop agency-level data archives and reporting tools as needed by agency • Provide regional traffic flow, traffic count, and travel time information to regional data archive • Provide TMC incident and event information to regional data archive • Provide transit operations/ridership data to regional data archive • Provide bicycle/pedestrian count data to regional data archive • Provide road weather information to regional data archive
CURRENT STAKEHOLDERS	**FUTURE ADDITIONAL STAKEHOLDERS**
• COMPASS (lead agency) • StateComm • ITD District 3 • ACHD	• City of Nampa • City of Caldwell • VRT • TVT • Other agencies generating systems-level ITS/operations data • Third-party data providers • Other archived data users

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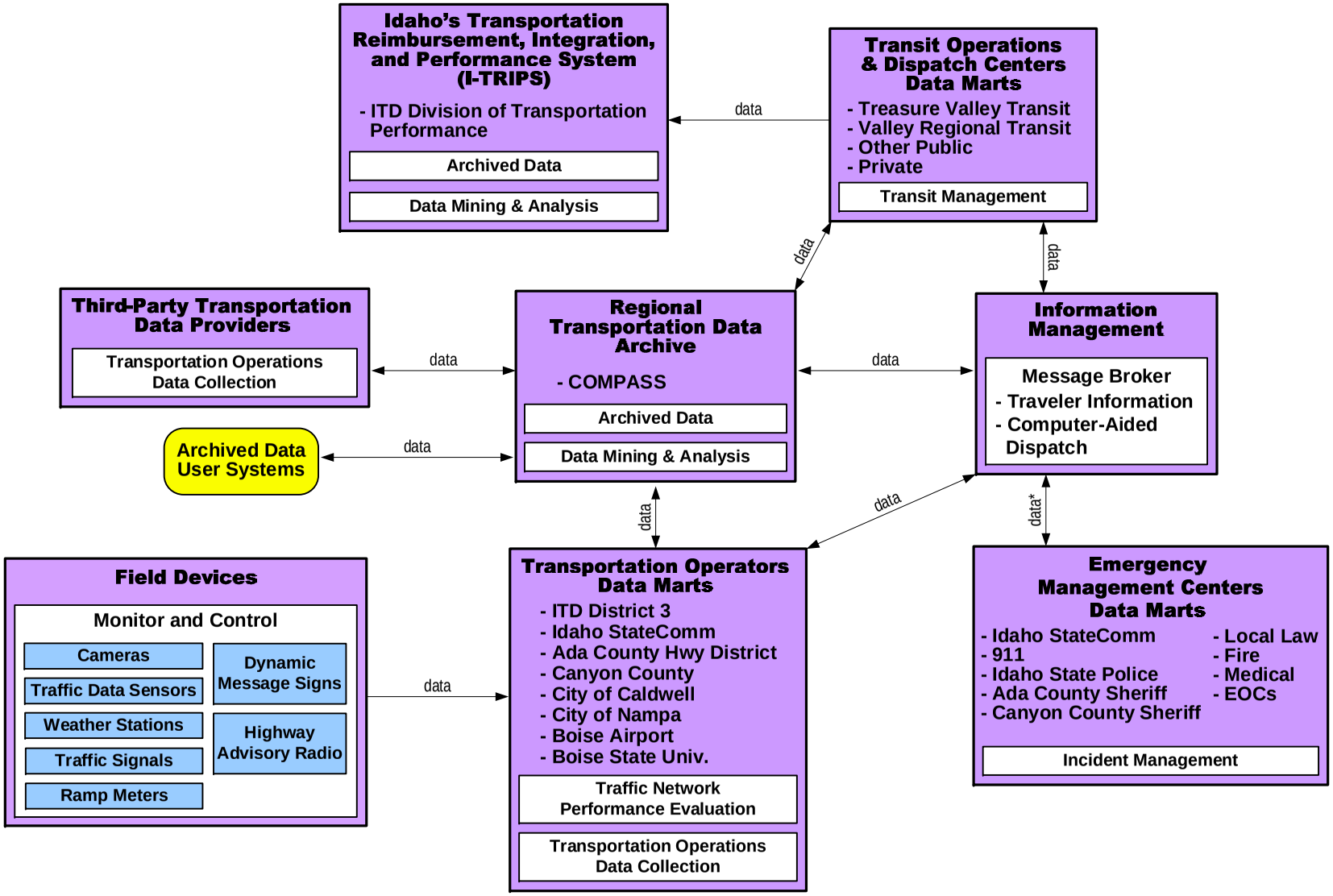

* Only secure data (e.g. general incident information) will be archived externally from emergency management agencies.

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REGIONAL DATA ARCHIVING OPERATIONAL CONCEPT YEARS 2014-2024

Regional Communications Infrastructure Management

OPERATIONAL SERVICE	DESCRIPTION
REGIONAL COMMUNICATIONS INFRASTRUCTURE MANAGEMENT	Describes a framework for management of regional communications infrastructure to support interagency fiber communications sharing.
REGIONAL OPERATIONS STRATEGIES	• Regional communications asset sharing • Coordinated communications infrastructure asset management, maintenance, and operations • Interagency agreements
CURRENT FUNCTIONS	**FUTURE ADDITIONAL FUNCTIONS**
• Coordinate on an informal or project basis • Implement informal fiber optic infrastructure between public entities • Develop public-private partnerships for fiber optic deployment (e.g., Syringa Networks)	• Develop and maintain interagency agreements for communications sharing • Manage a pooled fund/service level agreement for maintenance of shared communications infrastructure • Provide communications infrastructure asset management • Provide regional, interagency communications/ITS network management and security • Develop standard specifications for communications
CURRENT STAKEHOLDERS	**FUTURE ADDITIONAL STAKEHOLDERS**
• One-to-one agency coordination as needed; informal partnerships • State Interoperability Governance Board and ITD District 3 Interoperability Governance Board	• COMPASS (lead agency) • All regional agencies involved in transportation operations and emergency management

Chapter 7: Treasure Valley ITS Architecture

Chapter Highlights:

- Provides an overview of the updated Regional ITS Architecture for the Treasure Valley.
- Describes introductory ITS Architecture concepts, including terminology.
- Presents a checklist demonstrating conformance with federal requirements for Regional ITS Architecture content and development.
- Describes the regional ITS architecture maintenance plan, to ensure that the architecture remains current with deployment progress and evolving needs.

This chapter describes the update to the Regional ITS Architecture for the Treasure Valley. The ITS Architecture provides an overall vision and conceptual framework for ITS deployment and integration in the Treasure Valley and conforms to the USDOT National ITS Architecture (version 7)[1]. The Regional ITS Architecture also complements the Idaho Statewide and District 3 ITS Architectures, both developed and maintained by ITD, where elements overlap. Components of the Regional ITS Architecture also interface with the Oregon Statewide ITS Architecture, developed and maintained by the Oregon Department of Transportation (ODOT), due to the geographic proximity. This chapter supplements the Turbo Architecture™ electronic database that contains detailed ITS architecture elements, service packages, and information flows. The TurboArchitecture database is maintained by COMPASS and available to view online through the agency's website, www.compassidaho.org.

1 http://www.iteris.com/itsarch/. *The National ITS Architecture 7.0, U.S. Department of Transportation*. Last updated Jan. 22, 2013.

Why Develop an ITS Architecture?

The USDOT developed the National ITS Architecture to ensure that ITS deployed around the country can communicate with one another and share information to maximize the return of investment in ITS. As described by the FHWA, "The National ITS Architecture is a general framework for planning, defining, and integrating ITS. It was developed to support ITS implementations over a 20-year time period in urban, interurban, and rural environments across the country."[2]

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 operations 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 technology or management techniques.

The FHWA and FTA published a Final Rule and Policy[3] that all agencies seeking federal funding for ITS projects must develop a regional architecture that is compliant with the National ITS Architecture and must be able to demonstrate that the funded project was included in said architecture. The National ITS Architecture is now in Version 7, and has continued to evolve as ITS has expanded and evolved. For example, major updates included the addition of service areas for maintenance and construction and emergency management.

The update of the Regional ITS Architecture for Treasure Valley is a timely component as part of the overall project identification and strategic planning process.

Conformance with Federal Regulations

The purpose of the Regional ITS Architecture is to serve as a guide for the development of ITS projects and programs and be consistent with ITS strategies and projects contained in applicable transportation plans. The final rule making by FHWA provided the guidance for the development of a regional or statewide ITS Architecture, and noted that the regional ITS Architecture must include the elements in Table 7–1. A more detailed assessment of how the Treasure Valley ITS Architecture complies with FHWA's Regional ITS Architecture Assessment Checklist is included in "Appendix C: Regional ITS Architecture Assessment Checklist".

REQUIRED ELEMENT	LOCATION IN THE TREASURE VALLEY PLAN
Description of the Region	Plan Document (Chapter 1) and Turbo Architecture database
Identification of Stakeholders	Plan Document (Chapter 3) and Turbo Architecture database
Operational Concept	Operational Concept (Chapter 6)
Agreements	Plan Document (Chapter 3) and Turbo Architecture database
System Functional Requirements	Turbo Architecture database
Interface Requirements and Information Exchanges	Turbo Architecture database
Sequence of Projects Required for Implementation	Project Implementation Plan (Chapter 11)

Table 7–1: Locations of Required ITS Architecture Elements in the Treasure Valley Plan

2 *Regional ITS Architecture Guidance: Developing, Using, and Maintaining an ITS Architecture for Your Region*. Report FHWA-OP-02-024. U.S. Department of Transportation, Federal Highway Administration and Federal Transit Administration, National ITS Architecture Team, Oct. 12, 2001.
3 *Intelligent Transportation System Architecture and Standards: Final Rule.* FHWA Docket No. FHWA-99-5899. U.S. Department of Transportation, Federal Highway Administration, Jan. 8, 2001. *Federal Transit Administration National ITS Architecture Policy on Transit Projects: Notice*. FTA Docket No. FTA-99-6147. Federal Transit Administration, Jan. 8, 2001.

National ITS Architecture Overview

The National ITS Architecture provides a common framework for planning, defining, and integrating ITS. The framework is made up of two technical layers, including Transportation and Communications, that both must operate within an Institutional Layer, as shown in Figure 7–1. It is a mature product that reflects the contributions of a broad cross-section of the ITS community (transportation practitioners, systems engineers, system developers, technology specialists, etc.).

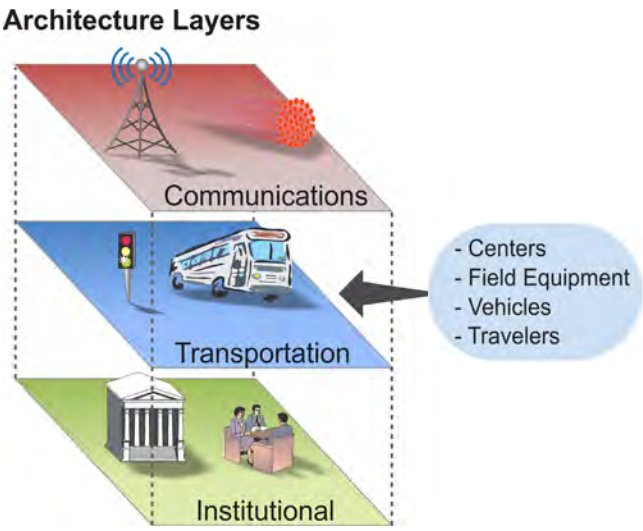


Figure 7–1: ITS Architecture Layers

The architecture defines:

- The **functions** (e.g., gather traffic information or request a route) that are required for ITS applications
- The **physical entities or subsystems** where these functions reside (e.g., the roadside or the vehicle)
- The **information flows** that connect these functions and physical subsystems together into an integrated system

Regional architectures are not intended to specify the particular technologies that will be used in ITS deployments; they are instead used to define the functions that technologies must perform. The architecture provides structure for defining general ITS functional requirements during the planning and design process. Key terms and concepts that are specific to, and used extensively in, the National ITS Architecture are discussed here.

Logical Architecture and User Services

The National ITS Architecture utilizes "user services" to document what ITS applications should accomplish from a user's perspective; for example, "Provide pre-trip traveler information" or "Provide transit route guidance". User services for a region can be selected by considering the needs and problems in the region and looking at how ITS can provide services to address these issues. The logical architecture defines the requirements needed to provide the selected user services, in the form of process specifications ("p-specs") and data flow diagrams. The logical architecture provides the detailed underpinnings of the physical architecture. The physical architecture is composed of the components most commonly worked with in the development of a regional architecture.

Physical Architecture

The physical architecture provides a framework for the physical elements of ITS. These elements include automobiles, people, computers, buses, trucks, etc. Figure 7–2 provides an illustration of the overall physical architecture. The physical elements are broken into large groups called subsystem categories. These are categories that describe what their member physical entities (subsystems) do.

There are four major subsystem categories:

1. **Traveler Subsystems:** Systems or applications that provide information to travelers (e.g., traffic conditions)
2. **Center Subsystems:** Systems or applications that process and use information to control the transportation network (e.g., signal timing)

3. **Vehicle Subsystems:** Systems or applications that provide driver information and safety on vehicle platforms (e.g., in-vehicle signing)
4. **Field Subsystems:** Systems or applications deployed in the field that collect transportation data and are ideally controlled from a center (e.g., traffic signals)

The bubbles between the subsystem categories represent the communications media. For example, the roadway subsystem (within the "Field" subsystem category) could potentially be communicating with the vehicle, the transit vehicle, the commercial vehicle, and the emergency vehicle subsystems (within the "vehicle" subsystem category) via short-range wireless links. Communications from the field devices to their respective center would be via fixed-point to fixed-point communications.

The subsystems shown in white boxes in Figure 7–2 currently exist or are planned for use in the Treasure Valley. The subsystems shown in gray boxes have not been selected for use in the region. They are more applicable at the state level (e.g., commercial vehicles) or have not been identified as a priority need within the region.

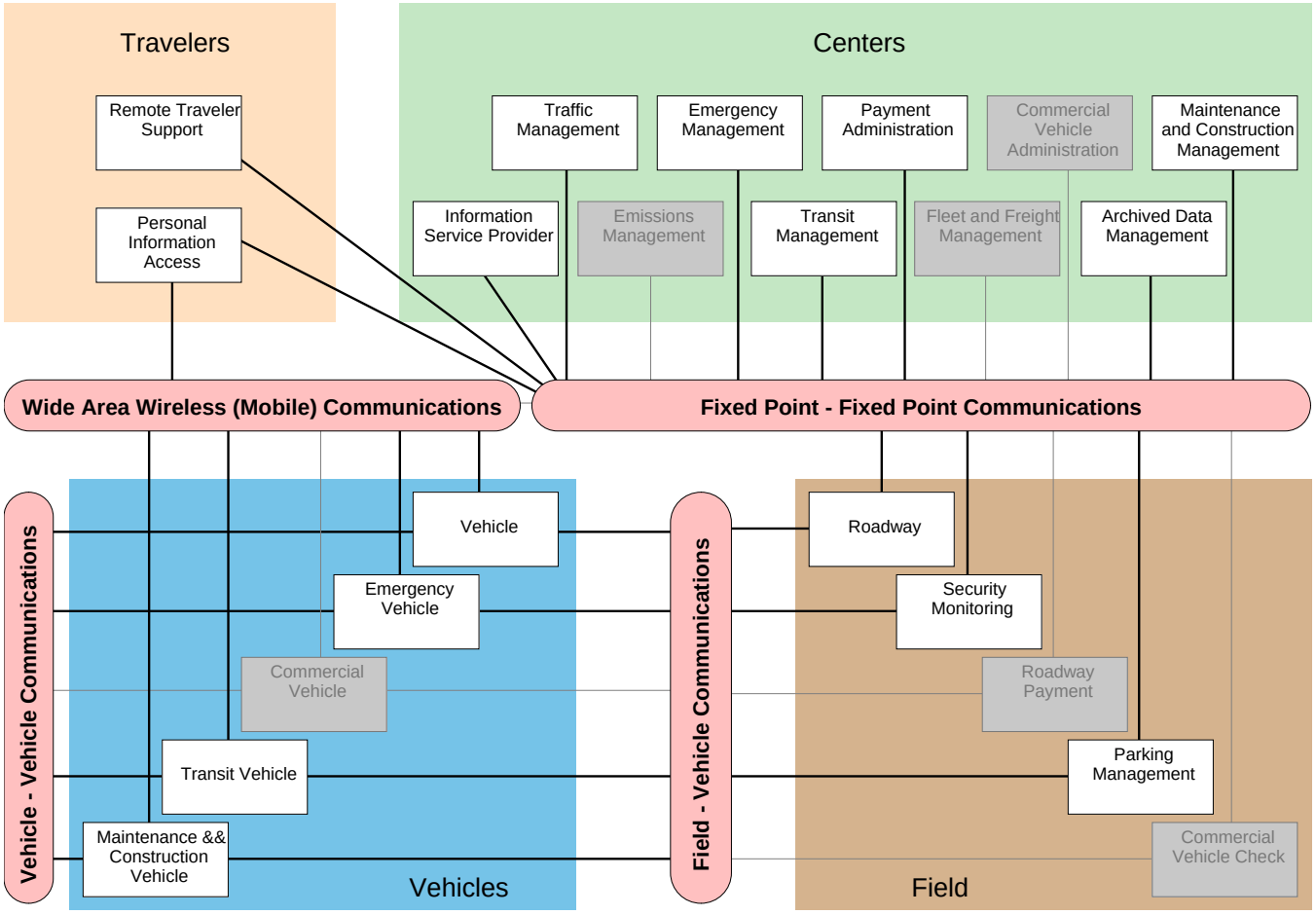


Figure 7–2: National ITS Architecture Subsystems

Equipment Packages

The subsystems generally provide a rich set of capabilities, more than would be implemented at any one place or time. Equipment packages break up the subsystems into deployment-sized pieces. An example equipment package is roadway basic surveillance, which is part of the roadway subsystem, and includes fixed equipment used to monitor traffic conditions, including loop detectors and CCTV cameras.

Terminators

Terminators are generally defined as people, systems, and general environment that are outside the boundary or control of ITS but still impact ITS. Interfaces between subsystems and terminators need to be defined, but there are no ITS-related functional requirements associated with terminators. Since regional architectures are usually developed from a specific agency(s) perspective, an entity that impacts ITS but is out of the bounds of the primary agency's perspective is called a terminator. This is done to illustrate ownership/control of the proposed services. Examples of terminators include "transit vehicle Operator", "Other Traffic Management" (such as a traffic management center that is outside of the study area but that still interacts with entities within the study area), and "Financial Institution" (such as a bank that holds revenues from transit fares or toll collection).

Architecture Flows

An architecture flow is simply the information that is exchanged between subsystems and terminators in the physical architecture. These architecture flows and their communication requirements define the interfaces that form the basis for much of the ongoing standards work in the National ITS Architecture program. The current USDOT guidelines require that a Regional ITS Architecture be developed at a sufficient level of detail to show subsystems and architecture flows.

Service Packages

Service packages (formerly called market packages) provide an accessible, deployment-oriented perspective to the National Architecture. Service packages group various elements of the physical architecture (subsystems, equipment packages, architecture flows, and terminators) together to provide a specific ITS service. A key step in the Regional ITS Architecture development process is selecting which service packages are applicable to the region and the status of deployment (existing or planned) of each. From that point, the service packages are reviewed individually to determine which physical architecture components in each are applicable to the region.

As stated in the previous paragraph, service packages are essentially a grouping of the physical ITS elements that are needed to provide a particular ITS service. For example, in the National ITS Architecture, the service package "Regional Traffic Control" (shown in Figure 7–3) is made up of the subsystems "Traffic Management" and "Roadway", as well as the terminator "Other TM". The service to be provided is "regional traffic control". Key subsystems are Traffic Management and Roadway. The specific Equipment Package needed is "TMC Regional Traffic Management". This equipment package provides capabilities for analyzing, controlling, and optimizing area-wide traffic flow. These capabilities provide for integrating control of a network signal system with control of freeway devices, with the goal of providing the capability for real-time traffic adaptive control. The terminator "Other TM" shows that the information collected must be accessible by other traffic management centers. The architecture flow indicates that "road network conditions", "device control request", and other flows will be exchanged between the "Traffic Management" subsystem and "Other TM" terminator.

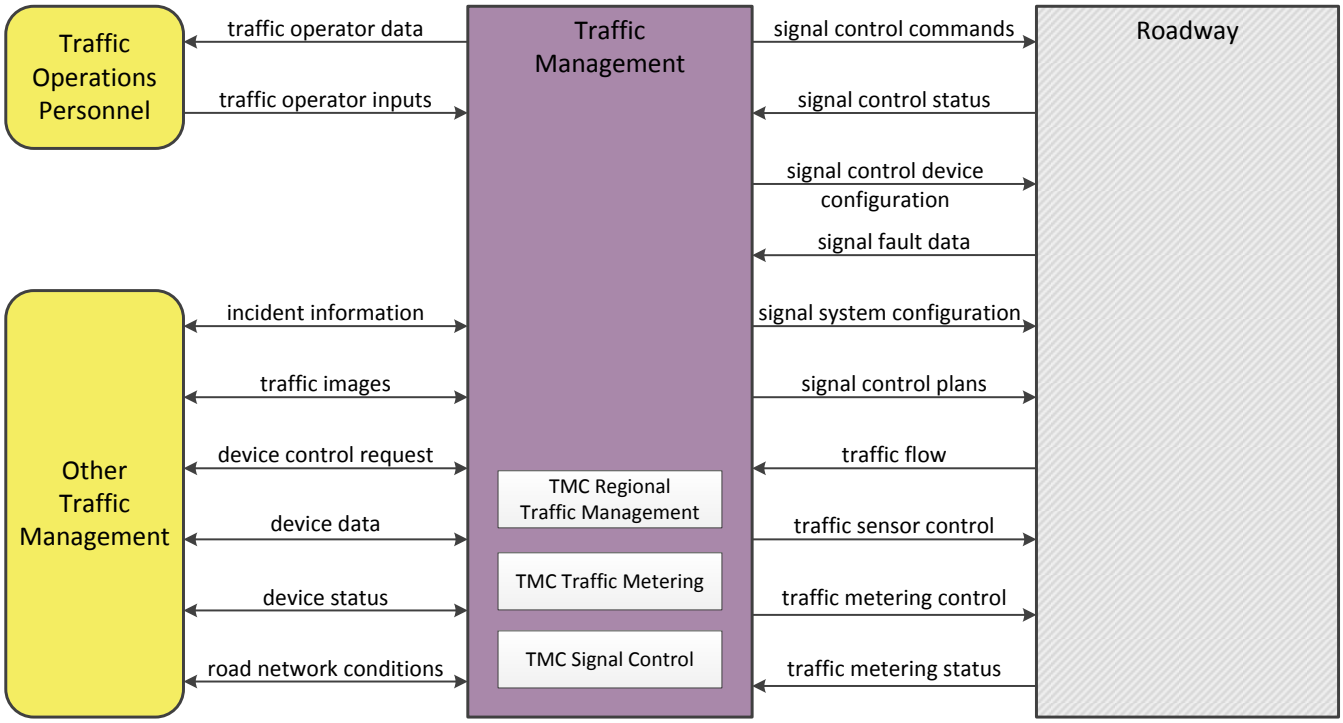


Figure 7–3: Example Service Package: Regional Traffic Control

Service packages are grouped in the National ITS Architecture based upon the category of the service provided as follows:

- **Archived Data Management (AD):** Store and retrieve transportation system information for future analysis.
- **Advanced Public Transportation Systems (APTS):** Manage transit operations and make transit use safer and more convenient.
- **Advanced Traveler Information Systems (ATIS):** Provide real-time information to travelers.
- **Advanced Traffic Management Systems (ATMS):** Manage operation of the roadway network.
- **Advanced Vehicle Safety Systems (AVSS):** Add capability for improved safety to vehicles. Generally, these are private-sector industry initiatives.
- **Commercial Vehicle Operations (CVO):** Provide for the electronic monitoring of commercial vehicle safety assurance and regulation and exchange of related information.
- **Emergency Management (EM):** Manage emergency response operations.
- **Maintenance and Construction Management (MC):** Manage maintenance and construction activities and operations.

Finally, service packages can be traced back to corresponding User Services to show how a given Service Package is relevant to a region. In Turbo Architecture, the subsystems and terminators assigned to a region's ITS inventory lead to the selection of appropriate service packages.

Service Packages Selected for the Treasure Valley Regional ITS Architecture

Based on the operational needs identified by stakeholder agencies in the Operational Concept, the project Technical Working Group reviewed and selected the appropriate service packages from the National ITS Architecture that are included in the Treasure Valley Regional ITS Architecture. These selections are summarized in the tables on the following pages, organized by Service Area.

Legend: ***Black*** *– Included in the Treasure Valley Regional ITS Architecture*
~~*Strikeout*~~ *– Omitted from the Treasure Valley Regional ITS Architecture*

SERVICE PACKAGE	SERVICE PACKAGE NAME	REMARKS
AD1	ITS Data Mart	Supports agency-level data archiving
AD2	ITS Data Warehouse	Deploying through planned Regional Transportation Data Archive project to support regional, multimodal archiving through physical and/or virtual integration
AD3	ITS Virtual Data Warehouse	Deploying through planned Regional Transportation Data Archive project to support regional, multimodal archiving through physical and/or virtual integration

Table 7–2: Archived Data Management Service Area

SERVICE PACKAGE	SERVICE PACKAGE NAME	REMARKS
APTS01	Transit Vehicle Tracking	Existing and planned CAD/AVL systems
APTS02	Transit Fixed-Route Operations	Existing and planned CAD/AVL systems
APTS03	Demand Response Transit Operations	Existing and planned CAD/AVL systems
APTS04	Transit Fare Collection Management	Exists plus planned project for future integration between transit and rideshare programs
APTS05	Transit Security	Planned projects for on-board and facility security projects
APTS06	Transit Fleet Management	Existing and planned CAD/AVL systems
APTS07	Multi-modal Coordination	Planned project
APTS08	Transit Traveler Information	Exists plus planned projects for future enhancements
APTS09	Transit Signal Priority	Planned projects
APTS10	Transit Passenger Counting	Planned projects
APTS11	Multimodal Connection Protection	Planned project

Table 7–3: Advanced Public Transportation Systems Service Area

SERVICE PACKAGE	SERVICE PACKAGE NAME	REMARKS
ATIS01	Broadcast Traveler Information	Core regional ATIS function
ATIS02	Interactive Traveler Information	Supports basic trip planning and real-time route information
~~ATIS03~~	Autonomous Route Guidance	Service package relies on in-vehicle sensory equipment; not identified as a regional priority
~~ATIS04~~	Dynamic Route Guidance	Requires ATIS03; not identified as a regional priority
ATIS05	Internet Service Provider Based Trip Planning and Route Guidance	Supports existing and planned third-party services
ATIS06	Transportation Operations Data Sharing	Core multimodal transportation system management function
ATIS07	Travel Services Information and Reservation	Potential future 511 or third-party Internet Service Provider service
~~ATIS08~~	Dynamic Ridesharing	Not identified as a priority need
~~ATIS09~~	In Vehicle Signing	Dependent on in-vehicle technology led by vehicle manufacturers
~~ATIS10~~	Short Range Communications Traveler Information	Dependent on in-vehicle technology led by vehicle manufacturers

Table 7–4: Advanced Traveler Information Systems Service Area

SERVICE PACKAGE	SERVICE PACKAGE NAME	REMARKS
ATMS01	Network Surveillance	Core regional ATMS function
ATMS02	Traffic Probe Surveillance	Potential for deployment through public system and/or commercial data sources
ATMS03	Traffic Signal Control	Core regional ATMS function
ATMS04	Traffic Metering	Planned projects for interstate system
~~ATMS05~~	HOV Lane Management	Identified as emerging strategy for consideration in future architecture updates
ATMS06	Traffic Information Dissemination	Core regional ATMS function
ATMS07	Regional Traffic Management	Core regional ATMS function
ATMS08	Traffic Incident Management System	Core regional ATMS function
ATMS09	Transportation Decision Support and Demand Management	Potential regional application, e.g., with upgraded ATMS functionality
~~ATMS10~~	Electronic Toll Collection	Identified as emerging strategy for consideration in future architecture updates
~~ATMS11~~	Emissions Monitoring and Management	Not identified as a priority need
ATMS12	Roadside Lighting System Control	Identified as emerging strategy for consideration in future architecture updates
ATMS13	Standard Railroad Grade Crossing	Covers operations at a standard rail crossing
~~ATMS14~~	Advanced Railroad Grade Crossing	No highway grade crossings with rail operational speeds above 80 mph
~~ATMS15~~	Railroad Operations Coordination	Requires high degree of rail-highway operational coordination – not identified as a priority need
ATMS16	Parking Facility Management	Planned projects
ATMS17	Regional Parking Management	Scope will be determined as part of the planned Parking Information Regional Concept for Transportation Operations
~~ATMS18~~	Reversible Lane Management	Not identified as a priority need
ATMS19	Speed Warning and Enforcement	Includes warning drivers when their speed is excessive. Provides safe speed advisories given limitation for the geometry of the roadway. Can be deployed without enforcement.
~~ATMS20~~	Drawbridge Management	Not identified as a priority need
~~ATMS21~~	Roadway Closure Management	Not identified as a priority need
ATMS22	Variable Speed Limits	Active traffic management identified as an emerging strategy for consideration in future architecture updates
~~ATMS25~~	VMT Road User Payment	Not currently planned in Idaho State
ATMS26	Mixed Use Warning Systems	Provides for multimodal safety/warning systems – e.g., crosswalks and train crossings

Table 7–5: Advanced Traffic Management Systems Service Area

SERVICE PACKAGE	SERVICE PACKAGE NAME	REMARKS
~~AVSS01~~	Vehicle Safety Monitoring	Service packages described in this Service Area rely heavily on deployment of in-vehicle intelligence and systems that are still in research and development stages. Deployment opportunities should be re-visited as these applications reach maturity and gain market penetration.
~~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	

Table 7–6: Advanced Vehicle Safety Systems Service Area

SERVICE PACKAGE	SERVICE PACKAGE NAME	REMARKS
~~CVO01~~	Carrier Operations and Fleet Management	Commercial vehicle operations (CVO) systems are primarily statewide and national in nature, without significant interaction with local agencies and systems. CVO services are covered in the ITD Statewide ITS Architecture.
~~CVO02~~	Freight Administration	
~~CVO03~~	Electronic Clearance	
~~CVO04~~	Commercial Vehicle Administrative Processes	
~~CVO05~~	International Border Electronic Clearance	
~~CVO06~~	Weigh-In-Motion	
~~CVO07~~	Roadside CVO Safety	
~~CVO08~~	On-board CVO Safety	
~~CVO09~~	CVO Fleet Maintenance	
~~CVO10~~	HAZMAT Management	
~~CVO11~~	Roadside HAZMAT Security Detection and Mitigation	
~~CVO12~~	Commercial Vehicle Driver Security Authentication	
~~CVO13~~	Freight Assignment Tracking	

Table 7–7: Commercial Vehicle Operations Service Area

SERVICE PACKAGE	SERVICE PACKAGE NAME	REMARKS
EM01	Emergency Call-Taking and Dispatch	Support for core emergency management dispatch functionality
EM02	Emergency Routing	Planned project to use ATMS/roadway conditions to support emergency routing
EM03	Mayday and Alarms Support	StateComm is currently implementing a project to support mayday systems (e.g., OnStar)
EM04	Roadway Service Patrols	Supports ITD's incident response program
~~EM05~~	Transportation Infrastructure Protection	Not identified as a priority need
EM06	Wide-Area Alert	Potential use for agency ATIS infrastructure
~~EM07~~	Early Warning System	Not identified as a priority need
EM08	Disaster Response and Recovery	Scope will be defined in a planned Incident and Emergency Management Regional Concept for Transportation Operations
EM09	Evacuation and Reentry Management	Scope will be defined in a planned Incident and Emergency Management Regional Concept for Transportation Operations
EM10	Disaster Traveler Information	Potential use for agency ATIS infrastructure

Table 7–8: Emergency Management Service Area

SERVICE PACKAGE	SERVICE PACKAGE NAME	REMARKS
MC01	Maintenance and Construction Vehicle and Equipment Tracking	Planned projects to track snow plows for maintenance support and traveler information
~~MC02~~	Maintenance and Construction Vehicle Maintenance	Not identified as a priority need
MC03	Road Weather Data Collection	Supports basic RWIS functions
MC04	Weather Information Processing and Distribution	Supports interagency RWIS information distribution
~~MC05~~	Roadway Automated Treatment	Not identified as a priority need
MC06	Winter Maintenance	Supports core maintenance operations like plowing and dispatch
MC07	Roadway Maintenance and Construction	Covers maintenance support and dispatch functions
MC08	Work Zone Management	Supports basic work zone ITS applications such as CCTV, DMS, and HAR
~~MC09~~	Work Zone Safety Monitoring	Highly degree of automation implied; not identified as a priority need
MC10	Maintenance and Construction Activity Coordination	Planned projects to support interagency information sharing and activity coordination
~~MC11~~	Environmental Probe Surveillance	Not identified as a priority need
~~MC12~~	Infrastructure Monitoring	Not identified as a priority need

Table 7–9: Maintenance and Construction Management Service Area

Turbo Architecture

Turbo Architecture version 7.0 is a software application used as a tool for developing regional and project-level ITS Architectures that are compliant with Version 7 of the National ITS Architecture. The benefit of using Turbo Architecture to create and store an ITS Architecture is that the architecture is developed using a standardized format that can be easily "handed off" from the original developer to subsequent users who will be updating and maintaining the architecture. Customized diagrams and reports can be easily created by the user and shared with colleagues during the detailed design of individual ITS applications and projects.

- **Inventory of Systems and Stakeholders:** The region's existing and planned ITS inventory, as documented through "Chapter 3: Existing Conditions" and "Chapter 6: Operational Concept", were used as input to the Turbo Architecture database. Relevant National ITS Architecture subsystem(s), terminator(s), and a primary stakeholder were assigned to each new inventory element. The ITS inventory and mapping to National ITS Architecture elements provides the basis for each step that follows in the architecture development. The ITS inventory was compiled at an overview level and not an "equipment" level, for the purpose of keeping the database at a manageable, usable size.
- **Selection of Service Packages:** Based upon the ITS inventory, and an understanding of planned and needed ITS applications in the Treasure Valley, service packages from the National ITS Architecture were selected for inclusion in the Regional ITS Architecture and relevant ITS inventory elements assigned to each service packages.
- **ITS Functionality:** ITS functional areas, related ITS elements, and general system functional requirements were selected in support of the existing and planned ITS in the region.
- **ITS Standards:** ITS standards that could potentially support compatibility and interoperability among regional transportation systems were selected. Regional stakeholders plan to use the national ITS standards to the extent applicable and work together to determine which standards to use and how.
- **Interconnects and Flows Customization:** An ITS Architecture defines flows of information that are exchanged between subsystems. A key task in Turbo Architecture is customizing the selection of flows between subsystems so that the appropriate flows are included as part of the architecture database. This information may then be output by the user as customized physical architecture flow diagrams.

An important benefit of using Turbo Architecture is the wide range of options for preparing customized diagrams and reports based upon the regional ITS architecture developed during this process. These reports and diagrams can be "filtered" to focus on selected ITS elements, depending on the needs of the user.

There are three types of diagrams that may be displayed or printed by the Turbo Architecture software[4]:

- **Subsystem Diagram –** The "subsystem" (communications) diagram illustrates the methods that are used to communicate between the subsystems selected for that region or project. These include fixed-point to fixed-point, wide area wireless, dedicated short range, and vehicle-to-vehicle communications. The subsystem diagram is functionally identical to Figure 7–2, but it is customized to show only the subsystems relevant to the region.
- **Interconnect Diagram –** The "interconnect" diagram illustrates the interconnections between element/stakeholder pairs selected for the region or a specific project. This diagram captures the physical interfaces between ITS entities by showing a simple line connection between them.
- **Flow Diagram –** The architecture "flow" diagram illustrates the flow of data between the element/stakeholder pairs selected for the region or a specific project. The flow of data appears as physical architecture flows (one or many) connecting the elements to each other. The direction of the flow of data also appears between the architecture flows and the other physical entities.

Three different types of diagrams are available for the "interconnect" and "flow" diagrams:

4 Source: Turbo Architecture version 7.0 User's Manual, pg 155, February 2012.

- Full architecture flow or interconnect diagram for the region.
- An architecture flow or interconnect diagram that illustrates the connections surrounding a single element/stakeholder, also known as a context diagram.
- An architecture flow or interconnect diagram that illustrates the connections between multiple (user selected) element/stakeholder pairs.

Key reports that are available from Turbo Architecture include the following[5]:

- **Stakeholder –** Report showing identified stakeholder names, descriptions, and associated inventory elements,
- **Inventory –** Report presenting all identified inventory elements with associated entities and stakeholders. The "Inventory" report shows the element inventory for the selected architecture.
- **Service Packages –** Report showing National ITS Architecture service packages assigned to the region.
- **Interconnects –** Report showing the architecture flows assigned to the region.
- **Functional Requirements –** Report showing the functional areas and requirements based on the service packages choices. The functional areas directly relate to the Equipment Packages in the National ITS Architecture.
- **Standards Activities –** Report consisting of relationships between ITS standards activities and applicable Regional Architecture flows. This report lists all standards activities applicable for the region.

Turbo Architecture allows for the generation of HTML web pages to display much of this information. Given the large amount of data generated, the web pages provide a familiar interface for browsing the Regional Architecture and an easy means of sharing the Regional Architecture with stakeholders. The remaining sections of this document provide a summary of the information in the Turbo Architecture database, which is posted on the COMPASS website (www.compassidaho.org).

5 Source: Turbo Architecture version 7.0 User's Manual, February 2012

ITS Stakeholders

Identifying stakeholders is an important task in ITS architecture development since effective ITS involves the integration of multiple stakeholders and their transportation systems. This section describes the stakeholders who either participated in the creation or updates of the Treasure Valley Regional ITS Architecture or whom the participating stakeholders felt were needed to be included in the architecture. Every stakeholder in this section is related to one or more of the transportation inventory elements described in the next section.

STAKEHOLDER NAME	STAKEHOLDER DESCRIPTION
ADA COUNTY HIGHWAY DISTRICT	ACHD is responsible for the construction, operation, and maintenance of county roads, as well as coordinating with other transportation agencies in the region. The district includes Boise, Eagle, Garden City, Kuna, Meridian, Star and unincorporated areas of Ada County.
ARCHIVED DATA USERS	End-user of archived data, including engineers, planners, and stakeholders of public and private entities, along with travelers.
BOISE AIRPORT	The airport authority responsible for operations, construction, and maintenance at the Boise Airport (Gowen Field).
BOISE STATE UNIVERSITY	Local state university responsible for traffic operations and parking management on the university, and coordinates with other agencies in the region for event planning and operations (e.g., football games).
CANYON COUNTY	Canyon County governmental authority, responsible for the construction, operation and maintenance of county facilities, and coordinates with other agencies on regional transportation issues. Portions of Nampa Highway District No. 1 and Canyon Highway District No. 4 are located in the Nampa urbanized area.
CAPITAL CITY DEVELOPMENT CORPORATION	Capital City Development Corporation (CCDC) is the redevelopment agency for downtown Boise. It is an independent public agency that serves as a catalyst for private development through urban design, economic development, and infrastructure investment.
CITY OF BOISE	Boise governmental authority, responsible for parking management. Coordinates with other agencies on regional transportation issues.
CITY OF CALDWELL	Caldwell governmental authority, responsible for arterial traffic management, incident/emergency management, road weather and maintenance operations, and traveler information. Coordinates with other agencies on regional transportation issues.
CITY OF EAGLE	Eagle governmental authority that coordinates with other agencies on regional transportation issues.
CITY OF GARDEN CITY	Garden City governmental authority that coordinates with other agencies on regional transportation issues.
CITY OF KUNA	Kuna governmental authority that coordinates with other agencies on regional transportation issues.
CITY OF MERIDIAN	Meridian governmental authority that coordinates with other agencies on regional transportation issues.
CITY OF MIDDLETON	Middleton governmental authority that coordinates with other agencies on regional transportation issues.

Table 7–10: ITS Stakeholders

STAKEHOLDER NAME	STAKEHOLDER DESCRIPTION
CITY OF NAMPA	Nampa governmental authority, responsible for arterial traffic management, incident/ emergency management, road weather and maintenance operations, and traveler information. Coordinates with other agencies on regional transportation issues.
CITY OF STAR	Star governmental authority that coordinates with other agencies on regional transportation issues.
COMPASS	The metropolitan planning organization for Ada and Canyon Counties.
COUNTY AND MUNICIPAL MAINTENANCE AND CONSTRUCTION DEPARTMENTS	This stakeholder includes the maintenance and construction departments for Ada County, Canyon County, and the cities of Boise, Caldwell, Eagle, Garden City, Kuna, Meridian, Middleton, Nampa, and Star.
COUNTY AND MUNICIPAL PUBLIC SAFETY DEPARTMENTS	All county and municipal public safety agencies responsible for law enforcement, fire, and EMS services in the Treasure Valley including, but not limited to, North Ada County Fire and Rescue District, Ada County Sheriff's Office, Canyon County Fire Districts, Canyon County Sheriff's Office, Boise Fire Department, Boise Police Department, Caldwell Fire Department, Caldwell Police Department, Eagle Fire Department, Eagle Police Department, Kuna Police Department, Kuna Rural Fire District, Meridian Fire Department, Meridian Police Department, Middleton Rural Fire District, Nampa Fire Department, Nampa Police Department, and Star Fire District.
COUNTY AND MUNICIPAL TRAVELER INFORMATION	Includes all county and municipal transportation agencies that provide traveler information, including Canyon County, and the cities of Boise, Caldwell, Eagle, Garden City, Kuna, Meridian, Middleton, Nampa, and Star.
FEDERAL HIGHWAY ADMINISTRATION	Although the FHWA does not have any associated inventory elements, they review the regional ITS architecture for compliance with national ITS architecture standards and eligibility for highway trust funds. They are also a member of the regional memorandum of agreement for coordinated planning of ITS in the region.
FINANCIAL INSTITUTIONS	Banks involved in the transfer of funds for fare collection as well as for other fee based transportation services.
IDAHO BUREAU OF HOMELAND SECURITY	Facilitates emergency management in Idaho.
IDAHO DEPARTMENT OF HEALTH AND WELFARE	Provides services to residents of Idaho to promote health and safety, including freeway/arterial traffic management, incident/emergency management, road weather and maintenance operations, and traveler information.
IDAHO STATE POLICE	Statewide law enforcement agency responsible for state response to emergencies, and coordinates with other agencies for traffic control and management and incident response and management.

Table 7-10: ITS Stakeholders (continued)

STAKEHOLDER NAME	STAKEHOLDER DESCRIPTION
IDAHO STATEWIDE INTEROPERABILITY EXECUTIVE COUNCIL AND ITD DISTRICT 3 INTEROPERABILITY GOVERNANCE BOARD (DIGB3)	Creates centralized interoperable communications planning and implementation at a statewide and district level.
IDAHO TRANSPORTATION DEPARTMENT - DISTRICT 3	Covers the Treasure Valley region and is responsible for the maintenance, operation, and construction of state and federal highways in the region, as well as coordinating with other transportation agencies in the region.
IDAHO TRANSPORTATION DEPARTMENT - DIVISION OF TRANSPORTATION PERFORMANCE	Comprised of public transportation and transportation planning.
IDAHO TRANSPORTATION DEPARTMENT - HEADQUARTERS	Statewide agency responsible for the operation, construction, and maintenance of state and federal highways, as well as coordinating with other agencies in the Treasure Valley region.
MAYDAY SERVICE PROVIDERS	Mayday service providers (e.g., OnStar, ATX, AAA, RESCU) that provide traveler assistance through an interface in personal vehicles.
MEDIA	Includes commercial media companies who disseminate traveler information to the public.
NATIONAL WEATHER SERVICE	Collects, stores, and disseminates weather condition information to their website, regional communications centers, ITD, counties, and cities in Idaho.
OREGON DEPARTMENT OF TRANSPORTATION	Includes all divisions (except Motor Carrier), regions, and districts within ODOT involved with ITS. ODOT Region 5 is located adjacent to Idaho.
OTHER EVENT MANAGERS	Includes special event promoters that have knowledge of events that may impact travel on roadways or other modal means. Examples of special events include sporting events, conventions, fairs, motorcades/parades, and public/political events. These promoters provide event information such as date, time, estimated duration, location, potential roadway impacts, event transit service, and any other information pertinent to travel in the surrounding area.
OTHER PUBLIC TRANSPORTATION PROVIDERS	Includes all public agencies that provide transit services (except for Treasure Valley Transit and Valley Regional Transit). They provide fixed-route and demand response services.
PRIVATE TRANSPORTATION PROVIDERS	Includes commercial companies that provide transit routes interregionally and interstate, such as Greyhound Bus Service, Sun Valley Express, Northwestern Stage Lines, Salt Lake Express, and Amtrak.
PRIVATE UTILITIES	Included because traffic impacts resulting from utility maintenance and construction need to be coordinated with regional transportation management agencies.

Table 7-10: ITS Stakeholders (continued)

STAKEHOLDER NAME	STAKEHOLDER DESCRIPTION
REGIONAL EMERGENCY MANAGEMENT	Responsible for emergency management and coordination in the event of a disaster, including mitigation, preparedness, response, and recovery. Key agencies include Ada City-County Emergency Management, Canyon County Office of Emergency Management, and municipal emergency management departments (e.g., Boise, Meridian, Nampa, and Caldwell).
REGIONAL RADIO COMMUNICATIONS CONSORTIUM	Promotes interoperability of radio systems among emergency management agencies in the Treasure Valley.
THIRD-PARTY TRANSPORTATION DATA PROVIDERS	Private companies that collect transportation data (e.g., vehicle/cell phone probe data).
THIRD-PARTY TRANSPORTATION INFORMATION SERVICE PROVIDERS	Private companies that provide transportation information to travelers.
TRAVELERS	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.
TREASURE VALLEY FARE MANAGEMENT AGENCIES	This group includes agencies that will likely be involved with the regional fare payment system.
TREASURE VALLEY TRANSIT	TVT provides Medicaid transportation for the eight rural counties in ITD District 3 and operates Mountain Community Transit, Mountain Home Community Transit, and Snake River Transit.
TREASURE VALLEY TRANSIT MANAGEMENT AGENCIES	Includes agencies involved with the GoRide System.
TREASURE VALLEY TRANSPORTATION MANAGEMENT AGENCIES	Includes agencies that will likely interface with the regional virtual TMC.
UNIVERSITY OF IDAHO	State university responsible for traffic operations and parking management on the university, and coordinates with other agencies in the region for event planning.
VALLEY REGIONAL TRANSIT	Regional public transportation authority for Ada and Canyon Counties. They provide transit service (ValleyRide) and manage operations.

Table 7-10: ITS Stakeholders (continued)

ITS Inventory

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

This section describes every surface transportation inventory element for the region. A transportation element can be a center, vehicle, traveler, or field equipment. Each transportation element listed in Table 7–11 has one or more stakeholders associated with it. In order to reduce the complexity of the architecture, some transportation elements with similar functionality have been grouped together. Each transportation inventory element is mapped to at least one National ITS Architecture entity.

ELEMENT NAME	ELEMENT DESCRIPTION	STAKEHOLDER	ELEMENT STATUS
ADA COUNTY HIGHWAY DISTRICT COMMUTERIDE RIDESHARING SYSTEM	The Commuteride program provides ridematching services that put travelers in touch with other commuters based on home and work locations and work schedules. The program includes vanpooling, carpooling, park and ride lots, and incentives for employers and commuters.	Ada County Highway District	Existing
ADA COUNTY HIGHWAY DISTRICT COMMUTERIDE VEHICLES	ACHD vanpool fleet used for Commuteride vanpool program.	Ada County Highway District	Existing
ADA COUNTY HIGHWAY DISTRICT FIELD EQUIPMENT	Roadside equipment includes any and all equipment distributed on and along the roadway that monitors and controls traffic. Key infrastructure includes, but is not limited to, traffic signals, CCTV cameras, DMS, traffic data stations, and weather stations.	Ada County Highway District	Existing
ADA COUNTY HIGHWAY DISTRICT TRAFFIC MANAGEMENT CENTER	ACHD has been operating a state-of-the-art TMC since January 2000. Operators at the TMC manage the day-to-day operations and maintenance of the roadway network (freeway and arterial) within Ada County, monitor and respond to traffic demand associated with incidents, and disseminate traveler information. The TMC operates from 5:30 a.m. to 6:30 p.m. Monday through Friday. ACHD also staffs the TMC for Boise State University football games, heavy shopping days (e.g., day after Thanksgiving), and other special events. This inventory element also represents all systems (e.g., advanced traffic management system, central traffic signal system) used at the TMC.	Ada County Highway District	Existing

Table 7–11: ITS Inventory

ELEMENT NAME	ELEMENT DESCRIPTION	STAKEHOLDER	ELEMENT STATUS
AGENCY DATA MART	This element represents any data mart housed by any traffic or transit agency within this regional architecture.		Existing
ARCHIVED DATA USER SYSTEMS	Users or systems that request or process archived data and products from the regional transportation data archive.	Archived Data Users	Existing
BOISE AIRPORT FIELD EQUIPMENT	Roadside equipment including any and all equipment distributed on and along the roadway that monitors and controls traffic.	Boise Airport	Existing
BOISE AIRPORT MANAGEMENT CENTER	Center managing airport activities, collecting and sharing information about transportation network with travelers.	Boise Airport	Existing
BOISE AIRPORT PARKING MANAGEMENT	Center managing the roadside equipment for parking, collecting data, and sharing information with travelers regarding parking.	Boise Airport	Existing
BOISE AIRPORT TRAVELER INFORMATION SYSTEM	System that provides information to travelers about the airport through means of the Boise Airport website, media, and personal information devices.	Boise Airport	Existing
BOISE PARKING MANAGEMENT	Center that collects parking data, manages roadside equipment and provides traveler parking information.	City of Boise	Existing
BOISE STATE UNIVERSITY SHUTTLE BUSES (BRONCO SHUTTLE)	Runs during the university's fall, winter, and spring terms on the Boise State University campus. The buses have location tracking devices in them.	Boise State University	Planned
BOISE STATE UNIVERSITY TRAFFIC MANAGEMENT CENTERS	Boise State University has a TMC at Bronco Stadium used for special event management and parking management as well as a TMC dedicated to research. Boise State University works closely with ACHD for special event management, particularly football games.	Boise State University	Existing
CALDWELL FIELD EQUIPMENT	Roadside equipment includes any and all equipment distributed on and along the roadway that monitors and controls traffic. Key infrastructure includes, but is not limited to, traffic signals. In the future this will likely include CCTV cameras and traffic data stations.	City of Caldwell	Existing

Table 7-11: ITS Inventory (continued)

ELEMENT NAME	ELEMENT DESCRIPTION	STAKEHOLDER	ELEMENT STATUS
CALDWELL TRAFFIC SIGNAL LAB	The primary responsibilities of the street department are the operations and maintenance of the Caldwell roadway network. Maintenance crews help support traffic control activities on an as-needed basis for incidents and other events. The city manages operations and maintenance from their business offices during normal hours of business. A traffic signal lab is being planned as part of a new city building. The lab will be used to support operations and maintenance functions and will not include formal staffing. This inventory element also represents all systems (e.g., central traffic signal system) used for Caldwell ITS services.	City of Caldwell	Planned
CANYON COUNTY HIGHWAY DISTRICT OFFICES	The district offices for Nampa Highway District No. 1 and Canyon Highway District No. 4 effectively serve as the centers for providing rural traffic management and road weather and maintenance operations.	Canyon County	Existing
CANYON COUNTY FIELD EQUIPMENT	Roadside equipment includes any and all equipment distributed on and along the roadway that monitor and control traffic. This includes, but is not limited to, weather stations and portable speed monitoring/feedback carts.	Canyon County	Existing
CAPITAL CITY DEVELOPMENT CORPORATION PARKING MANAGEMENT	The parking management center collects parking data, manages roadside equipment, and provides traveler parking information in downtown Boise.	Capital City Development Corporation	Existing
COUNTY 911 CENTERS	The Ada County 911 Communications Center and Canyon County 911 Communications Center are the two PSAPs in the Treasure Valley. They are responsible for answering calls for law enforcement, fire, and life safety services. They also provide dispatch services for a number of public safety agencies.	County and Municipal Public Safety Departments	Existing
COUNTY AND MUNICIPAL MAINTENANCE AND CONSTRUCTION SHOPS	Includes all management of roadway maintenance and construction activities by county or municipal agencies throughout the Treasure Valley.	County and Municipal Maintenance and Construction Departments	Existing

Table 7-11: ITS Inventory (continued)

ELEMENT NAME	ELEMENT DESCRIPTION	STAKEHOLDER	ELEMENT STATUS
COUNTY AND MUNICIPAL MAINTENANCE AND CONSTRUCTION VEHICLES	Includes all maintenance and construction vehicles operated by county or municipal agencies throughout the Treasure Valley. Some agencies use these vehicles to respond to roadway incidents.	County and Municipal Maintenance and Construction Departments	Existing
COUNTY AND MUNICIPAL PUBLIC SAFETY DISPATCH CENTERS	Centers that dispatch law enforcement, fire, and life safety emergency vehicles and personnel throughout the Treasure Valley.	County and Municipal Public Safety Departments	Existing
COUNTY AND MUNICIPAL PUBLIC SAFETY VEHICLES	Law enforcement, fire, and life safety emergency vehicles for the Treasure Valley.	County and Municipal Public Safety Departments	Existing
COUNTY AND MUNICIPAL TRAVELER INFORMATION SYSTEMS	Systems that provide information to travelers throughout the Treasure Valley by using interfaces such as websites, telephone numbers, and smart phone applications.	County and Municipal Traveler Information	Existing
EMERGENCY OPERATIONS CENTERS	Centers that manage major emergencies within the Treasure Valley.	Regional Emergency Management	Existing
FINANCIAL INSTITUTION	Banks involved in the transfer of funds for fare collection as well as for other fee based transportation services.	Financial Institution	Existing
GORIDE SYSTEM	Includes shared VRT and TVT demand response management software with interface to American Medical Response Medicaid services also supports commuter carpool/ridesharing for Ada and Canyon Counties.	Transit Management Agencies	Planned
GOWEN FIELD STATE EMERGENCY OPERATIONS CENTER	Center located at a military base in Boise that manages statewide emergencies in Idaho.	Idaho Bureau of Homeland Security	Existing
IDAHO - TRANSPORTATION REIMBURSEMENT, INTEGRATION, AND PERFORMANCE SYSTEM (I-TRIPS)	A web-based system to apply for and manage transportation projects. TVT and VRT are required to report transit operations performance to I-TRIPS.	Idaho Transportation Department - Division of Transportation Performance	Existing

Table 7-11: ITS Inventory (continued)

ELEMENT NAME	ELEMENT DESCRIPTION	STAKEHOLDER	ELEMENT STATUS
IDAHO 511/WEB SERVICE	A statewide phone-based and web-based traveler information system providing road and weather condition information to travelers.	Idaho Transportation Department - Headquarters	Existing
IDAHO STATE POLICE REGIONAL COMMUNICATIONS CENTER SOUTH	Center dispatches Idaho State Police vehicles and personnel for the Treasure Valley from Meridian; co-located with StateComm	Idaho State Police	Existing
IDAHO STATE POLICE VEHICLES	Emergency response vehicles for the Idaho State Police.	Idaho State Police	Existing
IDAHO TRANSPORTATION DEPARTMENT DISTRICT 3 MAINTENANCE SHOP	Manages the operations and maintenance of state routes for 10 counties as described in the Idaho ITS Strategic Plan (March 2011). In the Treasure Valley ITD manages operations and maintenance from their maintenance shop and business offices during normal hours of business as well as 24/7/365 with on call operations employees. ITD also partners with StateComm for around the clock response to incidents and other traffic events. Key focus areas in the Treasure Valley include management of freeways and urban arterials, incident management, winter operations, and traveler information dissemination. This inventory element also represents all systems (e.g., advanced traffic management system, central traffic signal system) used at the maintenance shop.	Idaho Transportation Department - District 3	Existing
IDAHO TRANSPORTATION DEPARTMENT FIELD EQUIPMENT	Roadside equipment includes any and all equipment distributed on and along the roadway that monitors and controls traffic. Key infrastructure includes, but is not limited to, traffic signals, CCTV cameras, DMS, HAR, traffic data stations, and weather stations.	Idaho Transportation Department - District 3	Existing
IDAHO TRANSPORTATION DEPARTMENT INCIDENT RESPONSE VEHICLES	Roving patrol vehicles on freeways that respond to incidents and stranded motorists.	Idaho Transportation Department - District 3	Existing

Table 7-11: ITS Inventory (continued)

ELEMENT NAME	ELEMENT DESCRIPTION	STAKEHOLDER	ELEMENT STATUS
IDAHO TRANSPORTATION DEPARTMENT MAINTENANCE AND CONSTRUCTION VEHICLES	Maintenance and construction vehicles operated by ITD; may also be used to support incident response as needed.	Idaho Transportation Department - District 3	Existing
MAYDAY SERVICE CENTERS	Mayday services (e.g., OnStar, AAA, ATX, RESCU) that provide traveler assistance via communications between a service center and a vehicle.	Mayday Service Providers	Existing
MEDIA	Information systems that provide traffic reports, travel conditions, and other transportation-related news services to the traveling public through radio, TV, and other media.	Media	Planned
NAMPA FIELD EQUIPMENT	Includes any and all equipment distributed on and along the roadway that monitors and controls traffic. Key infrastructure includes, but is not limited to, traffic signals, video detection, and traffic data stations. In the future this will likely include CCTV cameras.	City of Nampa	Existing
NAMPA TRAFFIC SIGNAL SHOP	Effectively serves as the center for arterial traffic management. The City of Nampa manages operations and maintenance during normal hours of business. Maintenance crews help support traffic control activities on an as-needed basis for incidents and other events. This inventory element also represents all systems (e.g., central traffic signal system) used for Nampa ITS services.	City of Nampa	Existing
NATIONAL WEATHER SERVICE	Collect, stores, and disseminates weather condition information to their website, regional communications centers, ITD, counties, and cities in Idaho.	National Weather Service	Existing

Table 7-11: ITS Inventory (continued)

ELEMENT NAME	ELEMENT DESCRIPTION	STAKEHOLDER	ELEMENT STATUS
OREGON DEPARTMENT OF TRANSPORTATION REGION 5 DISTRICT OFFICES	District offices (Districts 12 and 13) within Oregon's Region 5 operate as Transportation Operations Center System (TOCS) during normal business hours and the Region 4 TOCS (in Bend) acts as the Region 5 TOCS after hours. This element includes the TOCS, which is a comprehensive hardware and software platform for all ODOT TOCS that provides a unified, statewide platform for around the clock coordination of transportation related services between internal and external customers. TOCS is being implemented in several stages with functions in the following areas: traffic/event management, incident/emergency management (including a possible link to WebEOC), maintenance operations, winter operations, device management, traveler information, and data archival/reporting.	Oregon Department of Transportation	Existing
OTHER EVENT MANAGEMENT	Includes management of special events that may impact travel on roadways or other modal means. Examples of special events include sporting events, conventions, fairs, motorcades/parades, and public/political events.	Other event managers	Existing
OTHER PUBLIC TRANSPORTATION DISPATCH CENTERS	Centers that manage other public transportation services in the Treasure Valley (excludes Treasure Valley Transit and Valley Regional Transit).	Other Public Transportation Providers	Existing
OTHER PUBLIC TRANSPORTATION VEHICLES	Vehicles used by other public transportation agencies (excludes Treasure Valley Transit and Valley Regional Transit).	Other Public Transportation Providers	Existing
PERSONAL INFORMATION DEVICES	Equipment an individual owns and can personalize with their choices for information about transportation networks. Examples include smart phones and internet-connected personal computers.	Travelers	Existing
PERSONAL VEHICLES	Vehicles used by the traveling public, which may receive and transmit information to travelers, roadside devices, or other vehicles.	Travelers	Existing
PRIVATE TRANSPORTATION PROVIDER DISPATCH CENTERS	Centers that manage private transportation services in the Treasure Valley.	Private Transportation Providers	Existing

Table 7-11: ITS Inventory (continued)

ELEMENT NAME	ELEMENT DESCRIPTION	STAKEHOLDER	ELEMENT STATUS
PRIVATE TRANSPORTATION PROVIDER VEHICLES	Vehicles used by private transportation agencies.	Private Transportation Providers	Existing
PRIVATE UTILITIES	Private utility companies or employees that may provide information about work that may impact travel (e.g., lane or road closures).	Private Utilities	Existing
REGIONAL FARE PAYMENT CARD	Fare payment cards are currently available for VRT transit services. In the future it is envisioned that this card will be expanded to potentially include TVT transit services, parking, and bike sharing.	Travelers	Existing
REGIONAL FARE PAYMENT SYSTEM	Planned system to manage payment for transit fares, parking fees, and a bike sharing system.	Treasure Valley Fare Management Agencies	Planned
STATE EMS COMMUNICATIONS CENTER (STATECOMM)	Emergency management center that operates around the clock in Meridian. They are co-located with the Idaho State Police RCC. StateComm provides emergency dispatch and communications for EMS, ITD, hazardous material incidents, public health emergencies, AMBER alerts, and many other situations. They coordinate with agencies at the local, state, and federal levels depending on the scope of the incident. Approximately 65% of StateComm's operations focus on ITD activities. Medical and other emergencies take precedence at StateComm over day-to-day traffic management and operations.	Idaho Department of Health and Welfare	Existing
THIRD-PARTY TRANSPORTATION DATA PROVIDERS	Private companies that collect transportation data (e.g., vehicle/cell phone probe data).	Third-Party Transportation Data Providers	Existing
THIRD-PARTY TRANSPORTATION INFORMATION SERVICE PROVIDERS	Private companies that provide transportation information to travelers.	Third-Party Transportation Information Service Providers	Existing
TRAVELERS	The traveling public that access various modes of transportation, including surface street, air, rail/transit, and non-motorized. Includes personal and commercial vehicle operators.	Travelers	Existing

Table 7-11: ITS Inventory (continued)

ELEMENT NAME	ELEMENT DESCRIPTION	STAKEHOLDER	ELEMENT STATUS
TREASURE VALLEY REGIONAL COMMUNICATIONS INVENTORY AND ASSET MANAGEMENT SYSTEM	Inventory and asset management system for communications infrastructure in the Treasure Valley area including Ada and Canyon Counties as well as the cities of Boise, Caldwell, Eagle, Garden City, Kuna, Meridian, Middleton, Nampa, and Star.	COMPASS	Planned
TREASURE VALLEY REGIONAL MAINTENANCE AND CONSTRUCTION EVENT CLEARINGHOUSE	System that provides regional information about planned construction and maintenance events to facilitate interagency coordination and traveler information dissemination. The system includes the participation of ITD, Ada County, Canyon County, cities in the Treasure Valley, TVT, VRT, and private utility services.	County and Municipal Maintenance and Construction Departments	Planned
TREASURE VALLEY REGIONAL TRANSPORTATION DATA ARCHIVE	Will serve as a regional data clearinghouse and provide analytic tools for collecting, archiving, and sharing information for the Treasure Valley area including Ada and Canyon Counties as well as the cities of Boise, Caldwell, Eagle, Garden City, Kuna, Meridian, Middleton, Nampa, and Star.	COMPASS	Planned
TREASURE VALLEY REGIONAL VIRTUAL TRANSPORTATION MANAGEMENT CENTER	Virtual TMC that will connect StateComm, ITD, ACHD, Canyon County, and the cities of Nampa and Caldwell to provide cooperative traffic control and management capabilities. Interfaces will also be provided to TVT, VRT, and emergency management agencies for data sharing. A regional concept of transportation operations will be developed to establish the operating objectives, roles and responsibilities, and high level system requirements.	Treasure Valley Transportation Management Agencies	Planned
TREASURE VALLEY TRANSIT DISPATCH CENTER	Dispatch center in Nampa that manages TVT's fixed-route and demand response services. This inventory element also represents all systems (e.g., RouteMatch) used at the dispatch center.	Treasure Valley Transit	Existing
TREASURE VALLEY TRANSIT FARE PAYMENT SYSTEM	System that manages traveler's fare payments within TVT.	Treasure Valley Transit	Existing
TREASURE VALLEY TRANSIT SECURITY SYSTEMS	Monitoring and security systems implemented on-board vehicles and at bus stops/shelters.	Treasure Valley Transit	Existing
TREASURE VALLEY TRANSIT TRAVELER INFORMATION SYSTEM	System that provides information for travelers about TVT services, schedules, etc.	Treasure Valley Transit	Existing

Table 7-11: ITS Inventory (continued)

ELEMENT NAME	ELEMENT DESCRIPTION	STAKEHOLDER	ELEMENT STATUS
TREASURE VALLEY TRANSIT VEHICLES	Fixed-route and demand response vehicles used by TVT.	Treasure Valley Transit	Existing
VALLEY REGIONAL TRANSIT ASSET MANAGEMENT SYSTEM	Asset management system that keeps record of items that are property of VRT.	Valley Regional Transit	Existing
VALLEY REGIONAL TRANSIT BIKE SHARE MANAGEMENT SYSTEM	Central management and billing system for Boise Bike Share system.	Valley Regional Transit	Planned
VALLEY REGIONAL TRANSIT DISPATCH AND CALL CENTERS	Dispatch centers in Boise and Nampa as well as the Meridian Call Center. The dispatch centers manage VRT's fixed-route and demand response services. The call center is a one-call center for customer service. This inventory element also represents all systems (e.g., RouteMatch) used at the centers.	Valley Regional Transit	Existing
VALLEY REGIONAL TRANSIT FARE PAYMENT SYSTEM	System that manages traveler's fare payments within VRT.	Valley Regional Transit	Existing
VALLEY REGIONAL TRANSIT SECURITY SYSTEMS	Monitoring and security systems implemented on-board vehicles and at bus stops/shelters.	Valley Regional Transit	Existing
VALLEY REGIONAL TRANSIT TRAVELER INFORMATION SYSTEMS	Systems that provides information for travelers about VRT services, schedules, etc. including the valleyride.org website, transit trip planners (rideline.org, RideLine phone 345-RIDE), and links to statewide 511 transit traveler information services.	Valley Regional Transit	Existing
VALLEY REGIONAL TRANSIT VEHICLES	Fixed-route and demand response vehicles used by VRT. Transit vehicles include ITS devices that support the safe and efficient movement of passengers. These systems collect, manage, and disseminate transit-related information to the driver, operations and maintenance personnel, and transit system patrons.	Valley Regional Transit	Existing

Table 7-11: ITS Inventory (continued)

Architecture Use and Maintenance Plan

The purpose of the architecture use and maintenance plan is to support the development of integrated system management projects, support the regional transportation planning process, and to guide updates to the Treasure Valley Regional ITS Architecture so that it continues to accurately reflect the region's existing ITS capabilities and future plans.

Table 7–12 defines the where, who, when, and why of ITS architecture usage. The rest of the chapter describes how to use the architecture for project development and transportation planning and also defines the process for maintaining the Treasure Valley Regional ITS Architecture in the future.

WHERE DO I FIND THE ITS ARCHITECTURE?
COMPASS's website: http://www.compassidaho.org/.
WHO SHOULD USE THE ITS ARCHITECTURE?
All public agencies planning or implementing ITS projects or developing long-range transportation plans.
WHEN SHOULD I USE THE ITS ARCHITECTURE?
At the beginning of planning or implementation of all ITS related projects or during the development of long-range transportation plans.
WHY SHOULD I USE THE ITS ARCHITECTURE?
Using the architecture helps ensure that ITS projects throughout a region are consistent with existing and planned projects and with long-term regional plans. For ITS projects the architecture helps develop institutional agreements and technical integration of systems on local, regional, and even national levels. For long-range planning the architecture helps identify operational improvement strategies that are complementary or that can be used in lieu of traditional capital improvement strategies.

Table 7–12: ITS Architecture Usage Overview

Using the ITS Architecture for Project Development

During project development the ITS architecture helps lay the groundwork for the systems engineering approach recommended by FHWA and required for all federally funded ITS projects. Systems engineering is an approach intended to improve the success rate of systems projects by reducing schedule and cost risks and ensuring that user needs and requirements are met6.

Figure 7–4 shows FHWA's "V" diagram for systems engineering, including how the regional architecture fits into the process. There are many portions of the architecture that can be used as a starting point for a project's systems engineering analysis: stakeholders, system inventory, needs and services, operational concept, agreements, and interfaces/information exchanges. The black boxes in Figure 7–4 show how the various parts of the architecture feed into specific systems engineering steps.

6 *Systems Engineering. U.S. Department of Transportation, Federal Highway Administration.* Jan. 31, 2012. http://www.ops.fhwa.dot.gov/int_its_deployment/sys_eng.htm Accessed Jan. 8, 2013.

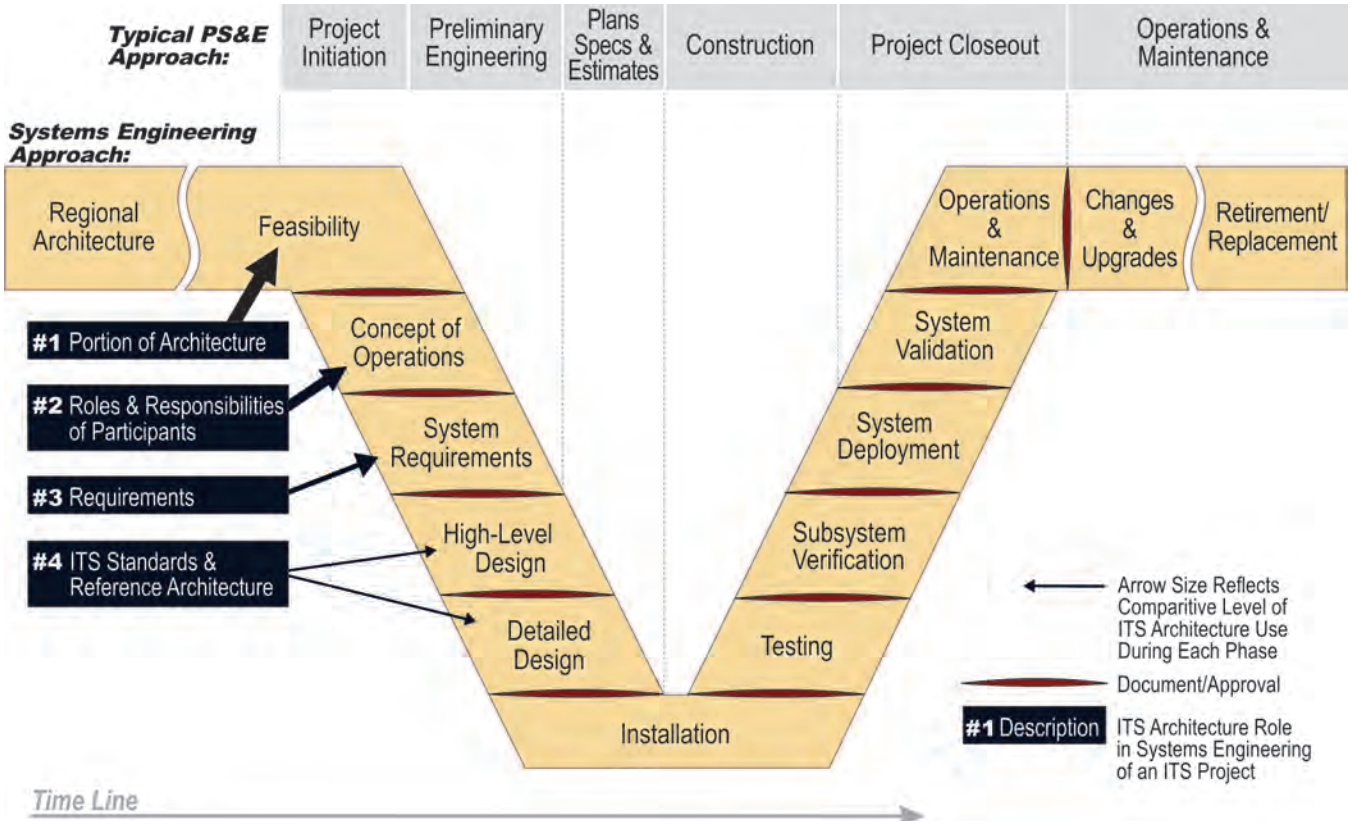


Figure 7–4: Systems Engineering "V" Diagram

The FHWA requires a systems engineering analysis for all federally funded ITS projects on a scale commensurate to each project. State and locally funded ITS projects are also encouraged to follow this process. The systems engineering analysis shall include[7]:

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

Using the ITS Architecture for Transportation Planning

The regional ITS architecture should be integrated into the transportation planning process because it represents a consensus vision for regional operations as defined by both operations and planning stakeholders. It also provides opportunities to meet regional needs that may be better suited to operational improvements rather than capital improvements. Key ways to integrate the regional architecture into long-range transportation plans include:

- Goals and Objectives: Both the regional architecture and long-range plan should be guided by the same operations goals and objectives.
- Operational Strategies: The service areas in the regional architecture may be used as input to develop operational strategies as alternates or supplements to traditional capital improvement strategies.

7 23 CFR 940.11. Title 23, Code of Federal Regulations (CFR), Highways, Chapter 1: FHWA, Department of Transportation, Part 940: Intelligent Transportation Systems Architecture and Standards, Section 940.11: Project Implementation.

- Project Sequencing: The project sequencing in "Chapter 11: ITS Implementation Plan" of this ITS plan may be used to help with evaluation and prioritization of strategies in the long-range plan.
- Performance Measurement: The architecture defines data collection from operational systems. This information may be used to measure performance, which helps support the use of performance-based goals in the long range plan.

The development of long-range transportation plans may also identify changes needed to the regional ITS architecture so that both living documents are consistent with one another and changing regional needs.

ITS Architecture Maintenance Plan

The development and implementation of an architecture maintenance plan is one of the requirements of the FHWA Final Rule and FTA Policy. This maintenance plan was developed using federal[8] guidelines for keeping the Treasure Valley Regional ITS Architecture up to date. The architecture is a fluid entity that must be updated as ITS needs and services evolve in Treasure Valley. This maintenance plan answers the following questions: Who? What? When? How?

Who Maintains the ITS Architecture?

In general the Treasure Valley ITS Technical Working Group (TWG) is responsible for maintaining the Treasure Valley Regional ITS Architecture. COMPASS intends to continue to facilitate monthly meetings of the TWG upon completion of this plan. A COMPASS staff member will be responsible for performing the actual maintenance to the architecture. This person will be referred to as the Maintainer throughout the rest of this section. The rest of the TWG will be responsible for reviewing and approving all architecture updates.

What is Maintained in the ITS Architecture?

The following items in the Treasure Valley Regional ITS Architecture will be maintained to reflect the deployment of ITS projects and changes in regional needs:

- Statewide architecture attributes
- Stakeholders
- Inventory elements
- User services and service packages
- Operational concept
- Interconnects and information flows between elements
- ITS standards
- Project sequencing

Deletions or additions to the Treasure Valley Regional ITS Architecture should be accompanied with descriptive comments in Turbo Architecture to document the reasons for the changes.

When is the ITS Architecture Updated?

Approaches to architecture maintenance include periodic, exception based, or a combination of the two methods. The TWG has decided that a combination of the two methods is the best approach for the Treasure Valley Regional ITS Architecture as follows:

- Exception Based Architecture Maintenance: The architecture will be updated when a regional project impacts a large portion of the architecture.
- Periodic Maintenance: Planned maintenance of the architecture will occur annually in conjunction with financial planning for ITS projects.

8 Regional ITS Architecture Maintenance White Paper. Report FHWA-HOP-04-004. U.S. Department of Transportation, Federal Highway Administration, National ITS Architecture Team, Jan. 31, 2004.

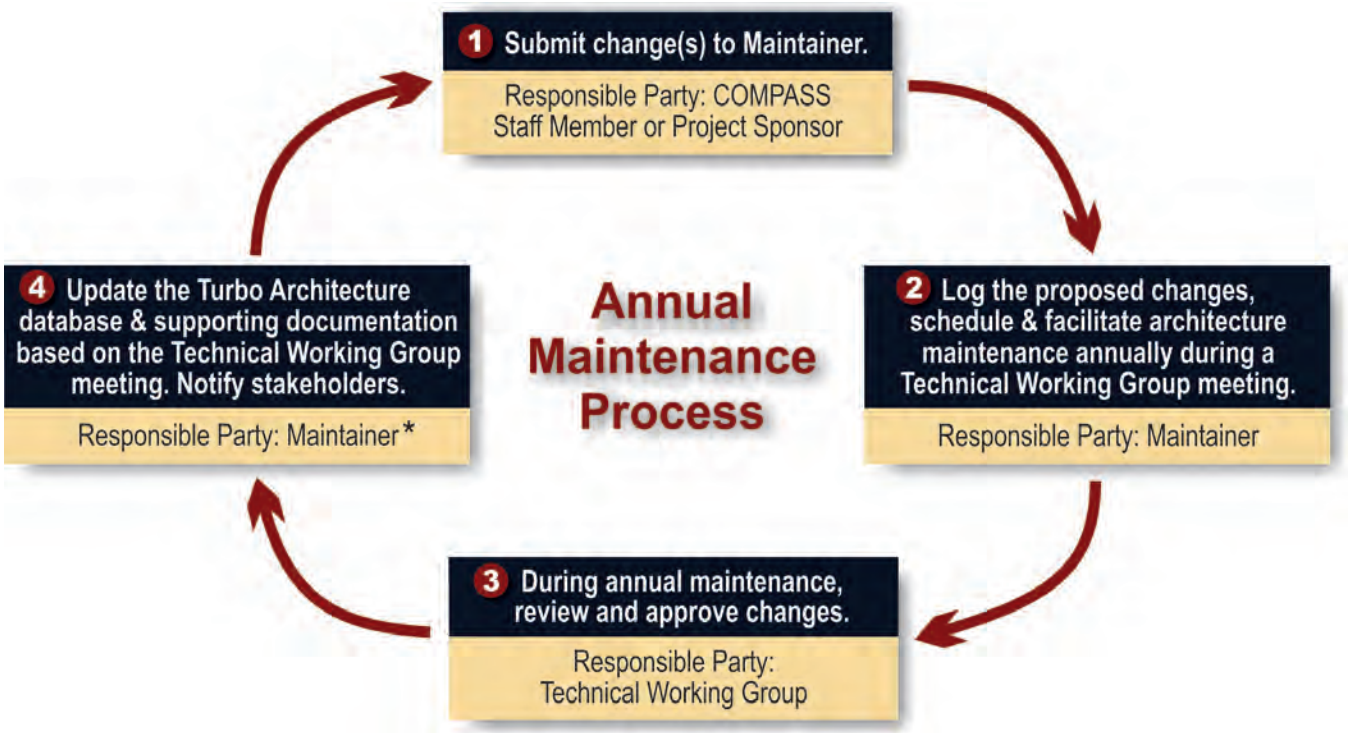
Updates to the Idaho Statewide ITS Architecture, maintained by ITD, should be reviewed to determine if and when updates are needed to the Treasure Valley Regional ITS Architecture where there is overlap between the elements in both architectures.

How is the ITS Architecture Maintained?

The Maintainer will be responsible for updating the Treasure Valley Regional ITS Architecture based on things such as changes to existing ITS elements or operations, addition of new projects, or status changes when funding is secured. Figure 7–5 shows the general process for maintaining the architecture for periodic maintenance updates. The same process should be followed for exception based maintenance except that the review process can be scheduled as part any monthly TWG meeting.

The Maintainer should use caution when building new flows in Turbo Architecture, which must be done when additional inventory elements are added or the subsystems and terminators for existing inventory elements are modified. Tailoring new flows within Turbo Architecture is easiest if the "conservative" setting is selected prior to running the build command.

FHWA recommends using configuration control and change management techniques to track updates to the regional architecture. The Turbo Architecture software provides a "change log" database to track maintenance records and allows the user to input the date and time, who updated the log, the version number, and a description. Regional change request forms and change logs with tracking capabilities for detailed changes to the architecture may also be developed to support the maintenance process.



* The Maintainer is a COMPASS staff member, or a designee, who is proficient in Turbo Architecture.

Figure 7–5: Treasure Valley Regional ITS Architecture Maintenance Process

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Chapter 8: Communications Plan

Chapter Highlights:

- Describes existing communications infrastructure and operations in the Treasure Valley.
- Describes existing gaps/deficiencies and opportunities for infrastructure expansion, upgrade, and collaboration.
- Identifies objectives and opportunities for regional collaboration in development, funding, operation, and maintenance of the regional, interagency communications system.

This chapter describes a transportation communication strategy for the transportation operating agencies in the Treasure Valley. The communications network is a critical, if often unseen, element of the regional operations program and is fundamental to tying together field ITS devices and management centers into a cohesive network.

Communications infrastructure is an area of rapid technological evolution. The growth in capacity of fiber optic, microwave, and wireless infrastructure has made possible operational functions that were not possible in the early days of ITS deployments.

Technological advances are providing greater engineering flexibility in backhaul of data from field systems. The use of wireless technologies, in coordinated traffic signal systems for example, may allow agencies to cost-effectively tie signals into the coordinated group which would have been otherwise difficult or cost-prohibitive using fiber optics. Similar, commercial cellular wireless technologies can be used to tie in isolated field infrastructure (particularly when combined with solar power), as well as real-time data communications with mobile transit, maintenance, and emergency fleets.

Public transportation is a classic example of the win-win benefits of regional collaboration to deploy and manage communications infrastructure. Transit agencies such as VRT operate at a regional level, with communications needs that cross jurisdictional boundaries. VRT has dispatch and passenger facilities that are widely dispersed across Ada and Canyon Counties that require communications connectivity. Similarly, VRT has both voice and data communications needs. With appropriate engineering and interagency agreements, VRT can leverage both fiber optic and radio frequency (RF) infrastructure deployed by other agencies; in turn, helping its partner agencies to defray the costs of communications infrastructure construction, operations, and maintenance.

Often, decisions about the appropriate mode and capacity of ITS communications systems are best made at the project engineering level—based on a detailed analysis of capacity needs and the best available technologies in the year of deployment. Many of these anticipated improvements are captured in the ten-year implementation plan as discussed in "Chapter 11: ITS Implementation Plan".

There are, however, a number of challenges and opportunities in the region that need to be addressed to ensure that the Treasure Valley is effectively implementing and managing communications infrastructure at the regional level. This chapter focuses on building a regional strategy for communications infrastructure management based on the operational vision for the Treasure Valley.

The Treasure Valley's transportation communications infrastructure consists of two primary elements: fixed communications infrastructure (primarily fiber optic) and RF communications. Both of these elements are discussed in this chapter.

Existing Conditions and Infrastructure

Mirroring the deployment of ITS infrastructure, there is an extensive existing communications infrastructure to support regional operations. Details on the existing infrastructure are provided in "Chapter 3: Existing Conditions". Chapter 3 includes maps of the location and ownership of existing fiber optic networks in Ada and Canyon Counties.

The sophistication and reach of communications infrastructure varies between Ada and Canyon Counties. This mirrors the overall intensity of ITS deployment as well as the urbanization of these two counties.

Traditionally, communications infrastructure deployment to support ITS has been ad hoc; deployments for specific project purposes have been implemented through informal partnership agreements when a particular fiber run was needed for a particular purpose. For example, the Canyon County Sheriff's Office owns a critical fiber backbone along the I-84 corridor (ITD right-of-way). This fiber has been heavily leveraged to support freeway ITS systems in the I-84 corridor in addition to its emergency management functions. While effective at meeting immediate needs, the ad hoc management model has created long-term challenges in managing the regional communications infrastructure, as is discussed later in this chapter.

Ada County Fiber Optic Network

Public agencies who own fiber optic infrastructure in Ada County include:

- Idaho Transportation Department
- Ada County Highway District
- City of Boise
- City of Meridian
- City of Garden City
- Ada County Sheriff's Office
- Ada City-County Emergency Management
- Idaho Bureau of Homeland Security
- Boise State University

Additionally, there are private owners of fiber optic infrastructure including but not limited to Syringa Networks, KBCI television, Time Warner, etc.

Both ITD and ACHD use extensive fiber optic connections between their respective transportation management centers and ITS field equipment (as well as center-to-center connections with each other).

In Ada County, ACHD operates and maintains an extensive ITS communications network to support central traffic signal control systems, CCTV surveillance cameras, over 1,000 video detection cameras, DMS, and other remote devices (e.g., Bluetooth readers). The ACHD network links together department facilities and programs (e.g., Traffic Engineering, Traffic Operations, Commuteride), and also includes connections to external network partners, including ITD to facilitate shared operation of certain ITS devices.

Emergency management agencies in Ada County also own and maintain fiber optic communications infrastructure. These include Ada County Sheriff, Ada City-County Emergency Management, and the State of Idaho Bureau of Homeland Security. These agencies have been consulted through the planning process about the prospects of shared fiber optic infrastructure.

Canyon County Fiber Optics

Canyon County's fiber optic deployment is currently far less extensive than Ada County's deployment. Public agencies owning fiber in Canyon County include:

- Idaho Transportation Department
- Canyon County Sheriff's Office
- City of Nampa

The Canyon County Sheriff's Office has by far the largest amount of public sector fiber in Canyon County at the present time. Combined with ITD-owned fiber to the east, it forms an important part of the ITS communications backbone along the ITD corridor. It also provides a potential communication path to connect traffic and emergency management centers to a regional "virtual TMC" including agencies in Ada County (and sharing of ACHD/ITD ITS resources).

The City of Nampa has limited fiber optic deployment, limited to connecting a few signal groups in the downtown area. The City of Caldwell does not have existing fiber optic deployment. Both the City of Nampa and the City of Caldwell have also been proactively deploying conduit in anticipation of future fiber optic deployment. Currently, neither city has an existing fiber connection between its central public works facility and its field traffic signal systems. Similarly, neither city is currently connected to the regional fiber optic network backbone with Ada County, though the potential exists through existing Canyon Sheriff's and ITD fiber.

Radio Frequency Communications and Interoperability

Given the mobile nature of transportation operations in the Treasure Valley, there are numerous, multimodal users of RF communications for maintenance dispatch, incident response, and other functions. These users include:

- Idaho Transportation Department
- Ada County Highway District
- Local Cities, including Nampa and Caldwell
- Valley Regional Transit
- Treasure Valley Transit
- Rural Highway Districts

Local law enforcement agencies make extensive use of RF communications. The State of Idaho holds statewide four 700 MHz area radio frequency licenses, authorized through the FCC Region 12 Planning Committee (RPC).

Beginning in 2009 with the Idaho State Police, public safety agencies in the Treasure Valley (including Ada and Canyon Counties) have migrated to a 700 MHz P25 interoperable multi-agency radio system though an initiative spearheaded by a Statewide Interoperability Executive Committee (SIEC) overseen by the Idaho Bureau of Homeland Security.

The statewide interagency system includes participating agencies at the municipal, regional, state, and federal levels. ITD, TVT, and StateComm are Treasure Valley transportation representatives on the SEIC; however, the focus of the work of the SIEC to date has been on emergency management more that transportation RF needs. Additionally, there is a district interoperability governance board representing the Treasure Valley (ITD District 3 territory) and reporting to the SEIC on issues related to interoperability.

StateComm, by virtue of its position dispatching emergency response, makes extensive us of the region's 700 MHz system for communications with ITD, county sheriffs, and municipal police, fire, and EMS. Additionally, StateComm manages radio dispatch for ITD District 3 maintenance and incident response vehicles.

VRT operates on an agency-owned 800 MHz voice and data radio system that is nearing the end of its useful life. The system has not been narrowbanded. VRT is looking to make use of commercial cellular data for future applications such as its AVL system.

One of the goals of this plan is to forge stronger operational linkages between operations and emergency management personnel. Coordination between transportation and emergency management is important from a functional point of view, both for transportation management purposes (e.g., incident response) as well as emergency management concerns (e.g., hazardous materials spills, wildfires, and severe weather).

During the planning process, meetings were held with emergency management stakeholders to identify areas of common interest and concern. Opportunities for operational partnerships such as incident management are documented elsewhere in this plan.

From an infrastructure perspective, a clear interest was noted in the development of an integrated regional and transportation management radio communications system, potentially using the 700 MHz frequency band (subject to further technical investigation). This shared infrastructure would offer several advantages to all parties involved, including:

- Interoperability between transportation and emergency management agencies, allowing for more effective incident and emergency response.
- Improved support for systems that involve both transportation and emergency management mobile users – for example, sharing of real-time transportation surveillance video and/or sharing emergency management CAD data with transportation incident response personnel.
- Improved multimodal coordination with transportation – e.g., freeway and arterial, transit and roadway.
- Cost efficiencies of using a common technology platform and shared costs of ownership and operation.

Institutionally, emergency management agencies in the region express interest in being a part of ongoing communications infrastructure discussions to promote interoperability. This should include future coordination of a future regional transportation operations working group with their counterparts in the emergency management community, such as the Ada and Canyon Counties local emergency planning committees. Involvement of these committees would broaden the reach of transportation agency discussions on interoperable communications discussions deeper into emergency management community – to local police and fire, for example.

A planning study for an interoperable regional RF system has been induced in the implementation plan (Project C-8, Chapter 11) as an immediate next step in this effort.

Regional Communications Needs

Through the stakeholder outreach process, "Chapter 4: Needs Assessment", participating agencies identified a number of specific needs related to implementation, operation, management, funding, and governance of the regional communications infrastructure.

Table 8–1 summarizes the communications needs identified through the stakeholder outreach process. As the table suggests, management of the regional communications infrastructure that exists today is an overarching concern in the Treasure Valley. There is a sense that a paradigm shift away from "handshake" agreements toward a more formalized asset management approach is warranted.

Upgrade of fiber infrastructure to meet the needs of expanding ITS infrastructure and operational objectives (e.g., linking management centers in a virtual TMC) is another key finding of the outreach.

REGIONAL COMMUNICATIONS INFRASTRUCTURE MANAGEMENT	
REGIONAL OPERATIONS OBJECTIVES	**PARTICIPATION AGENCIES**
The regional communications infrastructure for ITS provides the backbone for center-to-center (C2C), center-to-field (C2F), and field-to-field (F2F) transmission of data to support ITS networks and operational functions. A reliable, redundant communications backbone with adequate capacity is essential to the effective use of ITS equipment. In recent years, informal sharing of fiber optic communications infrastructure among agencies, as well as public-private partnerships for fiber deployment, has provided substantial benefits to participating agencies. Other public sector agencies in including schools, police, and fire also have a stake in the regional communications network, although certain critical emergency management infrastructure may be isolated from ITS networks for security reasons.	• ITD • ACHD • StateComm • Bureau of Homeland Security • Ada and Canyon County sheriffs • Local Police and fire/first Responders in Ada and Canyon Counties • Local cities in Canyon County • Other public agencies (e.g., school districts) • Private communications partners (e.g., Syringa Networks) • Boise State University
ASSOCIATED ITS INFRASTRUCTURE	**PARTICIPATING MANAGEMENT CENTERS**
• Public agency fiber optic infrastructure • Privately-owned fiber optic infrastructure • Short-hop wireless infrastructure • Regional radio frequency communications systems (e.g., VRT, emergency responders)	• StateComm • ACHD TMC • Ada County-City Emergency Management Center • Bureau of Homeland Security – Idaho Emergency Operations Center • Other local emergency management centers and PSAPs • Other public agency communications centers

NEEDS IDENTIFIED – REGIONAL COMMUNICATIONS INFRASTRUCTURE MANAGEMENT	
NEED	**DESCRIPTION**
ESTABLISHMENT OF CLEAR OWNERSHIP AND MAINTENANCE RESPONSIBILITIES	Historically, the deployment of fiber optic infrastructure has been ad hoc and opportunistic—for example, the Canyon County Sheriff owns fiber optic infrastructure in ITD's I-84 right of way. There is a need for better understanding of ownership and maintenance responsibilities for the region's fiber optic infrastructure to manage both available capacity and upkeep.
WORK GROUP FOR REGIONAL FIBER OPTIC COMMUNICATIONS	Stakeholders identified a need for a collaborative body to promote ongoing interagency coordination on fiber optic infrastructure deployment, operations, and maintenance.
FORMALIZE PROCESSES FOR FIBER INFRASTRUCTURE SHARING	Rather than the existing "handshake" agreements, stakeholders noted the need for clearer and more formalized procedures for fiber sharing agreements through a regional process.
FIBER MAINTENANCE SERVICE LEVEL AGREEMENTS	Agencies that rely on another agency's fiber for critical functions need the assurance through a written service level agreement that the host agency will promptly address maintenance responsibilities (e.g., if a fiber optic cable is cut or switching equipment required replacement). service level agreements should be part of any new formalized agreements.
NEED FOR FIBER CONNECTIVITY IN CANYON COUNTY	Currently, there is a lack of fiber communications connectivity in Canyon County between centers and to field devices. As ITS deployment and opportunities grow, so must the fiber backbone and provisioning for future expansion of the system (e.g., installing conduit).
CONSIDERATION OF THE COMMUNICATIONS NEEDS OF OTHER REGIONAL PARTNERS	To maximize the value of public investment in fiber infrastructure, transportation agencies should reach out to other stakeholders (e.g., school districts, law enforcement, colleges and universities, private fiber providers) to identify opportunities to coordinate fiber construction and/or take advantage of existing "dark" fiber.
PARTNERSHIPS FOR ONGOING FIBER OPTIC OPERATIONS AND MAINTENANCE	The City of Boise IT department and other stakeholders have explored the possibility of a contracted fiber optic maintenance service paid for by a pooled fund from participating agencies. Such an arrangement is one means of ensuring adequate resources and service level standards for ongoing fiber optic communications maintenance needs.
ITS POLICY ON FIBER OPTIC SHARING AND MAINTENANCE	Stakeholders noted the desirability of an ITD statewide fiber policy to provide guidance on use and maintenance of the agency's fiber infrastructure.
DOCUMENTATION OF THE SAVINGS OF REGIONAL FIBER OPTIC SHARING	To promote further cooperation and demonstrate the benefits of fiber sharing to decision makers, the cost savings and other benefits (e.g., redundant paths) of shared fiber optic infrastructure should be documented. A consortium of transportation agencies in Vancouver, WA has been able to demonstrate savings on the order of $10 million versus a "go it alone" approach.

Table 8–1: Identified Communications Needs

Communications Needs by County

While there is much to be gained from a regional approach to communications management (e.g., transportation/public safety interoperability), the primary communications infrastructure of the region varies between Ada and Canyon Counties. This reflects the state of current infrastructure and the intensity of needs to support ITS and operations.

In Ada County, the primary communications needs are:

- **Implementation of new fiber paths/corridors** for specific ACHD and ITD ITS corridors/projects, preferably through shared regional fiber infrastructure when possible.
- **Expansion of core fiber network capacity**, which, in the long term, may involve upgrade of ACHD, ITD and other area fiber partners to 10Gig Ethernet to support high definition cameras and additional ITS devices.
- **Development of increased network reliability** by creating redundant paths/rings for ACHD, ITD and other area fiber partners.
- **Maintenance of existing communications infrastructure**, including routine end-of-life replenishment of field equipment as well as network headend infrastructure at the ACHD TMC.

In Canyon County, the primary communications needs are:

- **Construction of basic fiber optic infrastructure**, connecting ITS field devices to each other and to central traffic control systems. Specifically, the Cities of Caldwell and Nampa envision future interconnects of their traffic signal systems with a new central traffic signal control system, requiring fiber and/or wireless connections both field-to-field and field-to-center. In the near term, some of these connections may be accomplished using wireless infrastructure, particularly in Caldwell.
- **Connections to the regional fiber optic backbone**, facilitating the implementation of virtual TMC capabilities and potentially off-hours monitoring and control capabilities by other regional partners such as StateComm, ITD, and/or ACHD.
- **Provisioning for future fiber optic deployment** in corridors that are seeing increased urbanization and traffic growth. For example, roadway widening projects or developments can deploy empty conduit and/or dark fiber to support anticipated traffic signal coordination, network surveillance, and detection needs.
- **Sharing maintenance and technical resources** with the appropriate technical resources to operate and maintain fiber infrastructure.

Public-Private and Municipal Partnership Opportunities

In the Treasure Valley and across the country, there is a recognized potential to expand transportation communications partnerships beyond the transportation and emergency management stakeholders discussed above. There are other potential partners in the region that should be considered in the development of future communications sharing schemes in the Treasure Valley.

For example, there have been successful public-private partnerships in the past with Syringa Networks, a private fiber optic communications provider in the Treasure Valley, to implement mutually beneficial fiber and right-of-way sharing agreements. Fiber optic communications infrastructure, or at the very least provisioning such as conduit and pull boxes, can be included in private development infrastructure upgrades, provided it is shown as part of agencies' standard roadway specifications. Hospitals and higher education facilities are other examples of high-bandwidth consuming facilities that may be approached as potential fiber sharing partners.

Municipal users such as water/sewer districts, school districts, and libraries are other potential public sector partners in the development of municipal fiber networks that meet needs beyond transportation. In Nampa and Caldwell, for example, several of the corridors identified for future fiber optic deployment are in close proximity to schools, fire stations, and other potential tenants of a shared municipal network. These partnerships should be considered in the development of the regional fiber optic management consortium as well as in the design phase of specific corridor fiber projects.

As the complexity of public-private and municipal communications partnerships grows, the importance of formalized, effective regional governance for infrastructure management, funding, design, operations, and maintenance becomes exponentially more important.

Regional Communications Infrastructure Management Vision for the Treasure Valley

The Regional Communications Infrastructure Management Vision for the Treasure Valley is:

"Development of the physical and institutional infrastructure to support the effective and efficient deployment, operating, maintenance, and funding of a multi-agency, multi-modal shared communications network across the Treasure Valley in support of transportation operations and emergency management."

This communications vision is reflected in the overall operational vision for the Treasure Valley discussed in "Chapter 2: Operational Vision for the Treasure Valley". Regional communications infrastructure management is one of the "operational services" described throughout this report, including the operational vision, needs assessment, regional TSMO strategies, operational concept, and implementation plan.

The operational vision includes the following objectives for the regional communications infrastructure management (Table 8–2):

REGIONAL COMMUNICATIONS INFRASTRUCTURE MANAGEMENT	• Complete interagency fiber optic network connecting centers and field ITS devices in both Ada and Canyon Counties. • Ensure communications system reliability through redundant paths and network infrastructure. • Develop a regional fiber consortium to coordinate and manage regional fiber optic and communications assets, including interagency agreements and addressing ownership, service levels, and funding. • Pool regional funding for fiber network maintenance, potentially through a third-party contractor, with specified individual agency funding contributions. • Design and implement a shared regional transportation and emergency management radio system to improve interagency coordination.

Table 8–2: Regional Communications Infrastructure Management Elements of the Operational Vision for the Treasure Valley

Realizing this vision requires progress on two fronts:

- **Infrastructure Deployment** to meet the growing ITS communications needs to support operations in the Treasure Valley over the next ten years.
- **Regional Communications Infrastructure Management**, to ensure that infrastructure is operated effectively and efficiently in the service of regional requirements.

Communications Infrastructure Implementation Plan

As part of the development of the ITS implementation plan for the Treasure Valley discussed in "Chapter 11: ITS Implementation Plan", participating agencies have identified critical communications infrastructure investments to support regional operations programs. The detailed descriptions, timeframes, and cost estimates for these projects are provided in "Appendix A: Implementation Plan - Project List". These projects reflect the specific needs of Ada and Canyon Counties, as well as regional strategic objectives for communications integration and interoperability (Table 8–3).

STRATEGIC REGIONAL COMMUNICATIONS OBJECTIVE	EXAMPLE PROJECT FROM THE IMPLEMENTATION PLAN
BUILDING THE REGIONAL COMMUNICATIONS BACKBONE	C4 - Virtual TMC Communications Network
CORRIDOR-SPECIFIC DEPLOYMENT	AM5 - Three Cities River Crossing ITS deployment
SYSTEM UPGRADES/ RENEWAL	TM12 - StateComm central systems upgrade
CANYON COUNTY – BASIC CONNECTIVITY	C6 - City of Caldwell wireless traffic signal interconnects
COMMUNICATIONS INTEROPERABILITY	C8 - Regional transportation/emergency management radio interoperability study
REDUNDANCY/ RELIABILITY	TM25 - ACHD backup control center/backend equipment
TRANSIT COMMUNICATIONS	C7 - Transit Facilities Fiber Interconnects
REGIONAL COMMUNICATIONS INFRASTRUCTURE MANAGEMENT	C2 - Create regional agreement for fiber optic sharing and management

Table 8–3: Examples of Communications Infrastructure Projects in the Implementation Plan

In addition to the communications infrastructure projects identified in the regional communications infrastructure Management element of the implementation plan, a number of corridor specific ITS projects have an assumed communications infrastructure implementation or upgrade component. This is particularly true of traffic signal corridor upgrade projects. These projects are included in the implementation plan under the freeway management and arterial management sections, respectively.

Transit communications infrastructure projects, including RF system upgrades and fiber connectivity between VRT dispatch facilities and intermodal centers, are discussed in the Public Transportation section of the implementation plan.

Regional Communications Infrastructure Management

Building the institutional infrastructure to effectively manage regional communications infrastructure is as important as the physical infrastructure projects described above. This section describes some of the critical initiatives to achieving the regional vision of a sustainable, multi-agency regional communications system.

Treasure Valley Communications Infrastructure Management Committee

A regional communications infrastructure management committee has been proposed as a means of establishing the relationships, agreements, and tools needed to sustainably manage the Treasure Valley's communications infrastructure. This type of committee has precedents in the northwestern US and across the county, often as an outgrowth of regional operations/ITS coordinating organizations.

The fundamental mission of a Treasure Valley Communications Infrastructure Committee is to oversee the technical, institutional, and financial aspects of managing a shared communications infrastructure. The representation of the committee should include agencies involved in ownership, design, construction, operation, use, maintenance, and finance of fiber optic and RF communications networks in the Treasure Valley. At a minimum, this includes regional transportation operating agency staff, as well as representatives from the emergency management community (with cross-representation with ITD's Region 3 district interoperability governance board and, ideally, the SIEC). Extended stakeholders involved with the committee may include agency information technology staff, other agency/municipal fiber optic interests (e.g., school districts), and private implementation partners. Typically, the Communications Infrastructure Committee would meet periodically (quarterly to monthly) depending on staff availability and workload.

Regional Communications Infrastructure Coordination Activities

Recommended activities to be undertaken by the Communications Infrastructure Committee include:

- Development of interagency agreements for shared communications infrastructure
- Assistance to agencies/project proponents in identifying fiber paths between specific locations over the regional fiber network
- Development and maintenance of a regional fiber optic inventory map database (GIS format)
- Development and maintenance of a regional fiber asset inventory, including ownership, capacity, and utilization
- Development of service level standards and compensation guidelines for maintenance and operations of shared communications assets.
- Development of a "permitting" process to facilitate the use of another agency's communications infrastructure
- Development of technical standards for fiber optic installation and configuration, and interagency network security
- Outreach and facilitation to potential communications sharing partners
- Pooling of resources for communications network maintenance, which may include an agreement with a third party contract on behalf of the interagency group

Interagency Communications Infrastructure Management Agreements

Formal interagency agreements for communications infrastructure sharing are recognized as a key step toward more effective communications infrastructure management. Like other agreements for shared use of ITS infrastructure, a regional communications infrastructure sharing agreement will spell out the overarching terms governing the development, use, maintenance, and funding of shared infrastructure. Agreements protect the parties by spelling out the expectations of "host" agencies (e.g., compensation for use and maintenance of fiber connections) as well as "tenant" agencies (e.g., service level agreements for network reliability and availability).

The regional communications infrastructure agreement may consist of multiple agreements, such as a "master" regional agreement with subordinate agreements on specific projects or technical/management issues.

Recommended content for the regional communications infrastructure agreement(s) includes:

- Definition of the physical and functional extents of the regional communications network
- Responsibilities of the signatory agencies, including host and tenant agencies
- Service level agreements for network operations and maintenance
- Maintenance activities, including pooled maintenance agreements, if any
- Network IT security standards/protocols and responsibilities
- Financial compensation and terms
- Processes for amending and terminating the agreement

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Chapter 9: Linking Planning and Operations

Chapter Highlights:

- Describes the benefits of linking operations and the regional planning process.
- Identifies specific opportunities to integrated planning and operations, including project development, performance measurement, and planning uses of data.
- Describes opportunities for ongoing regional planning coordination for operations in the Treasure Valley.

Over the past 20 years, the importance of transportation operations has grown significantly, enabled by advances in ITS and the need to make the most efficient use of existing transportation infrastructure. During this period, ITS systems have moved from the realm of pilot deployments and test bed environments firmly into the realm of established transportation practice.

To fully realize the benefits of transportation operations in meeting regional transportation needs, it is important that transportation operations is fully integrated, or "mainstreamed," into the regional transportation planning process. This chapter discusses opportunities to strengthen the integration of operations and regional planning in the Treasure Valley.

Why Link Planning and Operations?

Integration of transportation operations into regional planning processes offers numerous benefits to the region as a whole:

- **Demonstrate that operations contributes to meeting regional transportation goals:** As discussed in "Chapter 1: Introduction", transportation operations can directly contribute to meeting the regional transportation goals (as well as related goals such as economic development and environmental sustainability). Many of these goals are articulated in the region's long-range transportation plan, *Communities in Motion*. When operations are integrated into regional planning thought, and vice versa, the opportunities and benefits of transportation operations investments become more apparent to decision makers and the public.
- **Position operations as a viable part of the region's transportation toolkit:** TSMO complements other low-cost regional transportation strategies. Due to fiscal, environmental, and right of way constraints, as well as the timeframe to implement large-scale transportation infrastructure projects, it is often not practical to build the way out of the Treasure Valley's transportation challenges through extensive capacity expansion projects. Rather, the region is looking toward strategies that increase transportation system efficiency, diversity of transportation options, and targeted investment. TSMO strategies complement other low-cost transportation solutions that are often on the table, such as Transportation Demand Management or Access Management. It is important that proponents of transportation projects or corridor improvements are aware of the full toolkit of TSMO improvements that are available to them.
- **Create Visibility for regional operations program benefits and funding needs:** Those who are involved day-to-day in transportation operations are keenly aware of the impact of, for example, an effective traffic incident management system for keeping the Treasure Valley moving. They are also too often keenly aware of the unique operational funding requirements to support the needs of ITS technology re-investment, staffing control centers, and maintaining coordination among regional agencies. Integration of planning and operations ensures that operating agencies have a voice in the regional process that sets regional priorities and allocates funding for transportation investment.
- **Develop collaborative regional approaches to operations Initiatives:** As discussed throughout this plan, many of the operational needs of the Treasure Valley cross jurisdictional boundaries, and/or involve multiple elements of the multi-modal transportation system (e.g., freeways, arterials, and transit; passenger and freight). A key role of COMPASS, the metropolitan planning organizations (MPOs), is to facilitate conversations among its member agencies to address regional issues. By engaging a broad set of stakeholders through the regional planning process and ongoing coordination, participating agencies can address the complex operational needs of the region in a comprehensive fashion.
- **Leverage the wealth of planning data generated by ITS systems:** The same ITS that provide the capability for nimble real-time management of the transportation system also generate reams of data that can provide "big data" insight into regional planning issues. Traffic signal systems, vehicle detectors, and Bluetooth readers are examples of ITS technologies that can provide pervasive, 24/7 insight into regional transportation condition—particularly non-recurring events which TSMO is effective at addressing. Thoughtfully and deliberately deployed, operations data collection infrastructure can become a backbone of the region's Congestion Management Process, model calibration, and corridor studies. Accessible transportation performance data is becoming increasingly important in light of emerging federal policy (under MAP-21) for regional transportation performance measurement (discussed in "Chapter 10: Regional Operations Performance Measures").

Key Opportunities to Link Operations and Planning

The remainder of this chapter discusses specific opportunities to better link TSMO with Regional Transportation Planning in the Treasure Valley:

- Linking Operations and Long Range Planning
- Linking Operations and the Congestion Management System
- Linking Operations and Project Development
- Use of Operations Data for Planning and Performance Measurement
- Regional Operations Coordination – "Planning for Operations"

Many of these initiatives, by their nature, are appropriate to be led by COMPASS as the designated MPO for the Treasure Valley. Their implementation will, however, involve close coordination with planning and operations staff of participating agencies, regional policy makers, and others involved in the planning, funding, implementation, and maintenance of the region's transportation infrastructure.

Linking Operations and Long Range Transportation Planning

While TSMO is accurately described as a near-term, real-time approach to meeting transportation needs, this does not diminish the need to establish TSMO as in important part of the region's long term transportation vision and strategy through the regional long-range transportation plan.

In the Treasure Valley, this plan is known as *Communities in Motion*, and is developed and updated by COMPASS. *Communities in Motion l*ooks 20+ years into the future to prioritize project investments based on public input and how the Treasure Valley is likely to grow. COMPASS updates the plan every four years.

As a significant step toward integration of operations into long range planning, COMPASS plans to include a TSMO element in the *Communities in Motion* 2040 plan update (scheduled to be completed in September 2014). There are multiple opportunities to demonstrate the relationship of TSMO to regional transportation goals through the *Communities in Motion 2040* Plan.

- Acknowledge efficient operations of the multimodal transportation system through coordinated regional programs and investments as a key regional objective.
- Provide the context for TSMO by describing existing transportation conditions that may have operational solutions (e.g., congestion, non-recurring incidents, growth in transportation demand that outpaces the region's ability to expand transportation system capacity.)
- Include operational metrics (e.g., travel time reliability) as part of regional transportation performance measures.
- Establish the need to invest in ITS and communications infrastructure as enabling tools to advance regional TSMO goals.

- Acknowledge the need for sustainable operations funding to support TSMO programs, including staff costs, TMC operations, operations coordination, and technology replenishment.
- Make reference this plan, *Treasure Valley Transportation System: Operations, Management, and ITS*, as providing additional details on the region's TSMO vision, strategies, priorities, and proposed investments.

Recommendations – Linking Operations and Long Range Planning:

- Ensure that operations goals, opportunities, and performance measures are reflected in the region's long range transportation plan – *Communities in Motion 2040*.
- Build awareness among decision makers, project proponents, and the general public of the opportunities of the contribution of TSMO strategies toward meeting regional transportation needs.

Linking Operations and the Congestion Management System

Beginning in 1991, federal surface transportation policy under the Intermodal Surface Transportation Efficiency Act (ISTEA) required MPOs in transportation management areas to implement a Congestion Management System (CMS). Since 2002, northern Ada County has been federally designated as a TMA, with its population in excess of 200,000. As the region's MPO, COMPASS is responsible for implementing the federally-mandated Congestion Management Process (CMP).

The CMP, which has evolved from what was previously known as the CMS, is a systematic approach, collaboratively developed and implemented throughout a metropolitan region, that provides for the safe and effective management and operation of new and existing transportation facilities through the use of demand reduction and operational management strategies.

According to federal guidelines, the CMP involves an 8-step process, as follows:

1. Develop Congestion Management Objectives;
2. Identify Area of Application;
3. Define System or Network of Interest;
4. Develop Performance Measures;
5. Institute System Performance Monitoring Plan;
6. Identify and Evaluate Strategies;
7. Implement Selected Strategies and Manage Transportation System; and
8. Monitor Strategy Effectiveness.

Treasure Valley CMS Plan

The Treasure Valley CMS plan, adopted by COMPASS Board with Resolution 10-2005 on March 21, 2005, outlines congestion management elements, a travel time data collection process, use of the data, specific definitions for congestion and a "toolbox" of mitigation strategies[1]. As part of the annual reporting requirements under this plan, COMPASS produces an annual update of congestion, conditions based on an established travel time measurement methodology based on the Sanderson Index, which is the ratio of peak travel time to free flow travel time.

The annual CMS report serves as input into the project prioritization process for the annual update of the Regional Transportation Improvement Program, a five year budget for federal transportation funding in the Treasure Valley.

Treasure Valley CMS Corridors

COMPASS has established a network of regional corridors in Ada and Canyon Counties that are monitored under the CMS program. Through an annual monitoring and reporting process, COMPASS identified the level of congestion on these corridors is for the average weekday peak p.m. hour and assigns a ranking of high, medium, or low congestion (Figure 9–1 and Figure 9–2). Many of the corridors in the CMS network have been identified through this TSMO planning process as operationally significant given current or anticipated conditions in the next ten years.

1 The CMS plan is available at: http://www.compassidaho.org/documents/prodserv/reports/TreasureValleyCMSFinal.pdf

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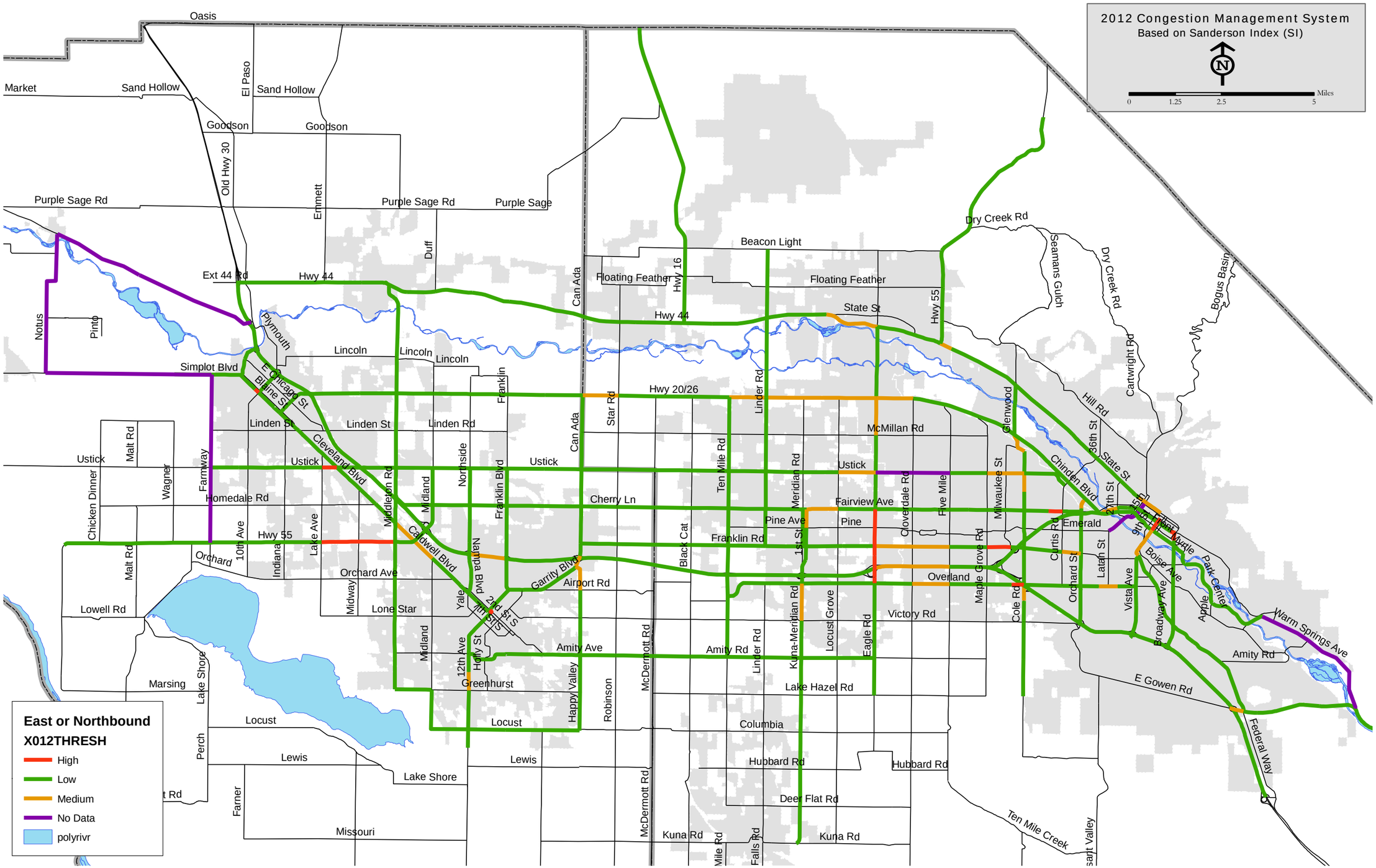

Figure 9–1: Treasure Valley CMS Corridor Weekday Peak Hour Rankings (East or Northbound) – 2012

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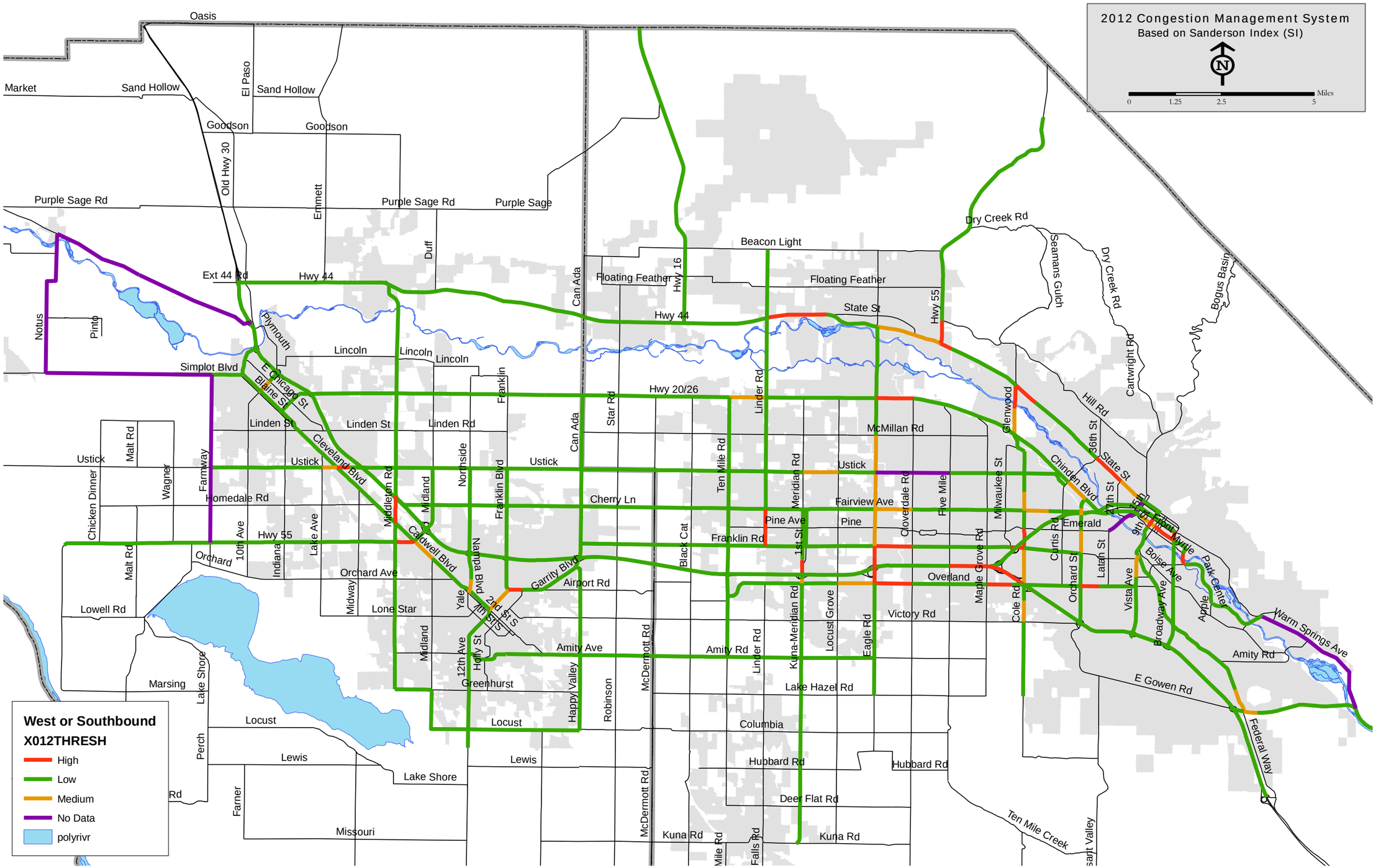

Figure 9–2: Treasure Valley CMS Corridor PM Peak Hour Rankings (West or Southbound) – 2012

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Integrating Operations into the Congestion Management System "Lifecycle"

Table 9–1 lists specific strategies for integrating operations with the regional CMS.

CMS LIFECYCLE PHASE	STRATEGY	DESIRED OUTCOME
Data Collection	Use field ITS data collection technologies (such as Bluetooth readers) to capture travel time data on an ongoing, automated basis.	Gradually shift from periodic, manual travel time surveys using GPS to automated travel time data collection on a 24/7/365 basis. Over time, provide detector coverage on all roadway segments in the regional CMS network.
Corridor Evaluation and Ranking	Use collected operational data in a future regional data archive to analyze congestion patterns and identify impacts of non-recurring congestion.	Migrate toward a CMS strategy that considers not only peak period recurring congestion, but also non-recurring delay.
Identifying Congestion Mitigation Strategies	Once regional congestion "hotspots" are identified, use the TSMO strategies toolkit to identify potential congestion mitigation measures.	TSMO strategies are considered alongside other regional, low-cost alternatives such as bottleneck capacity improvement, transportation demand management, and access management.
Performance Monitoring	Use data collected through the regional data archive to monitor before-after performance of congestion mitigation measures, as well as long-term trends in regional congestion.	Planning analytics establish a firm, quantitative measurement of the congestion mitigation strategies that are effective, and those that are not effective, using real empirical transportation data.

Table 9–1: Integrating Operations into the Congestion Management System "Lifecycle"

Recommendations – Linking Operations and the Congestion Management System:

- In partnership with regional transportation agencies, proactively deploy travel time detection infrastructure throughout the CMS network to automate data collection and obtain a 24/7 picture of recurring and non-recurring traffic congestion.
- Establish standards to ensure that traffic detection equipment is in the appropriate locations and of the appropriate quality and resolution to support CMS analysis (and other potential planning applications).
- Consider TSMO strategies and ITS deployment projects as part of the regional toolkit to address regional congestion "hotspots" identified through the CMS, noting that many of these strategies are low cost, can be implemented quickly, and are compatible with other low cost transportation strategies.
- Use operations data and performance measures to monitor the effectiveness of strategies (operational and non-operational) in addressing regional congestion "hotspots."

Use of Operations Data for Planning and Performance Measurement

As discussed, the data generated by ITS systems offers regional planners an unprecedented insight into regional traffic conditions.

Access to and use of operations data is also in the interest of the regional TSMO program—a 24/7 picture of traffic conditions is far more effective at identifying the extent of non-recurring congestion and the benefits of operational strategies.

Planning applications that can be supported by operations data include, but are not limited to:

- Corridor studies
- Traffic impact analyses
- Regional travel demand model/traffic simulation model calibration
- Transportation performance measurement
- Before-after studies of corridor improvements
- CMS (discussed previously)

Another advantage of a regional approach to collection and use of operations data is the ability to perform multi-modal and cross-jurisdictional analyses that draw together information from multiple agencies.

A critical success factor in the use of operations data for planning and performance measurement is a proactive, outcomes-oriented approach to operations data collection and infrastructure deployment. Over the years, agencies across the country have realized that the reams of operational data available "by default" from existing ITS systems may not be of the appropriate coverage, quality, or consistency for an intended planning application.

Common deficiencies in using operations/ITS data "as is" include:

- Varying levels of sophistication in traffic signal detection systems
- Inconsistent spacing and capabilities in traffic count stations
- Detection coverage that does not align with planning corridor definitions
- Inability to filter out erroneous traffic data

Because of this, it is important that partnerships are developed between planning and operations staff to develop a strategic plan to build out data collection infrastructure that will support specific planning and performance management objectives. Activities to support such planning efforts have been included in the implementation plan discussed in "Chapter 11: ITS Implementation Plan".

Recommendations – Performance Measurement:

- Establish a regional, multimodal transportation operations data archive to serve as a repository for operational data for use in planning, project evaluation, and regional performance measurement applications.
- Work with partner agencies and regional planning staff to develop business intelligence tools that allow agencies to effectively query and derive insight from data stored within the regional data archive.
- Work with operating agencies to develop and maintain data quality and consistency, potentially through the adoption of regional data quality standards.
- Develop a strategy for proactive field data collection to achieve the coverage and quality of data needed for planning and performance measurement applications. This may include deploying data collection infrastructure to fill existing gaps in coverage, developing partnerships with operating agencies to deploy/upgrade infrastructure as part of ITS projects, and/or identifying of third-party data sources as a complement to agency-owned data collection infrastructure.

Linking Operations and Project Development

Traditionally, ITS and operations investments in the Treasure Valley have been freestanding projects led by operating staff within transportation agencies. In the early days of the region's operations program, these investments were often the result of dedicated funding for ITS infrastructure deployment – funding sources that no longer exist.

As the regional operations program matures, it is important that corridor operational strategies and ITS infrastructure needs are considered as a part of "mainstream" project development and ranking.

For example, the solution to transportation issues in a principal arterial corridor may involve strategies such as access management, multimodal improvements, or selective facility widening. However, a range of TSMO strategies may also be effective, such as traffic signal coordination, adaptive signal control, transit signal priority, or signalized pedestrian crossings. This requires project planners, engineers, and proponents to be aware of the operations opportunities that have been identified in the corridor.

This plan can provide a valuable resource in making this connection. The ITS priority corridors and regional TSMO strategies identified in "Chapter 5: Regional Operations Strategies and Corridors" provide guidance on operations improvements that may be applicable, and where they may be applied. The ITS Implementation Plan for the Treasure Valley discussed in "Chapter 11: ITS Implementation Plan" identifies specific ITS infrastructure improvements that might be considered for implementation in parallel with—or in advance—of other corridor improvement work.

Finally, project evaluation criteria—at the regional and agency levels—should consider the possible operational benefits of a proposed project, as well as consistency with the principles of this plan. Project scoring criteria that, for example, reward provisioning for communications infrastructure, upgrading traffic signal control and surveillance capabilities, and/or addressing non-recurring congestion, will raise awareness within the transportation community of both the existence of regional operations objectives as well as the perceived value of operations investments to the region.

Quantifying the Benefits of Transportation Operations Projects

One consequence of the "mainstreaming" of transportation operations projects is the need to provide one-to-one comparisons of the benefits of these types of projects with more conventional transportation projects. The methodologies for evaluating, for example, capacity expansion projects are well established and can be readily converted into cost/benefit numbers, emissions reductions, or other common denominator metrics.

Operations project benefits can be more challenging with respect to benefits estimation. A traffic signal timing project may, with appropriate analysis, be converted into a delay reduction or emission savings. A traveler information or incident response program, on the other hand, is more difficult. Partially, this is because of the challenge in quantifying the need (i.e., a lack of existing operations data on the impact of traveler information or non-recurring events in transportation performance). It is also partially related to lack of well-established methodologies and tools for project evaluation, particularly in the early phases of project planning when one-to-one comparisons with 'conventional' projects are most needed.

Fortunately this challenge is an area of ongoing research and development of practical tools for use in planning-level evaluations. Candidate tools for project evaluation, including their pros/cons, data input needs, level of effort, and appropriate applications, are presented in "Appendix B: Analytical Tools Memo".

Recommendations – Linking Planning and Project Development:

- Work with project proponents and design engineers to raise awareness of operations opportunities and benefits in corridors that are being considered for transportation investments.
- Use this plan to help communicate regional priorities and specific opportunities to project proponents.
- Ensure that project evaluation criteria reflect the region's operational goals, and offer credit to projects that facilitate implementation of operations strategies and ITS infrastructure.
- Adopt a planning sketch-level tool, such as TOPS-BC, to assist in the evaluation of operations projects, as well as more direct comparisons between candidate operations and non-operations projects.

Regional Operations Coordination – "Planning for Operations"

The process of developing this plan provided many tangible examples of the benefits of regional collaboration in "planning for operations". Through the efforts of the project's Technical Working Group and stakeholder workshops, participating transportation and emergency management agencies identified issues of common interest and opportunity, ranging from goal-setting to identification of project collaboration opportunities to more effectively deploy and manage ITS and communications infrastructure. The process also built awareness, peer-to-peer networking, and momentum that will pay dividends in implementation of the recommendations of this plan.

Building upon this experience, it is important to continue the regional dialogue and interagency collaboration among interested parties in the Treasure Valley through a concerted planning for operations initiative.

According the USDOT, planning for operations…

…is vital to improving transportation decision making and the overall effectiveness of transportation systems. Coordination between planners and operators helps ensure that regional transportation investment decisions reflect full consideration of all available strategies and approaches to meet regional goals and objectives.

Planning for operations includes three important aspects:

1. Regional transportation operations collaboration and coordination activity that facilitates regional transportation systems management and operations,
2. Management and operations considerations within the context of the ongoing regional transportation planning and investment process, and
3. The opportunities for linkage between regional operations collaboration and regional planning.

Across the country, many MPOs have assumed the role of facilitating ongoing regional coordination among operating agencies on an ongoing basis. This role is often an outgrowth of their involvement in leading regional operations and ITS plans, and is consistent with these agencies' broader mandates to promote regional cooperation in transportation planning.

Furthermore, MPOs can help operations staff develop stronger linkages to regional planning and project funding processes, raising the profile of operations needs and benefits within the broader transportation community.

In the northwest, MPO-led regional operations groups can be found in Seattle, Spokane, Olympia, Vancouver (WA), and Portland, OR. Typical activities undertaken by these regional operations groups include:

- Project development updates
- Development of joint operating plans and interagency agreements
- Technical coordination (e.g., technology standards and interoperability)
- Incident/event planning, coordination, and debriefs
- ITS and communications infrastructure management
- Collaboration to obtain funding/grants
- Training/professional development/knowledge exchange
- Policy maker advocacy and outreach
- Regional planning process coordination
- Regional ITS architecture development and maintenance
- Exchange of agency news, priorities, and status updates

COMPASS has expressed a willingness to assume this role on an ongoing basis in the Treasure Valley. For a discussion of specific regional coordination objectives and planning for operations initiatives, see the ideas contained in the "Regional Operations Coordination and Planning" operational service contained in "Chapter 2: Operational Vision for the Treasure Valley", and "Chapter 11: ITS Implementation Plan", and elsewhere in this plan.

Recommendations – Planning for Operations:

- Develop a regional operations coordination group to continue the dialogue on operational issues of common interest beyond the completion of this plan.
- Ensure that COMPASS continues to provide a bridge between regional planning initiatives and the needs and concerns of the operations community.
- Develop formalized infrastructure to support ongoing operations coordination in the region, such as cross-coordination with other regional transportation and emergency management committees, involvement in project evaluation processes, and development of formalized interagency agreements.
- Implement the regional operations and planning coordination initiatives outlined in the Implementation Plan .

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Chapter 10: Regional Operations Performance Measures

Chapter Highlights:

- Discusses the role of performance measures in evaluating the effectiveness of regional operational strategies in the context of federal (MAP-21) transportation legislation.
- Describes candidate performance measures for evaluating the impact of regional transportation operations programs.
- Identifies data sources that can support regional performance measurement, and which may provide inputs to a future regional data archive.

This chapter presents candidate performance measures for regional TSMO projects that are consistent with measures used by the USDOT and ITD and that may also support the regional congestion management process. Performance measures will enable better measurement of the effectiveness of the various strategies being implemented to meet transportation needs. Currently, analysis is limited by data availability. However, with the central data warehouse that will be in place in the future, there will be many more options. This chapter discusses the role of performance measures, candidate performance measures, potential data sources, and evaluation methodologies.

Role of Performance Measures

Generally, the benefits of TSMO strategies have been difficult to quantify due to a lack of data available. Additionally, there are few adopted performance measures that are consistently used across states or agencies. There are no national standard methods for analysis yet, making the quantification of these systems challenging, especially in comparison to conventional transportation infrastructure investments, which have standard tools, models, and decision-making methods in place.

Established performance measures for the transportation system make it possible for transportation professionals and decision-makers to assess the effectiveness of various strategies. This will help allocate resources accordingly, and support data archiving.

The USDOT is currently working on developing standard performance measures, which will be released as part of MAP-21[1]. The performance measures will be established within 18 months of the date of enactment, which was on October 1, 2012. There are four program areas included: (1) National Highway Performance Program, (2) Highway Safety Improvement Program, (3) Congestion Mitigation and Air Quality Improvement Program, and (4) Freight Movement. Within the program areas, there are seven national goals:

- **Safety –** to achieve a significant reduction in traffic fatalities and serious injuries on all public roads
- **Infrastructure Condition –** to maintain a highway infrastructure asset system in a state of good repair
- **Congestion Management –** to monitor and improve management of congestion on the national highway system
- **System Reliability –** to improve the efficiency of the surface transportation system
- **Freight Movement and Economic Vitality –** to improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development
- **Environmental Sustainability –** to enhance the performance of the transportation system while protecting and enhancing the natural environment
- **Reduced Project Delivery Delays –** to reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices

The MAP-21 goals are consistent with the ITD Dashboard, which shows a status on the main goals of the department, including improving safety, enhancing mobility, and supporting economic vitality. Examples of performance measures that might apply include five year fatality rate, percentage of pavement in good or fair condition, and percentage of bridges in good condition.

Candidate Performance Measures

The candidate performance measures are categorized by the seven MAP-21 national goal areas and are consistent with the objectives for ITD. Table 10–1 shows the candidate performance measures, the MAP-21 national goal they support, and sample measurements that may be used.

1 USDOT, MAP-21, http://www.fhwa.dot.gov/map21/, accessed August 10, 2013.

MAP-21 NATIONAL GOAL	PROPOSED PERFORMANCE MEASURE	SAMPLE MEASUREMENT
SAFETY	COLLISION RATE	• Rate/number of collisions (primary and secondary) • Rate/number of fatalities • Rate/number of injuries
INFRASTRUCTURE CONDITION	DEVICE HEALTH	• Device failure rate (e.g., detectors) • On-time device life cycle replacement
CONGESTION MANAGEMENT*	HOURS OF CONGESTION	• Duration of congestion
	TRAVEL TIME	• Average travel time • Average speed
	RECURRING DELAY	• Vehicle delay • Person delay
	INCIDENT RESPONSE	• Number/type of incident responses • Incident duration • Incident response time • Average incident clearance time
SYSTEM RELIABILITY	TRAVEL TIME RELIABILITY	• Travel time index • Planning time index • Buffer time index • On-time transit performance
	NON-RECURRING DELAY	• Vehicle delay • Person delay
	TRANSIT SIGNAL PRIORITY	• Number of transit priority requests • Transit priority events served • Duration of green times
	CUSTOMER SATISFACTION	• Percent of population highly satisfied or satisfied with travel conditions • Complaint/compliment rate • Number/type of calls to 511 or transit advisory telephone • Number/type of hits on traveler information website
FREIGHT MOVEMENT AND ECONOMIC VITALITY	FREIGHT THROUGHPUT	• Freight volume • Travel times on key freight corridors • Freight delay (recurring and non-recurring)

Table 10–1: Candidate Performance Measures

MAP-21 NATIONAL GOAL	PROPOSED PERFORMANCE MEASURE	SAMPLE MEASUREMENT
ENVIRONMENTAL SUSTAINABILITY	GREENHOUSE GAS EMISSIONS	• Vehicle miles traveled • Vehicle emissions – CO, NOx, VOC • Transit vehicle fuel efficiency
	PASSENGER THROUGHPUT	• Passenger trips per vehicle revenue hour and mile • Passenger load (ridership/capacity)
	BICYCLIST	• Bicyclist volumes • Bicyclist delay • Number of bike share rentals
TRAVELER INFORMATION RELIABILITY	INCIDENT INFORMATION	• Time from 911 center notification to notice to the public • Percent of incidents reported to the public
	CONSTRUCTION INFORMATION	• Accuracy of construction information • Percent of construction events reported to the public
	SPECIAL EVENT INFORMATION	• Accuracy of special event information • Percent of special events reported to the public

*Supporting measurement of vehicle throughput (vehicle volume per hour) should be collected

Table 10-1: Candidate Performance Measures (continued)

Data Sources

Table 10–2 lists the regional data sources that are available to support performance measurement or that are planned for development.

DATA SOURCE	NOTES
SYSTEM DETECTORS (SPEED, VOLUME, OCCUPANCY)	• Speed, volume, and occupancy data available from traffic management agencies • Communications needed to some detectors to access the data • Some older detectors will require replacement to provide individual lane information
SYSTEM DETECTORS (TRAVEL TIME)	• 2011 data collection through *Treasure Valley Annual Congestion Management System* Report for interstates and arterial facilities • Bluetooth sensors
24-HOUR AND TURN MOVEMENT COUNTS	• Mostly available in hard copy or PDF format • The central traffic signal system can be configured to automatically collect turn movement counts, but in some cases modifications to existing detectors will be required • In the future agencies should request this data in its native electronic format
BICYCLE AND PEDESTRIAN COUNTS	• In the future agencies should request this data be included in vehicular counts; central signal systems can report how many pedestrian calls are made on each leg of a signalized intersection
ADVANCED TRAFFIC MANAGEMENT SYSTEM	• Data available through two platforms: Delcan and IBI Group. Both systems report when and what messages were posted to DMSs. The Delcan system also reports HAR usage. The IBI Group system includes detailed incident information.
CENTRAL TRAFFIC SIGNAL SYSTEMS	• See Table 10–3 with the performance measures available through central traffic signal systems.
CONDITION ACQUISITION AND REPORTING SYSTEM (CARS)	• Web based data available including road, travel, weather and traffic information
COMPUTER AIDED DISPATCH (CAD)	• The CAD systems used by StateComm, Idaho State Police, and the 911 centers include detailed incident information
IDAHO STATE POLICE ACCIDENT REPORTS	• Accident reports for all jurisdictions are sent to and are available through Idaho State Police
VRT AND TVT TRANSIT SYSTEMS (ROUTEMATCH AND FLEET-NET)	• Available for fixed-route service to evaluate transit performance measures such as schedule performance, routing, road conditions, vehicle location, and on-board systems data • Available for demand-response service to evaluate transit performance
WEATHER STATION DATA	• Pavement and ambient air conditions available from traffic management agencies
PARKING MANAGEMENT DATA	• Parking information for downtown Boise, Boise airport, and Boise State University
WINTER MAINTENANCE DATA	• Winter maintenance vehicle tracking data is collected by Canyon County and planned for collection by other traffic management agencies in the future

Table 10–2: Regional Data Sources for Performance Measurement

Table 10–3 provides potential performance measures that are available within most central traffic signal systems, both directly available and those that require calculation. Several central traffic signal systems are used in the Treasure Valley, including ATMS now, Streetwise, and NWSCentral; however, two of these systems may be consolidated in the future. Although the systems are different, they provide access to similar data to support performance measurement.

CANDIDATE PERFORMANCE MEASURES		AVAILABLE DIRECTLY	REQUIRES CALCULATION	NOTES
INCIDENT RESPONSE	INCIDENT DURATION	✓		Incident triggers must be set up to provide start time and stop time
TRAVEL TIME	AVERAGE TRAVEL TIME		✓	This data from the central traffic signal system may be used to verify or supplement Bluetooth data
	AVERAGE SPEED	✓		Available thru existing radar detection and Bluetooth systems on freeway and state routes
RECURRING DELAY	VEHICLE DELAY	✓		Level of service and volume-to-capacity ratios are provided by intersection for selected time period. Cycle and green time are available to allow for an automated HCM calculation
NON-RECURRING DELAY	VEHICLE DELAY	✓		Level of service and volume-to-capacity ratios are provided by intersection for selected time period
HOURS OF CONGESTION	DURATION OF CONGESTION	✓		Available by lane, by intersection, or by occupancy for selected time period
THROUGHPUT – VEHICLE	VEHICLE VOLUME PER HOUR	✓		Available by intersection for selected time period (resolution down to one minute)
GREENHOUSE GAS EMISSIONS	VEHICLE EMISSIONS – CO, NOX, VOC		✓	May be calculated from average travel time and average speed
TRANSIT SIGNAL PRIORITY	NUMBER OF TRANSIT PRIORITY REQUESTS	✓		With transit priority module a report is provided; without transit priority module the measure equals the number of buses requesting priority regardless of whether they have been served
	TRANSIT PRIORITY EVENTS SERVED	✓		With transit priority module a report is provided
	DURATION OF GREEN TIMES	✓		Provided as a report or can be watched with real-time graphical split monitoring
ARTERIAL PROGRESSION	PERCENT ARRIVAL ON GREEN	✓		With percent arrival on green module a report is provided that shows the efficiency of progression

Table 10–3: Potential Performance Measures Available with Central Signal Systems

Evaluation Methodologies

Currently, the Treasure Valley region does not have a centralized data archive; however, they plan to create one. This future data archive will play a large role in performance measurement. The data archive will provide helpful information in long-range transportation planning, will make it possible to improve management of the transportation system, and will provide additional measures for decision making. The data archive will be a resource available for researchers, local transportation planners and engineers, and the local news media. The data archive will be built in a consistent manner and will be able to be accessed throughout the region. Tools will be developed to automate analysis of data in the archive based on parameters set by each user.

Additionally, many of the existing systems (the central signal systems for example) have more tools that can be purchased that provide performance measurement, reducing the need for agencies to analyze data within their available resources.

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Chapter 11: ITS Implementation Plan

Chapter Highlights:

- Presents a ten-year project implementation plan to construct the ITS and communications infrastructure to support regional TSMO strategies.
- Identifies agencies' top priority ITS investment project.
- Identifies longer-range opportunities that may represent emerging project opportunities.

The observations, results, and findings presented in the previous chapters all come together in the Treasure Valley ITS Implementation Plan presented in this chapter. The Implementation Plan represents a ten-year time horizon and includes over 150 specific projects described within the 11 operational service categories. Additionally, emerging strategies are provided for longer term consideration.

This chapter contains the Implementation Plan project list with descriptions, high priority projects as identified by agencies, and a discussion of how to use the Implementation Plan.

Implementation Plan Project Descriptions

"Appendix A: Implementation Plan - Project List" contains the complete list of ITS Implementation Plan projects. The projects are presented in the following Operational service categories:

- Regional Operations Coordination and Planning
- Regional Transportation Management
- Freeway Management
- Arterial Management
- Incident and Emergency Management
- Traveler Information
- Public Transportation Management
- Road Weather Operations
- Maintenance and Construction
- Regional Data Archiving
- Regional Communications Infrastructure Management

It should be noted that this project list is considered a living document by the stakeholders. It will be kept up to date and refined as necessary by the Treasure Valley Regional Transportation Operations Working Group.

Each project includes the following information:

ID NUMBER	PROJECT NAME	LEAD AGENCY	ESTIMATED CALENDAR YEAR	PLANNING LEVEL COST ESTIMATE ($K, 2013)	PROJECT DESCRIPTION

ID Number – A unique number that identifies a specific project within an operational service category (e.g., RC-1 for Regional Coordination #1).

Project Name – A descriptive name given to each project.

Lead Agency – The agency, or agencies, responsible for the successful completion of the project. In most cases, a single project lead was identified. In some cases, multiple project leads were listed—this indicates either a possible joint effort or anyone of the agencies listed could lead the project depending on the circumstances. The agencies listed as a project lead have reviewed and accepted this responsibility. However, it is understood that the project leads could change as the project is defined in greater detail.

Year/Timeframe – This project descriptor category has two possible entries:

- A fiscal year in which the project is to begin. If a year is provided it means that the project is already "programmed" and has funding allocated to implement the project.
- A timeframe (near, medium, or long) may be provided that indicates general timing of the project. If only a timeframe is provided is means that the project does not yet have funding associated with its implementation.

Planning Level Cost Estimate ($k, 2013) – The estimated cost to complete the project. These estimates are for planning purposes only and more detailed cost estimates are expected to be completed prior to project initiation. If there is a fiscal year in the "Year/Timeframe" column, the cost provided is the programmed/budgeted amount allocated to complete the project.

Project Description – A description of the project scope including planned activities, needed equipment or software, and location.

Agency Priority Projects

During discussions with the Treasure Valley transportation agencies, each was asked to identify their near-term highest priority projects. The results are described in Table 11–1 below and represent a list of projects of most importance to the agencies. They should be considered for immediate implementation.

ADA COUNTY HIGHWAY DISTRICT	
RC-2	Create Interagency Agreements and ITS Management and Operations
RC-5	Update/Develop Standard Specifications for ITS and Communication infrastructure
C-1	Establish and Maintain Regional Communication Coordinating Committee
C-2	Create Regional Agreement for Fiber Optic Sharing and Management
CITY OF CALDWELL	
TM-18	Caldwell Arterial Traffic Management Center and System: Phase 1
C-9	City of Caldwell Field-to-Center Fiber Optic Backbone
CITY OF NAMPA	
RC-5	Update/Develop Standard Specifications for ITS and Communication infrastructure
TM-17	Nampa Arterial Traffic Management Center and System
TM-20	City of Nampa Integration with Regional Virtual TMC
C-10	North Nampa Fiber Optic Loop
COMPASS	
RC-1	Establish and Maintain regional operations working group
EMERGENCY MANAGEMENT RESPONDERS	
IM-2	Incident and Emergency Management (IEM) RCTO
IM-4, 5, 6	Idaho State Police, Ada County Sheriff, Canyon County Sheriff Integration with Regional Virtual TMC
C-2	Create Regional Agreement for Fiber Optic Sharing and Management
IDAHO TRANSPORTATION DEPARTMENT – DISTRICT 3	
MULTIPLE	To enhance mobility through improved traffic signal progression – either as a project lead or partnering with local agencies
IDAHO TRANSPORTATION DEPARTMENT HEADQUARTERS	
TM-5	ITD Statewide Central Control Software Implementation – Phase 2
C-4	Virtual TMC Communications/Network
STATE COMMUNICATIONS	
IM-3	Emergency Responder CAD Integration with Traffic Management/511 Traveler Information
VALLEY REGIONAL TRANSIT	
PT-2	ValleyRide Fixed Route Management and AVL System
PT-22	Downtown Boise Multi-Modal Center: Technology Applications
PT-23	Caldwell/Nampa Multi-Modal Center: Technology Applications
PT-25	ValleyRide Dispatch Centers - Integration with Regional Virtual TMC

Table 11–1: Near-Term Highest Priority Projects

Corridor Implementation Projects

While a majority of the Operational Service categories are directed at the Treasure Valley region as a whole, the Freeway and Arterial Management categories tend to align with specific corridors in the TSMO planning area. Figure 11–1 through Figure 11–3 show which corridors in Ada County, the City of Caldwell, and the City of Nampa are planned for Freeway and Arterial Management projects. Project descriptions can be found in Appendix A.

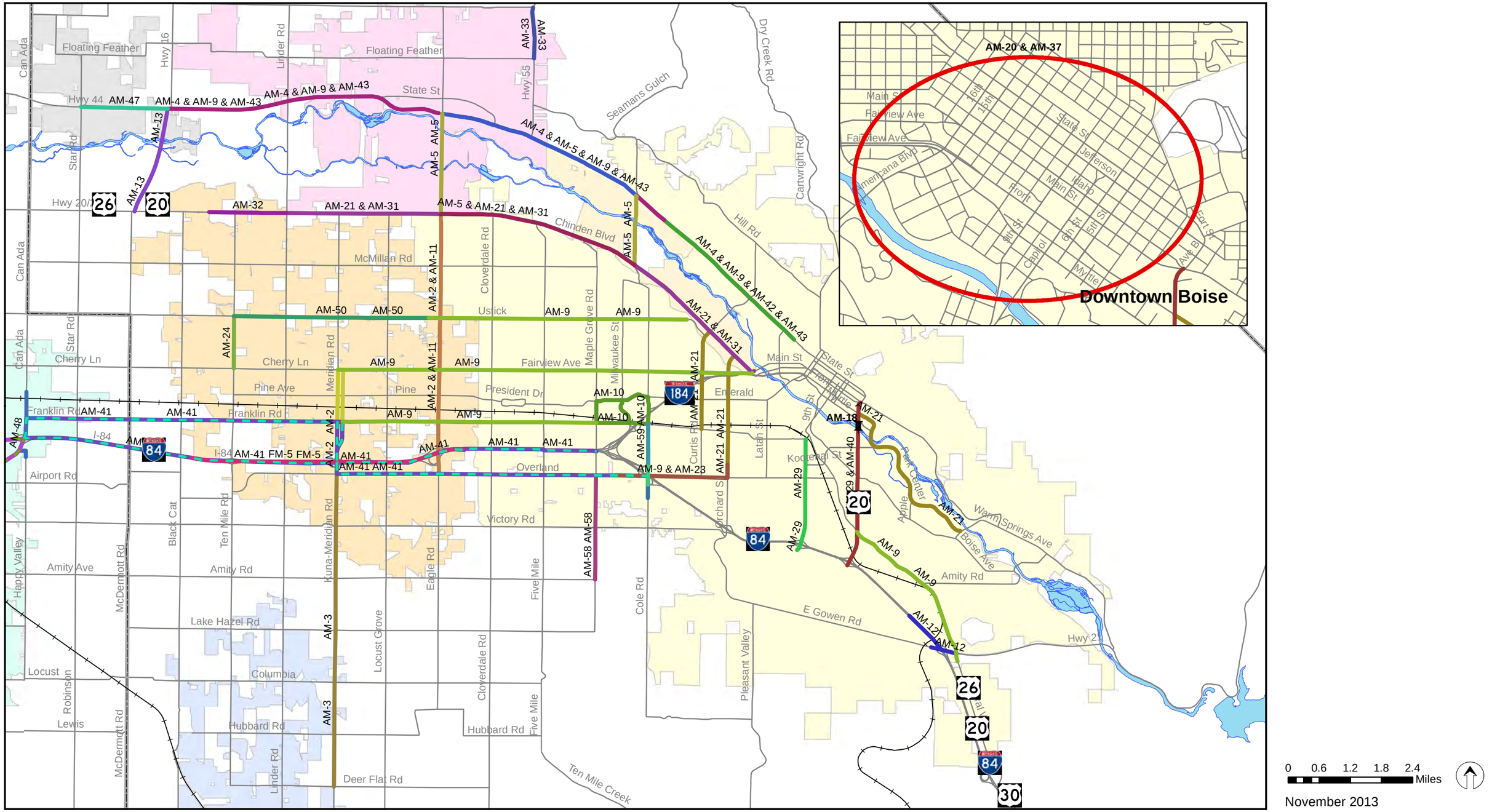
Using the ITS Implementation Plan

Over the past 15 years, two previous Treasure Valley ITS implementation plans have been used to educate stakeholders, ensure technology applications are considered in the transportation planning process, and guide technology project programming and deployment. This implementation plan will strive to achieve the same result, but will have a stronger emphasis on guiding the coordination of Treasure Valley's transportation operations through documented procedures, executed agency agreements, coordinated committee structures, advance technology applications, and interrelated project implementations.

The Implementation Plan should be used to:

- Identify needed Treasure Valley ITS projects to improve or enhance the management or operations of the transportation system. Agencies should identify those projects for which they have responsibility and determine how they will successfully accomplish each.
- Program the needed projects in agency's transportation improvement programs/plans such that they are funded and implemented in the most appropriate manner.
- Guide the successful implementation of each project in the timeframe suggested.
- Identify opportunities to work closely with other agencies to implement specific ITS projects.
- Identify opportunities to participate on various committees to oversee the execution of this implementation plan.
- Maintain the status of initiated and completed projects in order to track and report progress of the implementation activities.

Figure 11-1 ADA County Treasure Valley Corridor Implementation Projects for Freeway and Arterial Management



0 0.6 1.2 1.8 2.4 Miles

November 2013

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Treasure Valley Transportation System:
Operations, Management and ITS

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Figure 11-2 City of Caldwell Treasure Valley Corridor Implementation Projects for Freeway and Arterial Management

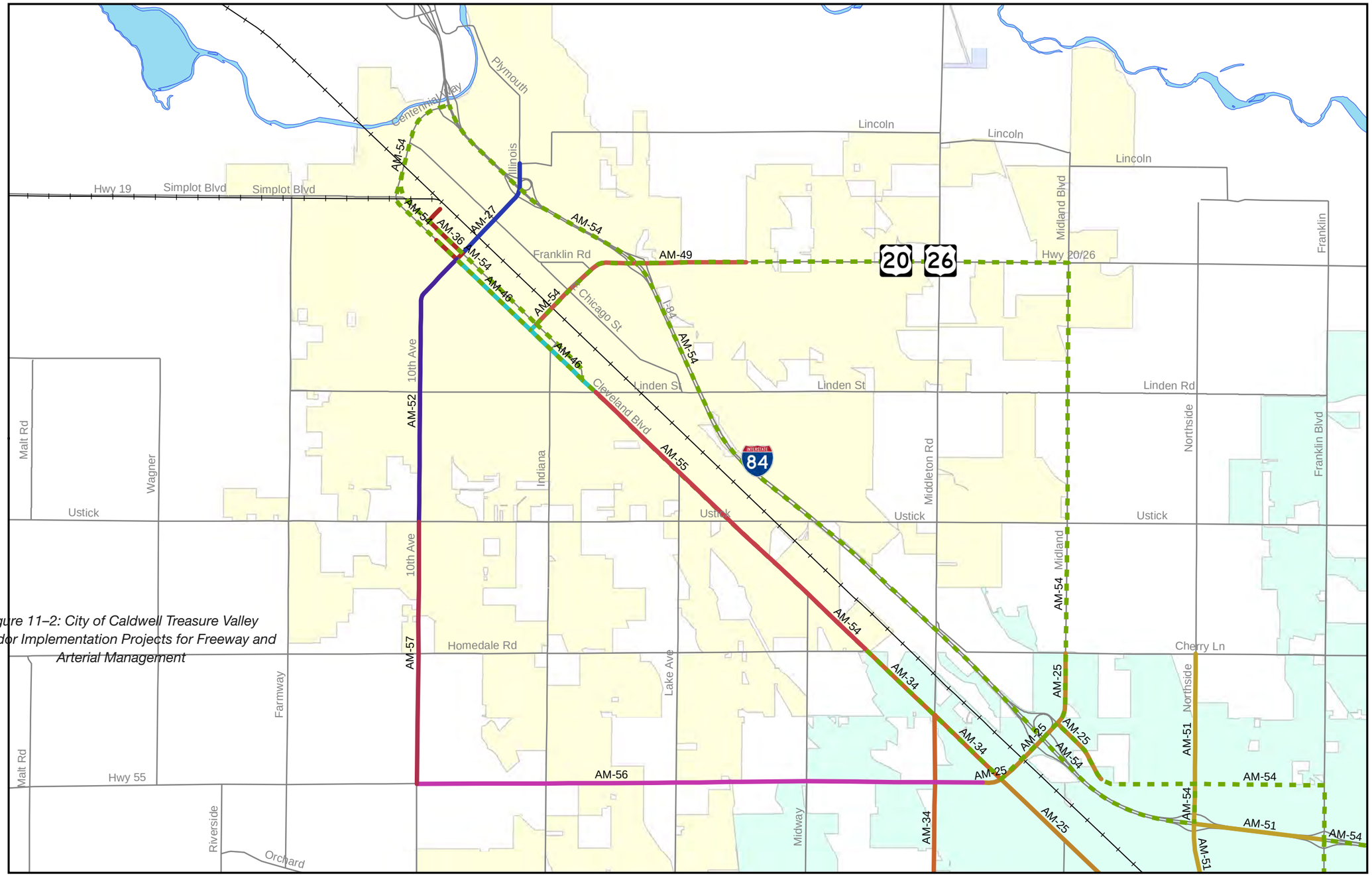

Figure 11–2: City of Caldwell Treasure Valley Corridor Implementation Projects for Freeway and Arterial Management

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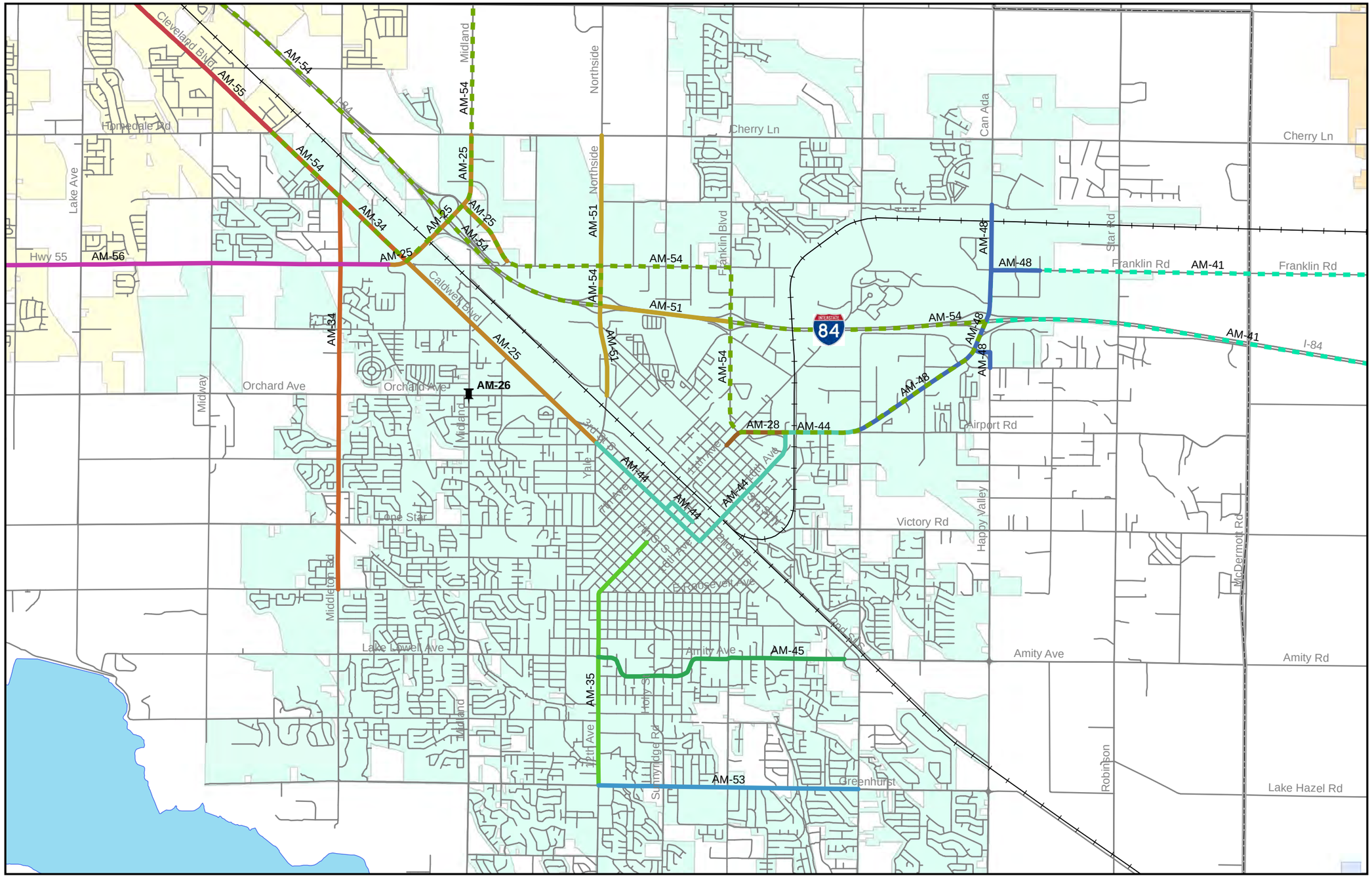
Figure 11-3 City of NampaTreasure Valley Corridor Implementation Projects for Freeway and Arterial Management



November 2013

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Chapter 12: Operations and Maintenance Requirements

Chapter Highlights:

- Discusses the staffing and resources required to support existing and proposed levels of Transportation System Management and Operations and ITS investment in the Treasure Valley.
- Describes the functions and personnel responsibilities that is required within agencies to support operations.
- Benchmarks existing personnel against optimal levels of staffing based on industry benchmarks and projected future growth in ITS devices and traffic signals.

The ITS Implementation Plan is aimed at making the most of the transportation infrastructure and where possible automating systems to respond to real-time traffic conditions. Examples of this automation are adaptive traffic signal control and cameras for network monitoring and traveler information. In order for agencies in the Treasure Valley to achieve the most benefit from their systems requires an ongoing commitment to equipment upgrades as well as personnel resources that can actively manage and operate the transportation infrastructure. In general, approximately three percent of the capital cost for each project in the ITS implementation plan is required to support operations and maintenance.

Figure 12–1 illustrates the common functions required in active transportation system management and operations. These functions are provided in varying degrees by ACHD, ITD, City of Caldwell, and City of Nampa today, but the level of effort required will expand as the region deploys more intelligent transportation systems. For example, this plan envisions extending the transportation communications network to nearly every traffic signal and ITS device in the region. Expansion of the communications network will enable traffic engineers and traffic signal technicians to remotely view real-time operations and systems status as well as make adjustments to signal timing or detection at each intersection. This access will allow more accurate and timely diagnosis of operational and maintenance issues as well as more appropriate, efficient, and targeted response. Remote troubleshooting and adjustments can help save time, fuel, and costly overtime call-outs. However, the communications network must be maintained by trained personnel, and engineers or technicians must be available to access the signal system to adjust signal timings or troubleshoot faults when the need arises.

This section describes equipment upgrades and end-of-life replacement, existing operations and maintenance personnel, and future staffing needs and alternatives. This section focuses on the surface transportation network. Valley Regional Transit and Treasure Valley Transit can expect that each project implemented from this plan will have an associated operations and maintenance cost of approximately three percent of the capital cost. Both VRT and TVT update their operations and maintenance programs on a periodic basis and should incorporate the projects from this plan into that process.

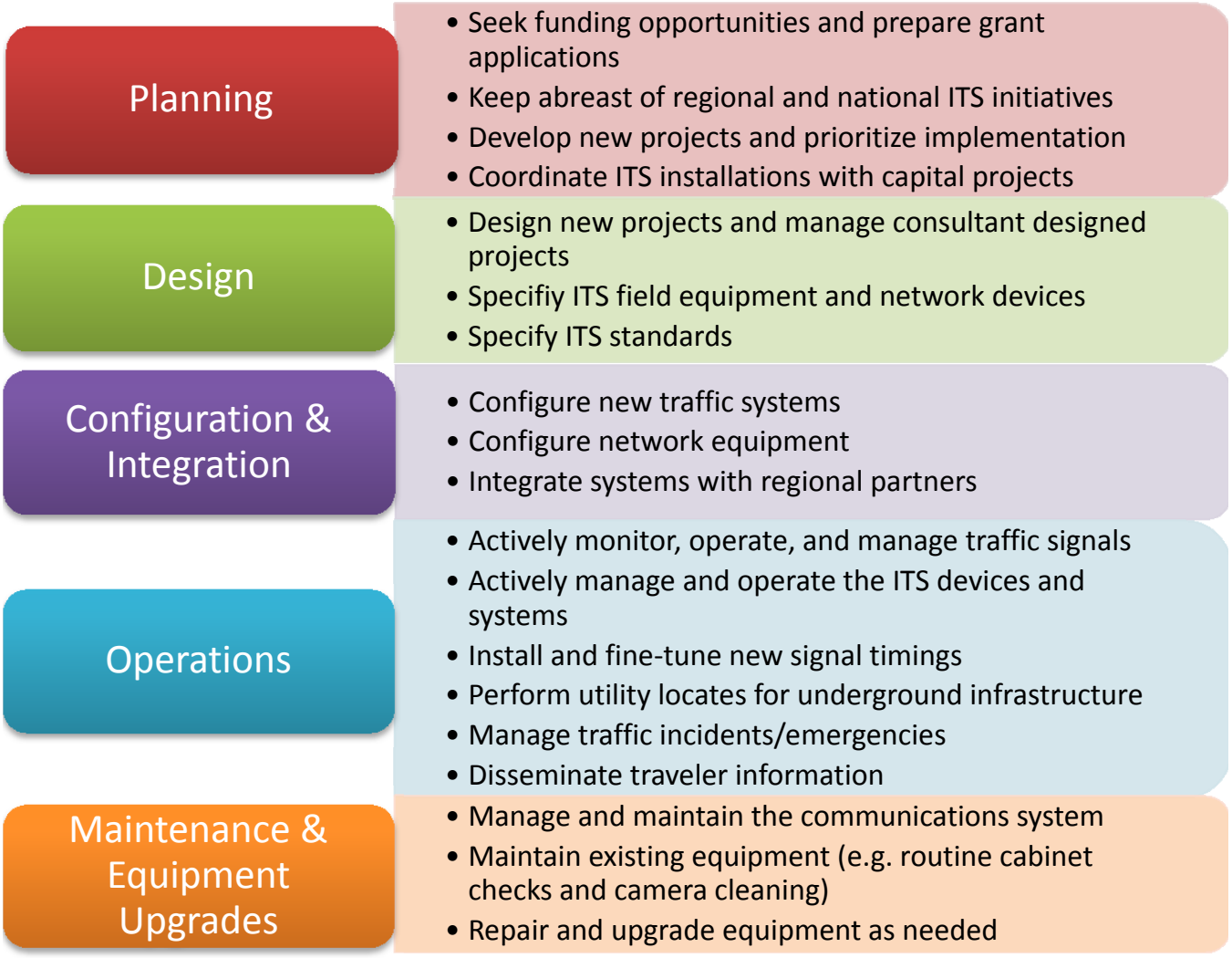

Figure 12–1: Transportation Systems Management and Operations Responsibilities

Equipment Upgrades and End-of-Life Replacement

The useful life for much of the electronics installed for transportation system management and operations is often less than 10 years. Over time, the electronic equipment needs upgrading or replacement as it fails or becomes obsolete. In order to budget for these modifications, it will be necessary to establish the expected useful life and lifecycle costs of key components in the ITS network. Another way to manage the expense of upgrading and replacing equipment will be to continually identify new equipment that requires less maintenance or has a longer useful life, and specify this equipment in future designs.

Equipment and system upgrades can either be funded through implementation projects or leveraged as part of other capital improvement projects. This increases the opportunities to secure funding and improves the ability for implementation. For example, if another roadway project is trenching in a desirable communications area, it can be more cost efficient to coordinate having ITS specific conduit and fiber optic cable installed in conjunction with the other effort rather than to pay trenching costs separately.

Equipment upgrades can also be supported through annual capital improvement allocations, which is a model currently used by Ada County Highway District and agencies in other regions such as the City of Bellevue. ACHD has found this allocation to be useful in covering numerous upgrades that are too small to be considered as individual capital works projects.

Existing Operations and Maintenance Personnel

This section describes typical agency operations and maintenance personnel as well as agency specific allocations. Although each agency differs in their organization, staff providing the services outlined in Figure 12–1 are generally broken into technology services, transportation engineering, and transportation maintenance groups. These groups typically have the essential duties and assigned support staff outlined in Figure 12–2. This figure is most typical of city and county agencies, whose focus has traditionally been traffic signals, street lighting, and the supporting communications network. In the Treasure Valley, agencies such as ACHD and ITD have broader responsibilities because they already have a heavier focus on ITS. In addition to the urban area of Treasure Valley, ITD staff is also responsible for the rest of District 3, which includes 10 counties and a large rural area.

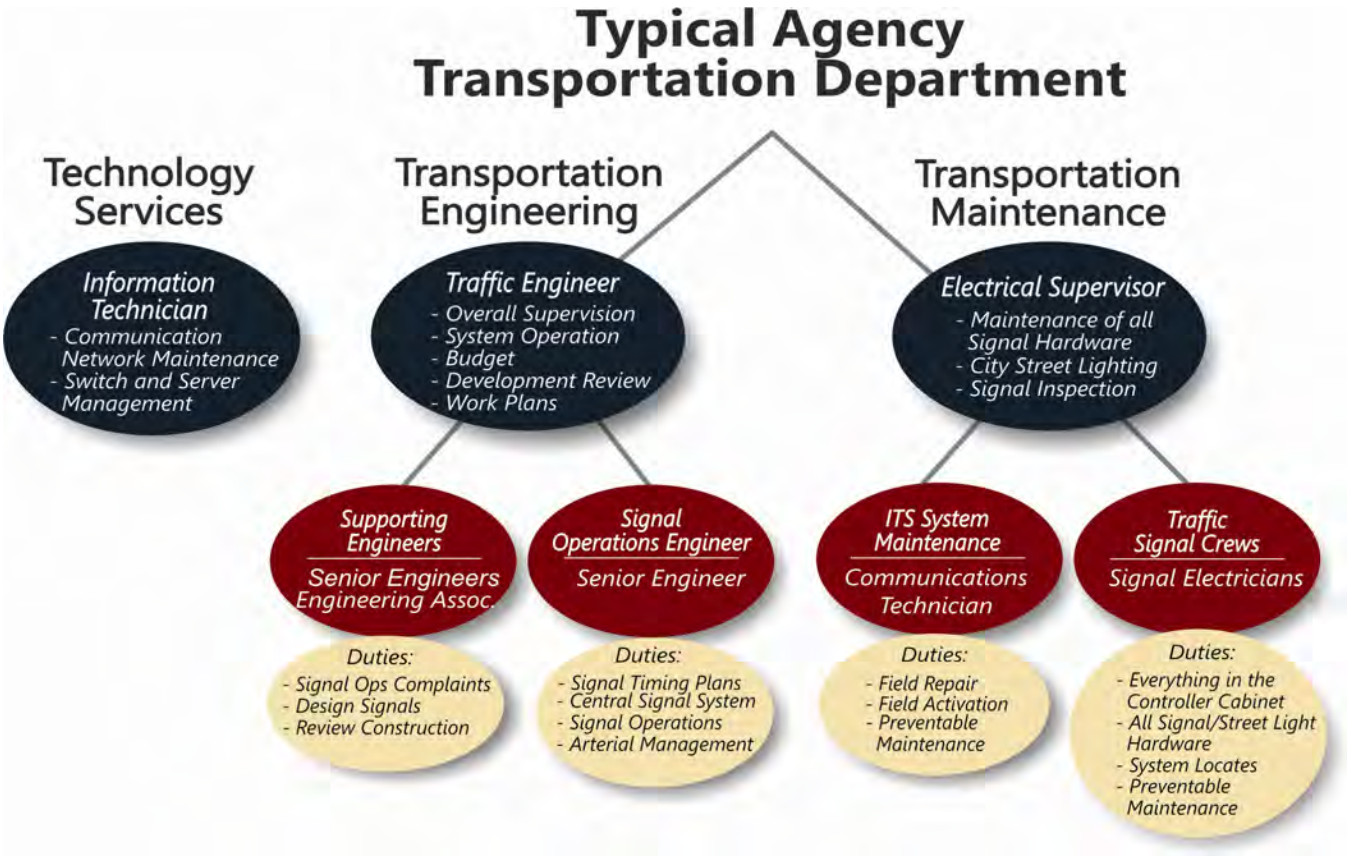

Figure 12–2: Typical City or County Transportation Department Organization Chart

Ada County Highway District Operations and Maintenance Staff

Figure 12–3 shows the organization chart for ACHD's traffic department. The 19.5 full time equivalents (FTEs) in the Traffic Operations and Congestion Management divisions are responsible for the operations and maintenance of ACHD's transportation infrastructure. ACHD contracts out the cleaning of their arterial roadway CCTV cameras at a cost of approximately $35,000 per year. Additionally, ACHD has three information technicians in their Information Technology (IT) department that provide IT services for the entire ACHD organization, which includes approximately 1,500 IP devices in the traffic network. The use of 3 FTEs for IT falls short of meeting ACHD's current needs.

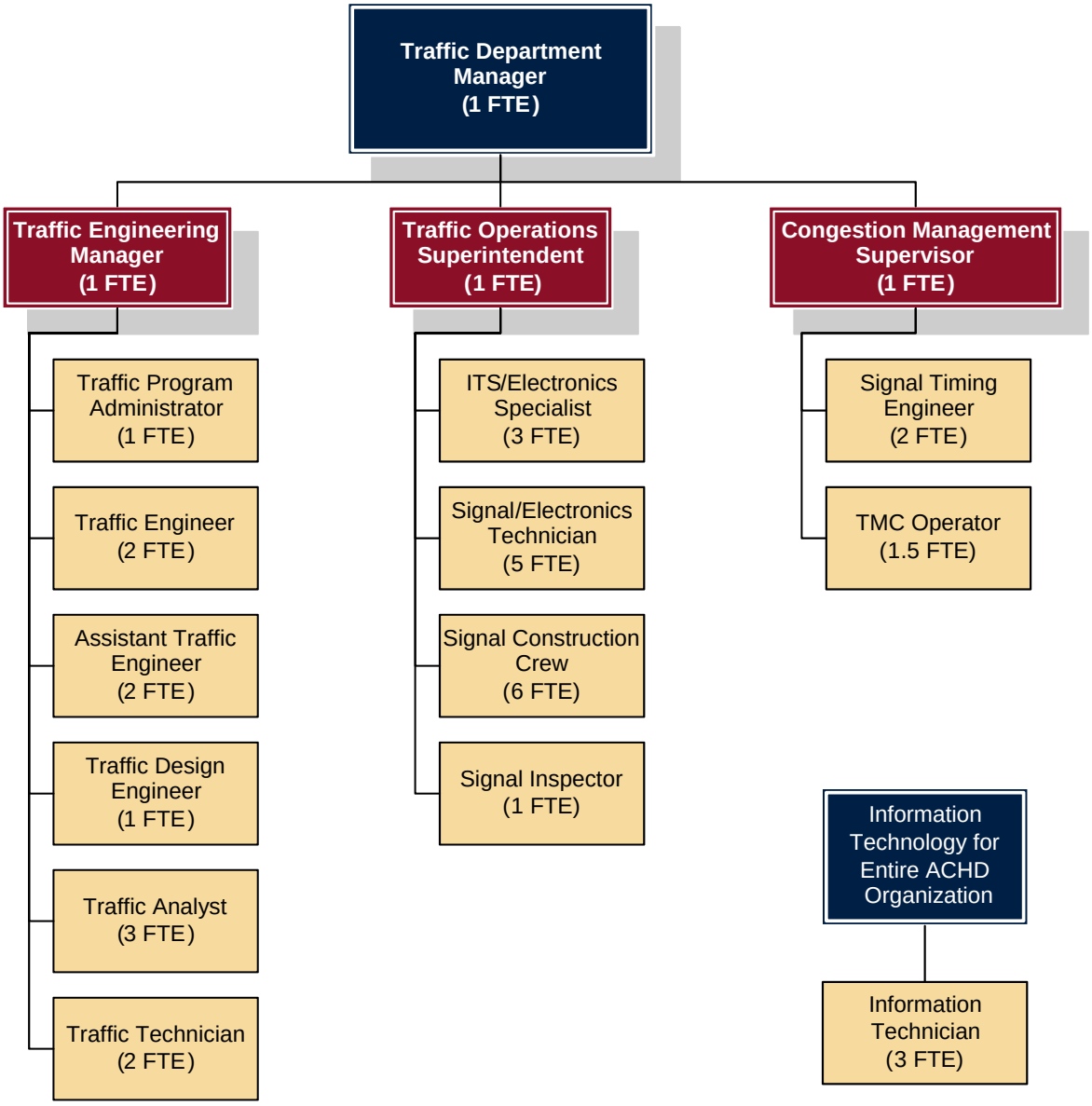

Figure 12–3: ACHD Traffic Department Organization Chart

Other Agency Operations and Maintenance Staff

ITD, City of Caldwell, and City of Nampa each use several FTE for the operations and maintenance of their traffic signals, street lighting, and ITS infrastructure as shown in Table 12–1. These agencies use fewer FTE than ACHD due to the smaller number of traffic signals in their networks. ITD contracts out maintenance for CCTV camera cleaning, replacement of camera parts, DMS repairs, RWIS site maintenance, and HAR maintenance. This is done through a statewide contract and the cost for the Treasure Valley portion of the infrastructure is approximately $200,000 per year. The City of Nampa contracts out repairs for fiber optic cable.

ITD	CITY OF CALDWELL	CITY OF NAMPA
1.0 FTE Traffic Engineer	0.5 Engineering Technician	0.5 FTE Traffic Engineer
3.0 FTE Electricians in Electrical/ Signal Crew		1.0 FTE Traffic Signal Technician
		0.5 FTE Electrician/Street Lighting
4.0 FTE	0.5 FTE	2.0 FTE

Table 12–1: Operations and Maintenance FTE for ITD, Caldwell, and Nampa

Future Operations and Maintenance Staffing Needs

This section provides an estimate of future staffing needs for the surface transportation network and for TMCs as well as contracting and resource sharing alternatives. Discussions with Treasure Valley agencies provided information on current engineer and technician staffing levels. These were compared to research on nation-wide staffing levels based on the number of traffic signals operated maintained to evaluate whether additional staff is recommended. It is important to note that nation-wide staffing levels for intelligent transportation systems are not readily available because the type and number of devices and systems varies widely from agency to agency. Therefore, ITS devices are assumed to be equivalent to traffic signals for the purposes of this estimate.

The results of the traffic signal and ITS staffing analysis are summarized in Table 12–2. Based on national standards, ACHD may currently benefit from the addition of three technicians and the City of Nampa may currently benefit from the addition of 0.7 FTE of engineering support or combined engineer/technician support. Although ITD's current staffing levels appear below national standards, they currently contract out the maintenance of a significant portion of their ITS infrastructure; therefore, no additional staff are recommended. The City of Caldwell currently has optimal staffing.

The incremental installation of ITS infrastructure per the implementation plan will require the addition of staff in the future. Table 12–2 includes the additional quantity of traffic signals and ITS devices anticipated in the next five years as well as in the long-term based on the full build-out of this plan. Implementation of the projects is dependent on funding availability. ACHD, City of Caldwell, and City of Nampa will all need additional staff to support future system expansion as shown in Table 12–2. Some of the traffic signal staffing deficits in this table may be reduced some as communications is installed to more traffic signals, which allows for more signal timing and troubleshooting to be done remotely.

	FULL TIME EQUIVALENT (FTE) STAFF											
	QUANTITY			ENGINEER[1]				TECHNICIAN[2]				
					OPTIMAL[3]				OPTIMAL[4]			
	EXISTING	PLANNED FOR NEXT 5 YEARS	PLANNED FOR NEXT 10+ YEARS	CURRENT	EXISTING NETWORK	FUTURE NETWORK	FUTURE DEFICIT	CURRENT	EXISTING NETWORK	FUTURE NETWORK	FUTURE DEFICIT	NOTES
ACHD												
Traffic Signals[A]	499	50	100	6.0	4.6	4.6	2.5	5.0	9.2	9.2	4.2	Includes operation of 97 ITD signals
ITS Devices[B]	145	100	272		1.2	3.9		3.0	2.3	7.9	4.9	
CITY OF CALDWELL												
Traffic Signals[A]	8	4	-	0.1	0.1	0.2	1.1	0.4	0.2	0.3	1.8	
ITS Devices[B]	0	31	45		0.0	1.0			0.0	1.9		
CITY OF NAMPA												
Traffic Signals[A]	57	6	-	0.5	0.8	0.8	1.6	1.0	1.4	1.6	3.0	Includes operation of 29 ITD signals
ITS Devices[B]	0	54	42		0.0	1.3			0.0	2.4		
ITD												
Traffic Signals[A]	52	8	-	1.0	0.7	0.8	1.7*	3.0	1.3	1.5	2.4*	29 of these traffic signals are in the Treasure Valley
ITS Devices[B]	167	8	18		1.7	1.9			3.3	3.9		Approximately half of these are in the Treasure Valley

*A significant portion of ITS maintenance is contracted out

Device Notes

A. Traffic signals include HAWK signals and ramp meters. The quantities indicate how many traffic signals are operated independent of ownership.

B. ITS devices include CCTV cameras, DMS, HAR, RWIS, radar detectors, Bluetooth readers, and weigh-in-motion stations.

FTE Notes

1. Engineers are responsible for traffic signal operations, which includes timing plans and day-to-day response to real-time conditions and citizen calls. In addition to operations, many current engineers are also responsible for design of other traffic elements.
2. Technicians are responsible for traffic signal maintenance, which is typically done with two-person crews and one bucket truck. Other technician responsibilities vary by agency and include maintenance of street lighting, ITS, and the supporting communications infrastructure.
3. Optimal FTE based on the Traffic Signal Operations and Maintenance Staffing Guidelines, FHWA, March 2009. Optimally an engineer operates an average of 75 – 100 traffic signals, with more signals with the higher end for agencies operating 150 or more signals. This table assumes 100 traffic signals per engineer for ACHD and 75 traffic signals per engineer for Caldwell, Nampa, and ITD. This table assumes ITS devices are equivalent to traffic signals.
4. Optimally a technician operates an average of 40 – 50 traffic signals with the higher end for agencies operating 150 or more signals. This table assumes 50 traffic signals per technician for ACHD and 40 traffic signals per technician for Caldwell, Nampa, and ITD. This table assumes ITS devices are equivalent to traffic signals and that ITD has 50 ITS devices per technician.

Table 12–2: Traffic Signal and ITS Operations and Maintenance Employee Allocation

Additional IT support will also be needed for ACHD, City of Caldwell, and City of Nampa to support the installation, configuration, monitoring, and troubleshooting of the ITS communications network electronics and servers.

Additional staffing for ITD is not anticipated since ITD has a comprehensive infrastructure, they may have the Cities of Caldwell and Nampa operate more traffic signals, and many of ITD's future efforts will focus on central control systems as opposed to field devices.

TMC Staffing Needs

The ACHD TMC and StateComm are used to manage traffic in the Treasure Valley. StateComm has 14 FTEs on staff and expends approximately 65 percent of their resources, or 9 FTEs, supporting ITD. No additional staffing is anticipated for StateComm. Table 12–3 includes the staffing levels for the ACHD TMC as well as other locations in the U.S. with traffic signal networks ranging in size from 320 to 765. As can be seen in Table 12–3, ACHD currently employs 1.5 operators whereas TMCs with similar numbers of traffic signals employ two to four operators. While a direct comparison of TMCs is difficult because each TMC has different hours of operation and responsibilities, it does indicate that ACHD may benefit from additional operational staff in the TMC.

LOCATION	NUMBER OF TRAFFIC SIGNALS	NUMBER OF STAFF[1]	
		SUPERVISOR	OPERATORS
Boston, MA	320	1	6
Phoenix, AZ	400	1	4
Seattle, WA	432	1	2
Albuquerque, NM	450	1	3
ACHD	**499**	**1**	**1.5**
Atlanta, GA	650	1	5
Las Vegas, NV	700	1	4
San Antonio, TX	765	1	3

[1] Staffing levels from Traffic Signal Operations and Maintenance Staffing Guidelines, FHWA, March 2009

Table 12–3: TMC Staffing Samples

Contracting Opportunities

There are opportunities to contract out certain elements of the maintenance and operations. Contracting services can make sense when the level of effort required is minimal over a given year (e.g. a small percentage of time relative to full time equivalent), or when the task is not needed very often and it requires specialty equipment or expertise.

Another opportunity for contracting out work is fiber optic cable maintenance, in particular cable splicing and emergency restoration. Having an on-call contractor would simplify the process for completing routine fiber optic cable maintenance, without requiring agencies to employ staff capable of doing this specialized type of work.

Resource Sharing Opportunities

Similar to contracting services, agencies may also elect to enter into agreements with agencies in the Treasure Valley to share maintenance and operations responsibilities. Several scenarios describe how this might work.

Under the first scenario an agency may hire another agency to perform some of their maintenance and operations responsibilities. For example, the City of Caldwell owns a small number of traffic signals. The City of Nampa is located in close proximity and may be a good fit for performing Caldwell's operations and maintenance. Or the City of Caldwell could still perform operations such as signal timing and hire the City of Nampa to handle the field maintenance (e.g. routine cabinet checks, equipment replacements).

Under the second scenario two or more agencies may elect to enter into a joint agreement to contract out services such as IT support or fiber optic cable maintenance. Such an arrangement would allow agencies to save time and money on administration of the contract and possibly receive cost savings because the contract would have a larger volume of components than a contract for a single agency.

Chapter 13: Achieving the Vision

Chapter Highlights:

- Discusses opportunities for near-term actions and "early wins" to implement the vision and recommendations of the plan.
- Provides a starting point for regional coordination among transportation and emergency management agencies to achieve common operational goals.
- Recommends future updates to the plan as regional needs and agency priorities evolve.

A significant amount of money, time, and effort has been invested by agencies in the Treasure Valley to create this plan. Numerous opportunities—ranging from regional coordination to deployment of ITS infrastructure—that have identified through the planning process can be acted upon in the years immediately following completion of this document. As was discussed in the Introduction, agencies in the Treasure Valley have a history of using regional ITS plans and architectures successfully to guide project deployments and operations initiatives in the region.

More importantly, the regular meetings and conversations during the planning process revealed a number of agencies with a shared interest in effective operation of the transportation system. This momentum must be sustained now that the plan is completed in order to realize the Operational Vision for the Treasure Valley.

The chapter identifies specific near-term actions that may be undertaken in the first two years following the completion of the plan to sustain the momentum. The content of this chapter draws upon ideas from throughout the plan and the planning process, and the input of a diverse group of project stakeholders.

These ideas are not intended to be a definitive work plan for the region in these first two years, but they do provide a starting point for developing work plans both for a Treasure Valley Regional Operations Work Group (TVROWG) as well as individual agencies.

Establish a Treasure Valley Regional Operations Work Group

A direct follow-on to the plan development process that has been recommended by many participating agencies is the establishment of a standing TVROWG to carry forward the inter-agency coordination of the planning process.

The TVROWG would be a voluntary, multi-agency initiative to promote the coordinated management and operation of the region's multi-modal transportation infrastructure. Chaired by COMPASS, the TVROWG would comprise the project stakeholder working group and add other agencies as appropriate, such as emergency response agencies.

Many metropolitan areas in the western U.S. and across the country have established similar operations working groups. Participating agencies have benefitted in numerous ways, including: increased visibility of operations and ITS in the planning regional process; improved coordination to address multi-agency and multi-modal needs and opportunities, greater success at securing funding for operations activities; and knowledge sharing among agency staff with common interests and goals. Many of these same benefits are anticipated in the Treasure Valley with the formation of the TVROWG.

It is important to identify one or more early success opportunities for the TVROWG to demonstrate its value to the region and for the participating agencies. This may include collaboration on a joint initiative of broad significance to the region, such as: submission of a joint grant funding opportunity for a multi-jurisdictional project; development of a Regional Concepts for Transportation Operations; and/or development of updated Interagency Agreements. Many of the ideas in this chapter could be spearheaded by the TVROWG in its first year or two of existence.

Pursue Innovative Funding Sources

A critical historical challenge for operating agencies in the Treasure Valley is the uncertainty of funding for operations investments—in particular, funding for staff and resources that support operations and maintenance beyond the initial capital investment. A number of stakeholders have expressed interest in pursuing innovative funding sources through means such as:

- Multi-agency applications for grant funding
- Pursuit of non-traditional funding sources for operations, such as development impact fees
- STP funding allocations designated for ITS and operations programs
- Use of shared infrastructure (e.g. existing fiber infrastructure) to reduce or eliminate the need for capital investments.

While stable, predictable funding for operations programs is the most desirable outcome, many regions around the country have had success through joint agency applications for discretionary funds. For example, an Integrated Corridor Management or Congestion Mitigation and Air Quality (CMAQ) grant that includes roadway agencies as well as transit agencies is more likely to score favorably relative to grant award criteria.

Similarly, if regional criteria for project funding reflect the operational goals and needs of the regions, proponents for traditional transportation capital projects are more likely to seek out operational partners to participate in those projects.

Develop Regional Concepts for Transportation Operations

One evolution of this plan as compared to previous plans is a shift in focus from infrastructure (ITS) deployment to a broader array of resource, policy, and operational issues that are critical to a successful regional operations program.

In the course of discussions, stakeholders identified the need for more coordinated regional approaches to operational strategies such as incident management, traveler information, and arterial management. Even where past operating plans exist (such as I-84 detour planning), the plans may be obsolete or no longer relevant to current needs (such as the growing emphasis of operations in Canyon County).

The Implementation Plan identifies numerous RCTO documents that would define how agencies work together to solve common operational challenges. The RCTOs identified in the Implementation Plan pertain to:

- Data Infrastructure Strategy
- Arterial Management
- Freeway Management
- Incident and Emergency Management
- Traveler Information
- Parking Information
- ITS System Maintenance

Regional Concepts for Transportation Operations represent a relatively low-cost, but highly collaborative means of improving management of the transportation system—in many cases, leveraging existing investments in ITS infrastructure.

Develop Interagency Agreements

One of the primary needs discovered during the development of this Plan was the lack of formal agreements that could guide agency activities and define the roles, responsibilities, and coordination efforts. Such agreements are critical to achieving the level of coordination defined with the vision established in this document. In some cases several attempts have been made to develop interagency agreements, and in other cases agencies have not seen the need for agreements—until now.

It is recommended as a high priority activity of the TVROWG that the necessary interagency agreements be defined, developed and executed. This may require special sub-committees to focus on certain agreements. Additionally, professional assistance may be required to assist in the process of developing these agreements.

Coordinate Management of Regional Communications Infrastructure

The Treasure Valley may wish to establish a Regional Communications Infrastructure Management Committee comprised of agencies that own, use, operate, and/or maintain communications infrastructure. This committee would coordinate the management and upkeep of existing and deployment of new infrastructure to minimize costs and maximize the utility to transportation and emergency management agencies, and potentially other municipal or private users. The committee could be a subcommittee or extension of the TVROWG. Specific regional communications management strategies that could be undertaken are discussed in Chapter 10.

Implement Priority Projects

The project list provided in Chapter 11 identifies a significant number of activities that are programmed for implementation over the next five years. These projects amount to over $26 million to be conducted by multiple agencies.

Each agency has also identified one or more priority implementation projects, also discussed in Chapter 11 (Table 11–1). These priority projects provide an opportunity to focus near-term efforts of each agency on an attainable goal in the years immediately following the plan. In most cases, these priority projects include opportunities to collaborate with other agencies in the Treasure Valley on funding, infrastructure sharing, and/or coordinated operations and maintenance.

Build Awareness of Operational Needs and Benefits

Many opportunities to link regional planning and operations are discussed in Chapter 9. An important starting point for these efforts is to increase visibility of this plan, the Operational Vision for the Treasure Valley, and the benefits that past operations investments have provided to the region.

Outreach and education opportunities to regional decision makers, transportation processionals, and the general public will raise awareness of Transportation System Management and Operations as a key transportation strategy for the region. Greater awareness will build support for low-cost, high impact operational strategies that are increasingly reflected in regional plans, projects, performance measures, and funding allocations.

Operations agencies may wish to reach out to interested parties with operational success stories—for example—measured benefits, low-cost solutions to transportation needs, and/or interagency cooperation. The audience for this message may include city councils, state legislators, senior agency management (e.g. ITS, ACHD), the COMPASS Board of Directors, and community organizations. Additionally, efforts should be focused on transportation professionals such as engineers and planners, to ensure that operational strategies are considered as part of the solution to the Treasure Valley's safety and mobility needs.

Update and Maintain the Plan

This plan is intended to be a living document that should be periodically updated as the needs and priorities of the region evolve. Given their short-term focus and emphasis on enabling ITS technologies, operational plans and ITS architectures tend to have a shorter planning horizon than many regional planning documents that look at long-term needs and long lead-time infrastructure projects. A comprehensive revision of the document, including the operational vision, needs assessment, operational concept is recommended in approximately 5 years following its completion.

The Implementation Plan is project-based, and is intended to be a very dynamic element of the plan. An update of the Implementation Plan is recommended at least once per year, as one of the responsibilities of the TVROWG. COMPASS, as facilitator of the plan and the TVROWG, will maintain a working copy of the Implementation Plan. Updates to the Implementation Plan should reflect project completion or cancellation; change in status of projects from unfunded to funded, and additions or changes to projects based on evolving needs or the evolution of technologies and operational strategies. This living project list will assist the TVROWG to continue to guide the project implementation activities recommended in this Plan, and can also be used as a benchmark of past progress and future needs.

Appendix A

Implementation Plan - Project List

Treasure Valley Transportation System: Operations, Management, and ITS Implementation Plan - Project List **Final 1-7-14**

The table below contains the complete list of ITS Implementation Plan projects. The projects are presented in the following Operational Service categories:

- Regional Operations Coordination and Planning
- Regional Transportation Management
- Freeway Management
- Arterial Management
- Incident and Emergency Management
- Traveler Information
- Public Transportation Management
- Road Weather Operations
- Maintenance and Construction
- Regional Data Archiving
- Regional Communications Infrastructure Management

This project list is considered a living document by the stakeholders. It will be kept up to date and refined as necessary by the Treasure Valley Regional Transportation Operations Working Group.

Each project includes the following information:

ID Number – A unique number that identifies a specific project within an Operational Service category (e.g., RC-1 for Regional Coordination #1).

Project Name – A descriptive name given to each project.

Lead Agency – The agency, or agencies, responsible for the successful completion of the project. In most cases, a single project lead was identified. In some cases, multiple project leads were listed – this indicates either a possible joint effort or anyone of the agencies listed could lead the project depending on the circumstances. The agencies listed as a project lead have reviewed and accepted this responsibility. However, it is understood that the project leads could change as the project is defined in greater detail.

Year/Timeframe – This project descriptor category has two possible entries:

- A fiscal year in which the project is to begin. If a year is provided it means that the project is already "programmed" and has funding allocated to implement the project.
- A timeframe (near, medium, or long) may be provided that indicates general timing of the project. If only a timeframe is provided is means that the project does not yet have funding associated with its implementation.

Planning Level Cost Estimate ($k, 2013) – The estimated cost to complete the project. These estimates are for planning purposes only and more detailed cost estimates are expected to be completed prior to project initiation. If there is a fiscal year in the 'Year/Timeframe' column, the cost provided is the programmed/budgeted amount allocated to complete the project.

Project Description – A description of the project scope including planned activities, purchased equipment or software, and location.

Project Names and IDs		Lead Agency	Year / Time Frame	Planning-Level Cost Estimate ($k, 2013)	Project Description
Regional Operations Coordination and Planning (RC)					
RC-1	Establish and Maintain Regional Operations Working Group	COMPASS	Ongoing (2013+)	$50/ year	Establish and facilitate a regional, interagency working group to discuss on regional operations issues on a regular basis (e.g. quarterly). Topics of the group may include: project updates and coordination; development of interagency agreements; project funding and grant opportunities; coordination with regional transportation planning processes and policy makers; maintenance of the regional ITS infrastructure inventory; and special projects of regional operations significance.
RC-2	Create Interagency Agreements for ITS Management and Operations	COMPASS	2014	$30	Develop a master, interagency agreement for ongoing management and operations of ITS equipment. This may include implementation, maintenance, operational protocols, and funding agreements. The master agreement may be supplemented by specific sub-agreements for management of specific devices/systems or in support of Regional Concepts for Transportation Operations (RCTOs).

RC-3	Performance Measurement Regional Concept for Transportation Operations (RCTO-PM) and Data Infrastructure Strategy	COMPASS	2015	$25	Building off of this regional plan, develop a detailed strategy for implementation of operations performance measurement and collection/archiving of regional operations data to ensure consistency in quality and coverage across the region. This study will identify the operations data needed to support the regional performance measurement program. The data collection strategy will identify the detection infrastructure, desired coverage, and deployment standards (e.g. and detector spacing) necessary to support the performance measurement program.
RC-4	Transportation System Management and Operations Performance Assessment	COMPASS	Near Term	$25	Conduct a regional study to quantify the benefits of regional operations programs, including ITS, based on regional performance measures and data developed under other tasks. This project may occur as a one-time project or as a recurring (e.g. annual or bi-annual) effort. The outcomes of this effort can be used to inform operating agencies, policy makers, and the public on the benefits of transportation system management and operations in the Treasure Valley.
RC-5	Update/Develop Standard Specifications for ITS and Communications Infrastructure	ITD D3/ACHD	Near Term	$60	Each agency will develop regional guidelines for ITS equipment deployed in the region to promote consistency and interoperability of ITS infrastructure across the region. These guidelines will supplement existing agency design standards. Examples may include: Traffic signal design and detection standards; provisioning for fiber optic infrastructure; and CCTV functional specifications. Guidelines can be assembled in "workbook" fashion and updated independently as needed.
RC-6	Update Treasure Valley Transportation Operations, Management and ITS Plan	COMPASS	2018/2019	$250	The region's ITS and operations strategic plan and ITS Architecture will be updated approximately every five years to ensure that it remains consistent with evolving needs, regional plans, and progress in ITS implementation. This effort will include a comprehensive update of the existing conditions assessment, regional ITS inventory, vision, operational concept, implementation plan, and Regional ITS Architecture.
RC-7	Update Treasure Valley Transportation Operations, Management and ITS Plan	COMPASS	Medium Term	$250	The region's ITS and operations strategic plan and ITS Architecture will be updated approximately every five years to ensure that it remains consistent with evolving needs, regional plans, and progress in ITS implementation. This effort will include a comprehensive update of the existing conditions assessment, regional ITS inventory, vision, operational concept, implementation plan, and Regional ITS Architecture.
Regional Transportation Management (TM)					
TM-1	ACHD Traffic Management Center (TMC) Upgrade	ACHD	2013	$260	The ACHD Traffic Management Center will be upgraded to include a new video wall and workstations and IP based video management system.
TM-2	ACHD Communications and Equipment Upgrade	ACHD	2013	$200	Implementation of Phase 1 upgrades to central communications and networking equipment at the ACHD TMC.
TM-3	ITD Statewide Central Control Software (CCS) Implementation - Phase 1	ITD HQ	2013	$745	Implement a new statewide traffic management platform (ITD Central Control Software, CCS) for ITD ITS devices including cameras, DMS, HAR, and other devices.
TM-4	"Virtual" Traffic Management Center (TMC) Regional Concept for Transportation Operations (RCTO-VTMC)	ITD	Near Term	$50	Establishes the operating objectives, roles and responsibilities, and high level system requirements for a regional Virtual TMC connecting StateComm, ITD, ACHD, and other regional partners to provide cooperative traffic control and management capabilities. RCTO will establish high level system functional requirements based on operational/business needs, as well as ongoing equipment maintenance and funding responsibilities. The RCTO forms the basis for future interagency agreements.
TM-5	ITD Statewide Central Control Software (CCS) Implementation - Phase 2	ITD HQ	2014	$185	Expand the statewide traffic management platform (ITD Central Control Software, CCS) to include central control of cameras and highway advisory radio in the Treasure Valley as well as statewide ITD data archiving and recording.
TM-6	ACHD Communications and Equipment Upgrade	ACHD	2014	$200	Project will upgrade equipment in the ACHD TMC and hub building locations and will upgrade ten CCTV cameras and install ten new CCTV cameras at ACHD signalized intersections.

TM-7	ITD Statewide Snowplow - Automatic Vehicle Location (AVL) tracking	ITD HQ	2014	$100	Implement Automatic Vehicle Location (AVL) on ITD snowplows for tracking of historical location and materials utilization. Project underway as the first phase of the ITD Central Control Software. Longer term vision includes provision of plow location data to maintenance foreman and to COMPASS data archive for environmental quality reporting.
TM-8	ACHD Automatic Vehicle Location (AVL) Snowplow Location Tracking	ACHD	Near Term	$30	Deployment of Automatic Vehicle Location (AVL) technology to support winter road maintenance dispatch and public information on road plowing status.
TM-9	Regional "Virtual" Traffic Management Center (TMC) Design and Implementation	ITD D3	Near Term	$200	Integrate the ITD Central Control Software and ACHD central traffic management systems to provide enhanced joint operational capabilities, as outlined in the Virtual TMC RCTO. This project forms a central foundation of the Virtual TMC system, to which other agencies will be added in the future.
TM-10	ITD - D3 Integration with Regional Virtual Traffic Management Center (TMC)	ITD HQ	2015	$25	Develop interface between Regional Virtual TMC and systems used at ITD's District 3 maintenance and engineering facilities. Build interface into ITD's planned (2014) Delcan advanced traffic management system if feasible.
TM-11	ITD Statewide Central Control Software (CCS) Implementation - Phase 3	ITD HQ	2015	$200	Expand the statewide traffic management platform (ITD Central Control Software, CCS) to include modules for center-to-center connectivity, travel time estimation, and snow plow automated vehicle location (AVL).
TM-12	StateComm Central Systems Upgrade	ITD HQ	Near Term	$500	Complete upgrades and critical replacements to the StateComm video walls (ITD and ISP), as well as other central communications and networking equipment.
TM-13	ACHD Traffic Management Center (TMC) Integration with Regional Virtual Traffic Management Center (TMC)	ACHD	Medium Term	$100	Develop interface between Regional Virtual TMC and systems used at the ACHD TMC. Build interface into ACHD's IBI Group advanced traffic management system if feasible.
TM-14	ACHD Performance Monitoring System	ACHD	Medium Term	$200	Allows for monitoring of the County transportation system using archived historical operations data and analysis tools.
TM-15	ITD - D3 Traffic and Maintenance Management System Upgrade	ITD D3	Near Term	$75	Provides upgraded traffic monitoring and control capabilities to support ITD D3 incident response and maintenance dispatch capabilities, such as CCTV camera control and central traffic signal control/monitoring. Integrates ITD assets including phase 1 ITD Central Control Software, radio dispatch, traffic management control systems, and CCTV surveillance cameras into an upgraded maintenance and operations control facility at ITD District 3.
TM-16	StateComm - Backup Center Central Equipment	ITD HQ	Near Term	$200	Replace and upgrade central systems infrastructure at the StateComm backup control center, including a video wall and ITD radio system integration.
TM-17	Nampa Arterial Traffic Management Center and System	City of Nampa	2016	$325	Deploy a central traffic signal/transportation management software system for the City of Nampa to allow for centralized traffic signal control, maintenance, and monitoring capabilities. This project may be combined with other signal upgrade, interconnect, and/or fiber optic communications projects as described above to form a 'core' central traffic management system that will expand over time as additional signals and field devices are integrated.
TM-18	Caldwell Arterial Traffic Management Center and System: Phase 1	City of Caldwell	2016	$325	Deploy a central traffic signal/transportation management software system for the City of Caldwell to allow for centralized traffic signal control, maintenance, and monitoring capabilities. This project may be combined with other signal upgrade, interconnect, and/or fiber optic communications projects as described above to form a 'core' central traffic management system that will expand over time as additional signals and field devices are integrated.
TM-19	StateComm Management Center Upgrade/ Integration with Regional Virtual Traffic Management Center (TMC)	ITD HQ	Near Term	$150	Integrate of StateComm/Treasure Valley ITS infrastructure, data flows, and operations/control capabilities with other agencies connected into the Virtual TMC. (Note: Integration with Emergency Responder Computer Aided Dispatch (CAD) is provided under a separate project under the Incident and Emergency Management section)
TM-20	City of Nampa Integration with Regional Virtual Traffic Management Center (TMC)	City of Nampa	2018	$50	Integrate of the City of Nampa traffic management center with the virtual capabilities of the regional traffic management system. Provides workstation capabilities for the City to access regional traffic management assets, as well as integration of City field and central systems into the Virtual TMC.

TM-21	Caldwell Arterial Traffic Management Center and System: Phase 2	City of Caldwell	2018	$200	Future expansion of the Caldwell TMC to support growth in anticipated ITS and operations programs. TMC improvements may be coordinated with integration of the City with the regional Virtual TMC (listed as a separate project).
TM-22	City of Caldwell Integration with Regional Virtual Traffic Management Center (TMC)	City of Caldwell	2018	$50	Integrate of the City of Caldwell traffic management center with the virtual capabilities of the regional traffic management system. Provides workstation capabilities for the City to access regional traffic management assets, as well as integration of City field and central systems into the Virtual TMC.
TM-23	Boise State University Integration with Regional Virtual Traffic Management Center (TMC)	BSU	2018	$50	Provide Virtual TMC capabilities, including traffic surveillance video feeds, at the campus command center for management of Boise State special events (e.g., football games).
TM-24	Boise Airport Integration with Regional Virtual Traffic Management Center (TMC)	City of Boise	2018	$50	Deploy traffic, parking and camera monitoring systems and integration of these systems with the regional virtual TMC
TM-25	ACHD Backup Control Center/Backend Equipment	ACHD	Medium Term	$100	Provide for redundant central systems backend/operations facility outside of existing ACHD facility, which is located in a floodplain. The ACHD Sheriff's Office has been identified as a likely backup location.
Freeway Management (FM)					
FM-1	Update Freeway Detour Plan	ITD D3	Near Term	$150	Update the existing ITD freeway detour plan to reflect updated ITS deployments and Regional Concepts for Transportation Operations. Integrate the freeway detour plan into ATMS. Other agency participation would include ACHD, ITD HQ, and Emergency Response Partners.
FM-2	Highway Advisory Radio (HAR) Integration	ITD HQ	Near Term	$150	Integrate Highway Advisory Radios into ITD Central Control Software (CCS) and incident response planning procedures and tools. Requirements for this project may be driven by updated operational policies for use of the HARS in Incident and Emergency Response (RTCO-IEM) and Traveler Information (RCTO-TI)
FM-3	Maintain Regional Incident Response Vehicle Program	ITD D3	On going	$200	Maintain the ITD Incident Response Vehicle Program along I-84 in the urbanized areas of Ada and Canyon Counties (freeway focus). Project includes ongoing operational costs/staffing, procurement of replacement response vehicles and ongoing coordination with StateComm, ITD, and Canyon County law enforcement/emergency management agencies.
FM-4	Incident Response Vehicle - Automatic Vehicle Location (AVL) Tracking	ITD D3	Medium Term	$25	Provide real-time location tracking of ITD Incident Response vehicles to assist in dispatch and for increased operator safety. Make position location available to ITD and StateComm operations personnel. Potential integration with Incident Response vehicle dispatching/logging functions.
FM-5	I-84 Ramp Metering Installation - Initial Deployment	ITD D3	Medium Term	$1,470	Implement freeway on-ramp metering system to reduce ramp merge area congestion, maintaining smoother traffic flow on the freeway main line. Project builds upon recommendations of previous ramp meter feasibility analysis by ITD. Three interchanges have been identified for initial deployment: Eagle Rd.; Ten Mile Rd.; and Meridian Rd. (Note: Deployment date pending ongoing initial study)
FM-6	I-84/I-184 Ramp Metering Installation - Expansion	ITD D3	Long Term	N/A	Implement freeway on-ramp metering system to reduce ramp merge area congestion, maintaining smoother traffic flow on the freeway main line where appropriate and geometrics allow. Project builds upon recommendations of previous ramp meter feasibility analysis by ITD and experience from the Initial deployment.

Arterial Management (AM)					
AM-1	Ada County Arterial closed-circuit television (CCTV) Camera Installation	ACHD	Annual	$50	Install 15 CCTV cameras per year on ACHD arterial roadways.
AM-2	ACHD Signal Timing Updates - 2013	ACHD	2013	$215	Update signal timings on Meridian Rd, Eagle Rd (Overland Rd - SH 44), and roadways involved in BSU football special events.
AM-3	Meridian Road ITS Deployment	ACHD	2013	$285	Install fiber optic communications, speed detection devices, travel time detection (e.g. Bluetooth), and CCTV cameras at key signalized intersections on SH 69 from I-84 to Deer Flat Rd.
AM-4	State Street ITS Deployment	ACHD	2014	$1,100	Install fiber optic communications and conduit, speed detection devices, travel time monitoring, CCTV cameras at key signalized intersections, and signal controller upgrades for transit priority at all intersections on State St from 23rd St to SH 16.
AM-5	Three Cities River Crossing ITS Deployment	ACHD	2014/2015	$3,800	This project is defined by a parallelogram of Glenwood St, SH 44 (State St), SH 55 (Eagle Rd), and US 20/26 (Chinden Blvd). Install fiber optic communications and conduit, speed detection devices, travel time monitoring, CCTV cameras at key signalized intersections, and adaptive traffic signal systems at 20 key intersections.
AM-6	Transit Signal Priority - Phase 1	ACHD/ITD D3	Medium Term	$200	Replace infrared phase selectors with GPS multimode phase selectors (in controller cabinets) and install GPS radio antennas at 20 traffic signals, including the State St corridor, to support GPS-based transit signal priority. Maintain infrared opticom detectors (on signal poles) for emergency signal preemption.
AM-7	Detection Infrastructure Deployment for Travel Time and Regional Planning	COMPASS/ Operating Agencies	Annual (Near Term)	$50	Deploy detection technology (e.g. Bluetooth or classification count stations) at approximately 10 locations per year to support regional travel time and planning performance measurement programs. Project complements other deployments to fill in gaps needed for completeness and accuracy of regional operations data. Coordinate and prioritize deployment with travel time projects, performance measurement RCTO, and regional Congestion Management Process/performance measurement programs.
AM-8	Arterial Management Regional Concept for Transportation Operations (RCTO-AM)	ACHD/ITD D3/City of Nampa/City of Caldwell	Near Term	$125	Develops a regional strategy for integrated operations and maintenance of signalized arterials in the region. Identifies operational goals, strategies, performance measures, and agency roles and responsibilities. Identifies operational/technology strategies for key corridors with multiple operating agencies and/or technology platforms (e.g. technology vs. policy-based coordination). Develop coordination and operational strategies for joint ITD/local agency operated signal corridors. Identifies candidate locations for future Integrated Corridor Management, detour route coordination, and/or arterial travel time information.
AM-9	ACHD Signal Timing Updates - 2014	ACHD	2014	$200	Update signal timings on Cole Rd/Overland Rd, Boise Towne Square Mall area, Franklin Rd, Ustick Rd, and Fairview Ave.
AM-10	Towne Square Mall Adaptive Traffic Signal System Installation	ACHD	Medium Term	$700	Upgrade traffic signal systems to adaptive control on roadways around the Boise Towne Square Mall area (up to 20 signals).
AM-11	Eagle Road Adaptive Traffic Signal System	ITD D3	Near Term	$550	Upgrade traffic signal systems to adaptive control on Eagle Rd from Overland Rd to US 20/26 (up to 15 signals).
AM-12	Gowen Road ITS and Communications	ITD D3	2014	$620	Incorporate ITS elements into the Gowen Road Interchange reconstruction, including fiber optic relocation/upgrades.
AM-13	State Highway 16 ITS Deployment	ITD D3	2014	$840	Install fiber optic communications and conduit on SH 16 from SH 44 (State St) to US 20/26 (Chinden Blvd). Install approximately two CCTV cameras at key intersections.
AM-14	Ada County Audible Pedestrian Signal Upgrades	ACHD	Annual (2014+)	$140	Enhance pedestrian signals with audible walk indications. Upgrade up to 10 locations per year.

AM-15	Pedestrian/Bicycle Crossing Enhancements	Local operating agencies (i.e. ACHD, City of Caldwell, City of Nampa)	Annual (2014+)	$1,090	Enhance visibility of bicycle and pedestrian crossings (e.g. pushbutton-activated rectangular rapid flashing beacons). Install bike/ped count stations for crossings on arterial roadways to support planning efforts. Project assumes up to 5 improvement locations per year per jurisdiction. Bike/Ped improvements may be coordinated with adjacent transit stop improvements or needs.
AM-16	ITD/Nampa/Caldwell Signal System Assessment and Integration Project	ITD D3	Near Term	$50	Evaluate central signal systems to determine which system and available components meet the functionality needed by ITD and the cities. Ultimate system should support emergency vehicle preemption and transit signal priority. Consider a shared system for all three agencies. Install new signal system and develop communications plan for bringing all traffic signals online.
AM-17	City of Caldwell Standard Roadway Sections and Signal Standards	City of Caldwell	2014	$50	Develop updated standard roadway sections including ITS elements such as conduit and pull boxes to support provisioning for future ITS equipment. Develop updated standard specifications for intersection design and traffic signal equipment to accommodate future improvements.
AM-18	Broadway Avenue Bridge Replacement ITS and Communications	ITD D3	2015	$40	Incorporate ITS elements of the Broadway Ave Bridge reconstruction, including fiber optic relocation/upgrades prior to bridge replacement
AM-19	ITS and Signal Asset Management System	ACHD	Medium Term	$200	Implements an asset management system that tracks traffic signal and ITS device maintenance (routine and unplanned) and uses life-cycle cost analysis to determine equipment life spans based on all associated costs (initial, operations, maintenance) and salvage values.
AM-20	Downtown Boise Signal Controller Upgrade (100 Intersections)	ACHD	2015	$350	Upgrade 100 traffic signal controllers in Downtown Boise to Naztec equipment capable of Ethernet communications.
AM-21	ACHD Signal Timing Updates - 2015	ACHD	2015	$190	Update signal timings on Federal Way, State St, Parkcenter Blvd, Orchard Rd, and Curtis Rd.
AM-22	Wireless closed-circuit television (CCTV) Camera and Signal Interconnect	ACHD	2015	$150	Install wireless radio links to 20 remote traffic signals, and install CCTV cameras.
AM-23	Cole/Overland Road Adaptive Traffic Signal System Installation	ACHD	2018	$350	Upgrade traffic signal systems to adaptive control on Cole Rd and Overland Rd area (up to 15 signals).
AM-24	Ten Mile Road ITS Deployment	ACHD	2015	N/A	Install fiber optic communications and conduit on Ten Mile Rd from Ustick Rd to Cherry Ln. Install approximately two CCTV cameras. The ITS deployment is part of the Ten Mile Road capital project with construction scheduled to begin in 2015.
AM-25	Nampa-Caldwell Boulevard/Midland Boulevard Corridor Signal System and ITS Deployment	ITD D3	Near Term	$580	Install fiber optic communications on Nampa-Caldwell Blvd from Karcher Rd/Midland Blvd to Orchard Ave. For Nampa-Caldwell Blvd from Bingham Dr to Northside Blvd/Yale St, Karcher Rd from Cassia St to Nampa-Caldwell Blvd, Midland Blvd from Nampa-Caldwell Blvd to Cherry Ln, and Karcher Connector from Midland Blvd to Karcher Rd: Upgrade 16 traffic signal controllers, install approximately five CCTV cameras at key signalized intersections, and install detection for travel time and speed monitoring.
AM-26	Orchard Avenue/Midland Boulevard Wireless Signal Communications	City of Nampa	2015	$40	Install wireless radio communications to traffic signal at Orchard Ave/Midland Blvd.
AM-27	10th Avenue Corridor /Illinois Avenue North Signal System and ITS Deployment	ITD D3	Near Term	$480	Install fiber optic communications on 10th Ave/Illinois Ave from Blaine St to Marble Front Rd. Upgrade four traffic signal controllers. Install approximately two CCTV cameras at key intersections.
AM-28	Garrity Boulevard/6th Street North Corridor Adaptive Signal System	ITD D3	Near Term	$190	Install adaptive signal control at 6th St N/11th Ave, Garrity Blvd/11th Ave/Franklin Blvd, and Garrity Blvd/16th Ave.
AM-29	ACHD Signal Timing Updates - 2016	ACHD	2016	$150	Update signal timings on Broadway Ave and Vista Ave from Rose Hill St - Wright St.
AM-30	Transit Signal Priority - Phase 2	ACHD	Medium Term	$200	Expand Phase 1 to an additional 20 traffic signals.
AM-31	US 20/26 (Chinden Boulevard) Adaptive Traffic Signal System Installation	ITD D3	Near Term	$750	Upgrade traffic signal systems to adaptive control on US20/26 (Chinden Blvd) corridor from Linder Rd to Fairview Ave (up to 20 signals).
AM-32	US 20/26 (Chinden Boulevard) ITS Deployment	ITD D3	Medium Term	$350	Install fiber optic communications and conduit on US20/26 (Chinden Blvd) from Linder Rd to Tree Farm Ln. Install speed detection and approximately two CCTV cameras.

AM-33	State Highway 55 ITS Deployment	ITD D3	Long Term	$200	Install fiber optic communications and conduit on SH 55 from Beacon Light Rd to Floating Feather Rd. Install approximately two CCTV cameras.
AM-34	Middleton Road Corridor Signal System and ITS Deployment	ITD D3	Medium Term	$1,490	Install fiber optic communications on Nampa-Caldwell Blvd from Homedale Rd to Karcher Rd/Midland Blvd and on Middleton Rd from Nampa-Caldwell Blvd to Roosevelt Ave. Upgrade two traffic signal controllers. Install approximately two CCTV cameras at key signalized intersections.
AM-35	12th Avenue Corridor Signal System and ITS Deployment	ITD D3	Medium Term	$820	Install fiber optic communications on 12th Ave from 7th St to Greenhurst Rd. Upgrade four traffic signal controllers. Install approximately three CCTV cameras at key signalized intersections.
AM-36	Downtown Caldwell Signal System and ITS Deployment	ITD D3	Medium Term	$540	Install fiber optic communications on Blaine St from 5th Ave to 10th Ave, on 5th Ave from Blaine St to Main St (Caldwell Police Station), on Cleveland Blvd from 7th Ave to 10th Ave, and on 10th Ave from Blaine St to Cleveland Blvd. Upgrade six traffic signal controllers. Install approximately two CCTV cameras at key signalized intersections.
AM-37	ACHD Signal Timing Updates - Downtown Boise area	ACHD	Medium Term	$150	Update signal timings in the Downtown Boise area (100 signals)
AM-38	Transit Signal Priority - Phase 3	ACHD	Long Term	$200	Expand Phases 1 and 2 to an additional 20 traffic signals.
AM-39	Wireless closed-circuit television (CCTV) Camera and Signal Interconnect	ACHD	2017	$150	Install wireless radio links to 20 remote traffic signals, and install CCTV cameras.
AM-40	Broadway Avenue Adaptive Traffic Signal System Installation	ITD D3	Medium Term	$750	Upgrade traffic signal systems to adaptive control on Broadway Avenue corridor (up to 20 signals).
AM-41	I-84/Franklin Road/Overland Road Integrated Corridor Management (ICM) Implementation	ITD D3	2017	$200	Implement ICM along the I-84 corridor from Garrity Blvd to the I-84/I-184 WYE interchange. Automate the detour plans currently used by ACHD to divert traffic to Franklin Rd and Overland Rd using ACHD's ATMS. Install trailblazer signs along arterials, dynamically adjust traffic signals for detour conditions, and disseminate detour-related traveler information. Disseminate travel times along all corridors during normal operating conditions.
AM-42	State Street - Pierce Park Lane to 23rd Street Adaptive Traffic Signal System Installation	ACHD	2016	$750	Upgrade traffic signal systems to adaptive control on State Street corridor from Pierce Park Ln to 23rd St.
AM-43	State Highway 44/State Street Adaptive Traffic Signal System Installation	ITD D3	Medium Term	$740	Upgrade traffic signal systems to adaptive control on SH 44 / State St corridor (up to 12 signals).
AM-44	Downtown Nampa ITS Deployment	ITD D3	2017	$970	Fill in fiber optic communications gaps on Nampa-Caldwell Blvd/3rd St, 2nd St, Garrity Blvd, and 16th Ave. For the downtown area (bounded by Garrity Ave, 16th Ave, 7th St, and 11th Ave): Install approximately four CCTV cameras at key signalized intersections.
AM-45	Amity Road Corridor Signal System and ITS Deployment	City of Nampa	2017	$790	Install fiber optic communications on Amity Ave/Colorado Ave from 12th Ave to Kings Rd. Upgrade one traffic signal controller. Install approximately two CCTV cameras at key intersections and install detection for travel time and speed monitoring.
AM-46	Blaine Street/Cleveland Boulevard Corridor Signal System and ITS Deployment	ITD D3	Long Term	$590	Install fiber optic communications on Cleveland Blvd from 10th Ave to Linden St and on 21st Ave from Cleveland Blvd to Blaine St. Upgrade four traffic signal controllers. Install approximately two CCTV cameras at key intersections.
AM-47	State Highway 44 ITS Deployment	ITD D3	Long Term	$275	Install fiber optic communications and conduit on SH 44 from SH 16 to Star Rd. Install approximately two CCTV cameras at key signalized intersections.
AM-48	Garrity Boulevard/Idaho Center Boulevard Corridor Adaptive Signal System and ITS Deployment	ITD D3	Long Term	$870	For Garrity Blvd/Idaho Center Blvd (Kings Rd to Birch Ln/Terra Linda Way), Franklin Rd/Gate Blvd, and Happy Valley Rd (Flamingo Ave to Stamm Ln): Upgrade 10 traffic signal controllers to adaptive control, install approximately two CCTV cameras at key signalized intersections. Incorporate pedestrian enhancement such as pedestrian countdown timers and audible crossing signals.
AM-49	Franklin Road/21st Avenue Corridor Signal System and ITS Deployment	ITD D3	Long Term	$580	Install fiber optic communications on 21st Ave/Franklin Rd from Blaine St to Smeed Pkwy in the City of Caldwell. Explore wireless communications feasibility on US 20/26 between Smeed Pkwy and Middleton Rd. Upgrade seven traffic signal controllers. Install approximately four CCTV cameras at key signalized intersections.

AM-50	Ustick Road ITS Deployment	ACHD	Long Term	$600	Install fiber optic communications and conduit on Ustick Rd from Ten Mile Rd to Centerpoint Way. Install approximately three CCTV cameras.
AM-51	Northside Boulevard Corridor Signal System and ITS Deployment	ITD D3	Long Term	$930	Install fiber optic communications on Northside Blvd from Cherry Ln to 1st St and on I-84 from Northside Blvd to Franklin Blvd. Upgrade six traffic signal controllers.
AM-52	10th Avenue Corridor Central Signal System and ITS Deployment	ITD D3	Long Term	$690	Install fiber optic communications on 10th Ave from Cleveland Blvd to Ustick Rd. Upgrade three traffic signal controllers. Install approximately two CCTV cameras at key intersections.
AM-53	Greenhurst Road Corridor Signal System and ITS Deployment	City of Nampa	Medium Term	$770	Install fiber optic communications on Greenhurst Rd from 12th Ave to Southside Blvd. Upgrade three traffic signal controllers. Install approximately two CCTV cameras at key intersections and install detection for travel time and speed monitoring.
AM-54	I-84/Nampa-Caldwell Boulevard Integrated Corridor Management (ICM) Implementation	ITD D3	Long Term	$200	Implement ICM along the I-84 corridor from Centennial Way to Garrity Blvd. Automate the detour plans currently used by the Canyon County Sheriff's Office to divert traffic to Blaine St/Cleveland Blvd, Nampa-Caldwell Blvd, 2nd St, 11th Ave, and Garrity Blvd. Install trailblazer signs along arterials, dynamically adjust traffic signals for detour conditions, and disseminate detour-related traveler information. Disseminate travel times along all corridors during normal operating conditions.
AM-55	Nampa-Caldwell Boulevard Corridor Signal System and ITS Deployment	ITD D3	Long Term	$1,020	Install fiber optic communications on Nampa-Caldwell Blvd from Linden St to Homedale Rd. Upgrade four traffic signal controllers. Install approximately two CCTV cameras at key signalized intersections.
AM-56	State Highway 55 (Karcher Road) Signal System and ITS Deployment	ITD D3	Long Term	$1,480	Install fiber optic communications and upgrade four new traffic signals on SH 55 (Karcher Rd) between 10th Ave and Nampa-Caldwell Blvd. Install CCTV camera at SH 55/Karcher Rd interchange. Install approximately two CCTV cameras at key signalized intersections.
AM-57	10th Avenue Corridor South ITS Deployment	City of Caldwell	Long Term	$640	Install fiber optic communications on 10th Ave from Ustick Rd to SH 55 (Karcher Rd). Install approximately one CCTV camera at a key intersection and install detection for travel time and speed monitoring.
AM-58	Maple Grove Road ITS Deployment	ACHD	Long Term	$400	Install fiber optic communications and conduit on Maple Grove Rd from Overland Rd to Amity Rd. Install approximately two CCTV cameras.
AM-59	Cole Road ITS Deployment	ACHD	Long Term	$200	Install fiber optic communications and conduit on Cole Rd from Franklin Rd to I-84 Westbound Ramps. Install approximately one CCTV camera.

Incident and Emergency Management (IM)					
IM-1	Integrate Traffic Video into Emergency Responder Mobile Data Terminals (MDTs)	ACHD	2014	$200	Provides ACHD traffic video data feed to emergency responder vehicles to assist in incident response and other emergency management functions.
IM-2	Incident and Emergency Management Regional Concept for Transportation Operations (RCTO-IEM)	COMPASS	2015	$40	Develop a regional concept for transportation operations (RCTO) for incident and emergency management that defines the desired operations objectives as well as the physical improvements, jurisdictional relationships and procedures, and resource arrangements needed to achieve the objectives. Defines key linkages between transportation and emergency management agencies and infrastructure.
IM-3	Emergency Responder Computer-Aided Dispatch (CAD) Integration with Traffic Management/511 Traveler Information	ITD	Medium Term	$300	Develop an interface for automated exchange of emergency responder (Idaho State Police, Ada County Sheriff's Office, Canyon County Sheriff's Office) CAD data with transportation agencies, including ITD, StateComm, ACHD, and local agencies, to support incident management, ITD CARS 511/traveler information, and maintenance dispatch. System requirements will be driven in part by roles and system interfaces documented in the Regional Concept for Transportation Operations. (Note: ACHD is currently integrated with Ada County Sheriff's Office CAD system)
IM-4	Idaho State Police (ISP) Integration with Regional Virtual TMC	ITD HQ	2016	$50	Develop an interface between Regional Virtual TMC and systems used at the ISP Dispatch Center to support traffic management functions such as device sharing and event viewing. Install fiber interconnects/consoles to support virtual TMC.
IM-5	Ada County Sheriff/Ada City-County Emergency Management (ACCEM) Integration with Regional Virtual TMC	ITD HQ	Medium Term	$50	Develop an interface between Regional Virtual TMC and systems used at the Ada County Sheriff's Office and Ada City-County Emergency Management (ACCEM), to support traffic management functions such as device sharing and event viewing. Install fiber interconnects/consoles to support virtual TMC.
IM-6	Canyon County Sheriff Integration with Regional Virtual Traffic Management Center (TMC)	ITD HQ	Medium Term	$50	Develop an interface between Regional Virtual TMC and systems used at the Canyon County Sheriff's Office , such as CCTV viewing and control. Install fiber interconnects/consoles to support virtual TMC.
IM-7	Mobile Traffic Management/Incident Information for Emergency Responder Vehicles	ITD HQ	Long Term	$100	Provides real time traffic management, incident, and event information to emergency responder vehicle Mobile Data Terminals (MDTs), potentially through integration of traffic management/computer aided dispatch systems or other application.
IM-8	Replace/Upgrade GPS Opticom Control Units for Emergency Vehicles	Multiple Emergency Responders	Long Term	N/A	Replace existing infrared opticom emitters with GPS opticom control units for entire emergency vehicle fleet.

Traveler Information (TI)					
TI-1	Traveler Information Regional Concept for Transportation Operations (RCTO-INFO)	COMPASS	2013	$30	Provides a coordinated regional strategy for use of agency traveler information assets - such as ITD 511, dynamic message signs, Highway Advisory Radio (HAR), and third-party providers - across all to provide consistent and complete information under critical operational scenarios (incidents, special events, weather emergencies, etc.). This project may inform subsequent interagency agreements and standard operating procedures for the participating agencies.
TI-2	Arterial Travel Time Information System - 2014	ACHD	2014	$200	Install travel time infrastructure (e.g. Bluetooth) on approximately 10 arterial roadways in Ada County for dissemination of arterial travel time information and to support future planning efforts.
TI-3	Regional Traveler Information System Integration	ITD HQ	Medium Term	$250	Provides for integration of central systems/data flows to support the vision described in the Traveler Information Regional Concept for Transportation Operations.
TI-4	ACHD Traffic Management Integration with ITD 511	ITD HQ	Near Term	$200	System-to-system interface to integrate ACHD's traffic management system event data with the ITD statewide 511 traveler information system.
TI-5	Arterial Dynamic Message Sign (DMS) Installation	ACHD	2015	$300	Adds arterial Dynamic Message Signs at a key traveler decision points within Ada County. Can support arterial, freeway, and special event (e.g. BSU) traffic management scenarios.

TI-6	Arterial Travel Time Information System - 2016	ACHD	2016	$300	Install travel time infrastructure (e.g. Bluetooth) on approximately 10 arterial roadways in Ada County for dissemination of traveler information and to support future planning efforts.
TI-7	Travel Time Information Management System	COMPASS/ Operating Agencies	2016	$100	Install a regional server to manage travel time data collected from travel time infrastructure throughout the region.
TI-8	Parking Information Regional Concept for Transportation Operations (RCTO-PARK)	Operating Agencies	Near Term	$25	Develops a regional framework strategy for dissemination of advanced parking information in the region, including urban centers (e.g. downtown Boise) special event venues, transit park and ride locations, and the Boise International Airport. The RCTO will define opportunities, operational objectives, participating agencies, and the potential for joint use of existing ITS/traveler information infrastructure to minimize deployment costs.
TI-9	Arterial Travel Time Information System - 2017	ACHD	2017	$200	Install travel time infrastructure (e.g. Bluetooth) on approximately 10 arterial roadways in Ada County for dissemination of traveler information and to support future planning efforts.
TI-10	Parking Information Systems - Implementation Projects	Operating Agencies	Medium Term	$300	A series of project implementations of parking management/information systems based on the Regional Concept for Transportation Operations (RCTO-PARK). Individual deployments may be led by different agencies depending on the specific location, operational objectives, and infrastructure involved.
TI-11	I-84 Dynamic Message Sign (DMS) Replacement	ITD D3/ITD HQ	2018	$600	End-of-Life Replacement of existing DMS signs at Eagle Rd, Gowen Rd, and Locust Grove Rd.
TI-12	Boise International Airport - Traveler Information	Operating Agencies	Medium Term	$20	Provides real-time roadway conditions and traveler information to passengers at Boise International Airport, e.g. through kiosks, monitors, or mobile applications. May include an airport parking availability component.
TI-13	Arterial Dynamic Message Sign (DMS) Installation	ACHD	Long Term	$300	Adds arterial Dynamic Message Signs at a key traveler decision points within Ada County. Can support arterial, freeway, and special event (e.g. BSU) traffic management scenarios.
Public Transportation Management (PT)					
PT-1	State Street Transit Signal Priority (TSP) Project - Onboard and Roadside Equipment Installation	VRT/ACHD	2013	$325	Install required on-board (vehicle) and roadside equipment to support the State Street TSP project. (Note: equipment has been purchased for this project.)
PT-2	ValleyRide Fixed Route Management and Automatic Vehicle Location (AVL) System	VRT	2013	$400	Purchase and install equipment and software to deploy a fixed route management and automated vehicle location system on ValleyRide buses.
PT-3	GoRide Trip Request and Notification System	VRT/TVT	2013	$100	Purchase and install equipment and software to manage demand-response service trip requests and automatic notifications. Enhanced services include RouteMatch software modules IVR notification; customer, facility, and provider web portals; and integration with AMR Medicaid broker information. Also supports car/van sharing among social service agencies in the Valley. This project involves VRT and TVT transit services in the Treasure Valley.
PT-4	Automatic Stop Annunciators (ASA)	VRT	2014	$250	Purchase and install stop annunciator systems in ValleyRide fixed route buses. System shall be integrated with AVL equipment (see project above).
PT-5	Implement Asset Management System	VRT	2013	$375	Deploy a medium sized transit operator asset management system and share with other Idaho providers (as appropriate and desired). This project is underway and will focus on capital planning and begin to include vehicle maintenance activities.
PT-6	Integrate Google General Transit Feed Specification (GTFS) Validator Tool into MODES UPDATE	ITD-DTP	2013	$20	MODES UPDATE is GTFS builder software linked to Idaho's 511 Transit traveler information system. This project will integrate the Google GTFS Validator software into MODES UPDATE to assist VRT and TVT to more efficiently update their GTFS files and upload them to Google Transit.
PT-7	Add Transfers to MODES UPDATE	ITD-DTP	2013	$17	MODES UPDATE is GTFS builder software linked to Idaho's 511 Transit traveler information system. This project will add 'transfers.txt' to the GTFS dataset to allow for proper trip planning with Google Transit when travelers wish to make a transfer (at the same stop) from one bus route to another that share the same stop.

PT-8	Automatic Vehicle Location Data Feed and Integration with Statewide 511 Transit Database	ITD-DTP	2013	$65	Integrate real time AVL data feed (from RouteMatch) with statewide 511 transit system to display actual bus locations instead of calculated location based on static schedules. This is a statewide project that will benefit VRT and TVT in the Treasure Valley.
PT-9	Develop Mobile Application for Transit Information	ITD-DTP	Near Term	$60	Develop a mobile smartphone application to provide fixed route transit information using the 511 Transit database.
PT-10	Transit Communications Infrastructure Requirements Study	VRT	2014	$100	Identify operational and technological requirements of VRT and other transit operators for voice and data radio communications, including emergency services interoperability and support of ITS systems such as CAD/AVL and traveler information field infrastructure. Develop recommendations for communications system upgrade capital projects and migration strategy based on potential agency-owned, regional, and commercial communications alternatives.
PT-11	Online Transit Pass Sales	VRT	2014	$50	Implementation of a system for online sales of VRT transit passes to retail customers.
PT-12	Bike Share Management System	VRT	2014	$100	Implementation of a central management and billing system for Boise's upcoming bike share system, which will be managed and operated by VRT. (Note: Timing of anticipated grant funding may impact project implementation timeframe.)
PT-13	Automated Passenger Counters (APCs)	VRT	2014	$150	Purchase and install automated passenger counters in ValleyRide fixed route buses. System shall be integrated with RouteMatch fixed route management system (see project above) to efficiently collect ridership information.
PT-14	Automated Passenger Counters (APCs)	TVT	2014	$75	Purchase and install automated passenger counters in TVT buses. System shall be integrated with RouteMatch fixed route management system (see project above) to efficiently collect ridership information.
PT-15	Automatic Stop Annunciators (ASA)	TVT	2014	$125	Purchase and install stop annunciator systems in TVT buses. System shall be integrated with AVL equipment (see project above).
PT-16	Enhance Asset Management capabilities within ITD I-TRIPS	VRT	2014	$100	I-TRIPS requires asset inventory and the capability to perform capital planning functions in the future. This project will enhance I-TRIPS to include asset management capital planning analysis using FTA's TERM LITE software.
PT-17	Implement Personalized Transit Trip Planner and Alert System within 511 Transit	VRT	2014	$150	Implement MODES-ROUTES and ALERTS. This functionality includes (components of the 511 Transit System) personalized profiles of commonly used transit services to be established by riders (using a custom interface) and used to be alerted to changes in service (bus timings, system events, etc.). Alerts could come in the form of texts or emails. This project is closely linked to mobile applications project to enhance the way riders get information.
PT-18	Enhance 511 Transit Website to Display Service Areas	VRT	2014	$62	Enhance the current 511 Transit website in Treasure Valley to display other services, such as flex routes, and demand response service providers area of coverage.
PT-19	Regional Transit Signal Priority Deployment Plan	VRT	2015	$75	Develop a regional strategy for TSP implementation following the State Street pilot corridor, based on operational need, expected benefit, corridor traffic signal/communications systems capabilities, and cost considerations.
PT-20	Transit Signal Priority (TSP) - Phase 2	VRT	Medium Term	$1,000	Deploy Transit Signal Priority (TSP) in the next high priority corridor per regional TSP Deployment Plan. Likely to include deployment in the vicinity of the Downtown Boise Multi-Modal center.
PT-21	Transit Emergency Management Plan	VRT/Multiple Emergency Responders	2015	$30	Develops a plan for transit/emergency management coordination, e.g. evacuation scenarios.
PT-22	Downtown Boise Multi-Modal Center: Technology Applications	VRT	2015	$100	As part of the Downtown Boise Multi-Modal Center design, incorporate technology application to support efficient operations, security surveillance, and traveler information.
PT-23	Caldwell/Nampa Multi-Modal Center: Technology Applications	VRT	2015	$50	Incorporate technology application to support efficient operations, security surveillance, and traveler information at the new park and ride facility located in Caldwell.

PT-24	RideLine Call Center/Website - Integration with Regional Virtual Traffic Management Center (TMC)	VRT	2015	$200	Develop interface between Regional Virtual TMC and VRT's RideLine to support real-time transit trip planning. Build interface to integrate real-time traveler information from Regional Virtual TMC with the RideLine call center and website. This project would include Rideline facilities in Meridian, Downtown Boise Multimodal Center and at their new facility in Caldwell.
PT-25	ValleyRide Dispatch Centers - Integration with Regional Virtual Traffic Management Center (TMC)	VRT	2015	$200	Develop interface between Regional Virtual TMC and systems used at VRT dispatch centers (Ada and Canyon counties). Build interface into VRT's RouteMatch dispatch/scheduling system if feasible. Consider implementation of a system/protocol for incident notifications provided by transit operators in the field to traffic management centers via transit dispatch.
PT-26	Closed-circuit television (CCTV) Video Surveillance - Facilities	TVT	2016	$80	Implement security surveillance cameras at TVT maintenance and passenger facilities
PT-27	Closed-circuit television (CCTV) Video and Audio Surveillance - Onboard	TVT	2016	$125	Implement security surveillance cameras onboard transit vehicles
PT-28	Boise State University: Technology Applications	VRT	2016	$200	Incorporate technology application to support efficient operations, security surveillance, and traveler information on the Boise State campus.
PT-29	Update VRT Technology Investment Plan	VRT	2017	$50	Comprehensive update of the VRT Technology Investment Development Plan to reflect accomplishments and new projects based on current needs of the organization. The contents of the updated Plan will be incorporated in the update to the Treasure Valley Transportation: Operations, Management and ITS Plan. This project complements annual interim reviews/updates conducted by VRT staff.
PT-30	Transit Signal Priority (TSP) - Phase 3	VRT	2017	$1,000	Continued deployment of Transit Signal Priority (TSP) in the next highest priority corridors per regional TSP Deployment Plan. Likely to include deployment in the vicinity of the Caldwell Transit Center and Nampa-Caldwell Blvd.
PT-31	Regional Transit Call Center Management/Call Sharing System	VRT/TVT	2017	$100	Implement a system to share call loads among customer service centers operated by TVT and VRT to manage call loads during peak times, and to provide call center coverage with fewer, consolidated staff during off peak hours.
PT-32	Integrate Operational Data with ITD I-TRIPS	VRT/TVT	2017	$100	Currently, operational data is stored in the RouteMatch/FleetNet databases for VRT and TVT. I-TRIPS is a statewide performance management system that requires the operational data be submitted on a monthly basis. This project will build an interface to automatically populate the I-TRIPS database with agency operational data.
PT-33	Real-Time Passenger Information - Deployment at Other Key Locations	VRT	2018	$100	Following completion of the ValleyRide fixed route management system installation and other related technologies, deploy traveler information systems at key high-volume bus stops/transfer locations to provide timing of next buses to arrive at the stops.
PT-34	Upgrade Farebox/Fare Media in VRT Fixed Route Fleet	VRT	2018	$700	VRT's current fare box/media is 12 year old technology and needs upgrading. This project will purchase and install new fare boxes in all ValleyRide buses in the Treasure Valley with the most current technology to allow for more efficient collection of fare types, pass programs, and financial management. May be deployed incrementally as part of bus procurements.
PT-35	Regional Transit Farecard Integration	VRT/TVT	2019	$250	Develop and implement of a regional interoperable farecard among transit operators and institutional pass programs in the region. Program may include transit, vanpool. Paratransit, bikeshare, and/or parking.

Road Weather Operations (RW)					
RW-1	Deploy Additional RWIS Stations in Ada County	ACHD	Near Term	$340	Adds up to five additional Road Weather Information Systems (RWIS) stations as key locations in Ada County to support maintenance and traffic operations activities.
RW-2	RWIS Replacement and Deployment in Ada County	ACHD	Long Term	$680	End-of-life renewal and/or new deployment of up to ten Road Weather Information Systems (RWIS) stations in the ACHD system.
RW-3	Weather Information and Warning System	ITD D3	Medium Term	$300	Pilot project for the deployment of road weather based safety and warning systems in up to two high-accident locations prone to severe weather conditions due to elevation or exposure.
RW-4	Integrate weather information into ACHD Traffic Management Center (TMC)	ACHD	Near Term	$400	Using the FHWA developed Weather Responsive Traffic Management (WRTM) Strategies document and the Self-Evaluation Planning Guide document, ACHD will work toward integrating weather information into their traffic operations activities.
RW-5	Integrate weather information into ITD D3 Traffic Management Center (TMC)	ITD HQ	Medium Term	$400	Using the FHWA developed Weather Responsive Traffic Management (WRTM) Strategies document and the Self-Evaluation Planning Guide document, ITD-D3 will work toward integrating weather information into their traffic operations activities.

Maintenance and Construction (MC)					
MC-1	Ada County Arterial closed-circuit television (CCTV) Camera Cleaning	ACHD	Annual	$15	Clean approximately 60 CCTV cameras on arterial roadways four times per year.
MC-2	ITD Interstate and State Highway ITS Device Maintenance	ITD D3	Annual	$200	Clean CCTV cameras and perform maintenance and repairs for CCTV cameras, dynamic message signs, road weather information systems, and highway advisory radio on interstates and state highways. This maintenance is typically done as part of a statewide contract. The cost shown is approximate for the Treasure Valley part of the contract.
MC-3	Develop ITS Systems Maintenance Regional Concept for Transportation Operations (RTCO-MAINT)	ITD D3/ACHD	2015	$5	Develop a joint regional strategy for ongoing maintenance of ITS devices and infrastructure, with the objective of promoting resource sharing such as technical personnel, training activities, spare parts, and after-hours emergency on-call services. The project may result in interagency agreements to document the recommendations of the Regional Concept for Transportation Operations.
MC-4	ACHD Maintenance and Construction Database	ACHD	Medium Term	$100	Provides a single repository for planned maintenance and construction activity as well as scheduled events. System will be integrated into existing ACHD traffic management permitting procedures to streamline work flow. The system may be further expanded to include other regional partners and/or provide traveler information to 511 (similar to existing Canyon County system).

Regional Data Archiving (DA)					
DA-1	Develop Regional Transportation Data Archive	COMPASS	2015	$250	The regional data archive will serve as a multi-modal repository for operations data generated by ITS systems and field detection to support agency and regional performance measurement; operations planning studies; before-after analysis; and regional planning initiatives including the Congestion Management System and calibration of the regional travel demand model.

Regional Communications Infrastructure Management (C)					
C-1	Establish and Maintain Regional Communication Coordinating Committee	COMPASS	2013	$50/year	Operating in conjunction with the Regional Operations Working Group, this committee will meet regularly to coordinate the management and operation of the Treasure Valley's multi-agency regional fiber optic network. Responsibilities of the group include: developing and maintaining a regional fiber optic asset inventory; development of interagency and public-private fiber sharing agreements; coordinating fiber optic implementation projects, identifying system gaps and expansion needs; identifying funding opportunities; managing design standards; and development of service level agreements. Based on the interest of regional partners, the committee may also oversee a regional pooled fund for contracted fiber optic network maintenance on behalf of the participating agencies.
C-2	Create Regional Agreement for Fiber Optic Sharing and Management	COMPASS	2013	$25	This project will develop a regional, interagency master agreement for the shared use of fiber optic infrastructure among agencies in the Treasure Valley. Both transportation and non-transportation agencies may be party to this agreement. The master agreement will address basic provisions and expectations for deployment and management of shared fiber optic infrastructure, including rights of use, ownership of assets, service level agreements, sharing of capital and maintenance costs, and network configuration. Agreements or "permits" for sharing of specific fiber assets will be developed as addenda to the master fiber sharing agreement through the Communication Coordinating Committee.
C-3	Develop Regional Communications Inventory and Asset Management System	COMPASS	2014	$75	This project develops a comprehensive inventory of existing public agency fiber optic infrastructure in the Treasure Valley, including ownership, physical/technical characteristics, and utilization. The inventory will be developed using a fiber optic asset management software product designed for this purpose. Following the development of the initial inventory, the fiber optic asset management system will be used by the Communication Coordinating Committee in support of subsequent system expansions and fiber sharing agreements.
C-4	Virtual Traffic Management Center (TMC) Communications/Network	ITD and other interested agencies	2014	$200	Establish a regional interagency network to support the regional Virtual TMC. Complete communications connectivity, install networking equipment, and establish network management and security protocols for center-to-center integration of regional traffic management, video sharing, traveler information, and data archiving systems. Network will consider needs of transit and emergency management partner agencies.
C-5	Public-Private Communications Partnership	ITD D3/ACHD	2014	$20	Ongoing effort to build additional partnerships with private communications companies, utilities, institutions, and other entities for cooperative deployment and management of fiber optic agreements. Project entails exploration of relationships and development of agreements with partners. This project will be closely coordinated with C-1.
C-6	City of Caldwell Wireless Traffic Signal Interconnects	City of Caldwell	2014	$110	Utilize wireless communications to link the City of Caldwell field traffic control devices to the future City of Nampa central traffic management system, to support centralized signal operations and maintenance. An existing City of Caldwell public safety wireless radio system has been identified as a potential option for implementing the wireless interconnect project, subject to further engineering feasibility assessment.
C-7	Transit Facilities Fiber Interconnects	VRT/TVT	2014	$150	Implement a fiber optic network backbone among transit facilities in the Valley (e.g. multi-modal centers (Boise, Boise State, Caldwell), Meridian headquarters/customer service, and Ada/Canyon maintenance and dispatch facilities) to support ITS applications and other IT services. Assumes interconnects may be substantially accomplished through fiber-sharing partnerships with other agencies.

C-8	Regional Transportation/Emergency Management Radio Interoperability Study	Multi-Agency	2015	$100	Evaluate regional interagency radio interoperability requirements among transportation, public safety, and emergency management agencies and recommend future infrastructure investment strategies. Study may result in future capital projects to implement the preferred radio system upgrades/interoperability enhancements. Explore potential partnerships and interoperability with the Idaho Bureau of Homeland Security, the Statewide Interoperability Executive Council, and the District 3 Digital Interoperability Governance Board with emergency management partners.
C-9	City of Caldwell Field-to-Center Fiber Optic Backbone	City of Caldwell	2015	$200	Provide fiber optic backhaul between the future City of Caldwell central traffic management system and field signals/CCTV infrastructure. Also provides connectivity to the regional fiber optic network and virtual TMC via the I-84 fiber optic backbone. Note that while fiber optic infrastructure may be deployed incrementally over time, the deployment of high bandwidth ITS devices such as streaming video will be a key driver for fiber integration. Consider implementing in conjunction with Project AM-53.
C-10	North Nampa Fiber Optic Loop	ITD D3/City of Nampa	2016	$340	Provide fiber optic backhaul to the City of Nampa Streets Dept. shop (future central traffic management system) and nearby radio tower as well as interconnectivity with the regional fiber optic network and virtual TMC via the I-84 corridor. Consider implementing in conjunction with Project AM-40.
C-11	Communications Upgrade (Fiber Rings)	ITD HQ/ ITD D3/ACHD	Long Term	$500 - $1000	Upgrade existing regional fiber system to higher speed network (up to 10 Gig).
Emerging Strategies (ES) - *Not Included in Implementation Plan*					
ES-1	High-Occupancy Vehicle (HOV)/High Occupancy Tolling (HOT) Laves on Freeway	ITD D3	Long Term	N/A	Implementation of traffic management and dynamic tolling field and backend equipment to support future high occupancy vehicle (HOV) or high occupancy toll (HOT) lane implementations on I-84 and/or I-184. Requires policy direction from ITD as a prerequisite.
ES-2	Freeway Active Traffic Management (ATM)	ITD D3	Long Term	N/A	Implementation of dynamic lane control, variable speed limits, and other ATM techniques to reduce incident impacts, improve safety, and improve travel time reliability on the urban freeway system.
ES-3	Regional Traffic Management Center	Multiple Agencies	Long Term	N/A	Development of a single facility integrating multiple agencies for regional operation of freeway and arterial systems in the Treasure Valley. May be further integrated with public transportation and law enforcement.
ES-4	Advanced Roadway Lighting Control Systems	Multiple Agencies	Long Term	N/A	Incorporates advanced systems to control and monitor the operations of roadway lighting systems, including automated dimming and performance measurement of energy use. Could leverage existing or future communications systems used to support traffic signal operations in many corridors in the region.
ES-5	Ustick Road Corridor ITS Deployment	City of Caldwell	Long Term	$730	Install fiber optic communications on Ustick Rd from 10th Ave to Nampa-Caldwell Blvd. Install approximately two CCTV cameras at key intersections and install detection for travel time and speed monitoring. Implement these strategies as the corridor re-develops. Fill in gaps as needed in the long term.
ES-6	Indiana Ave Corridor ITS Deployment	City of Caldwell	Long Term	$1,300	Install fiber optic communications on Indiana Ave from Cleveland Blvd to Karcher Rd. Install approximately two CCTV cameras at key intersections and install detection for travel time and speed monitoring. Implement these strategies as the corridor re-develops. Fill in gaps as needed in the long term.
ES-7	Kings Road Corridor Communications	City of Nampa	Long Term	$710	Install fiber optic communications on Kings Rd from Garrity Blvd to Greenhurst Rd as the corridor re-develops. Fill in gaps as needed in the long term.
ES-8	Lake Lowell Ave/Middleton Road Corridor Communications	City of Nampa	Long Term	$820	Install fiber optic communications on Lake Lowell Ave from Middleton Rd to 12th Ave and on Middleton Rd from Roosevelt Ave to Lake Lowell Ave as these corridors re-develop. Fill in gaps as needed in the long term.

Appendix B

Analytical Tools Memo

DRAFT MEMORANDUM

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DATE: August 28, 2013

TO: **MaryAnn Waldinger,** COMPASS
Randy Knapick, AICP, IBI Group

FROM: James Peters, PE, PTOE
Renee Hurtado, PE, PTOE
Courtney Slavin, EIT

SUBJECT: Analytical Tools for Treasure Valley Operational Assessment P#12083-000

This memorandum outlines possible analytical tools that may be used for transportation operational assessment in the Treasure Valley. The tools included in this memorandum highlight some of the available options, as well as the tradeoffs between each tool. The tools being considered support many of the objectives of COMPASS and agencies in the Treasure Valley region, covering both qualitative and quantitative methods. The analytical tools are meant to quantify benefits and costs of various projects, providing useful information, as part of the decision making process.

The operational assessment tools have been split into three categories: (1) sketch-planning, (2) post-processing, and (3) multiresolution/multiscenario. Sketch-planning methods are the most affordable and require the least amount of data; however, there are many assumptions involved that can significantly affect the outcome. Sketch-planning methods are most appropriate in the preliminary planning level stages of a project. Post-processing methods link the benefit cost analysis with travel demand, and are more detailed than sketch-planning methods. However, the cost is higher and greater staff expertise is required. Post-processing methods are most appropriate in the middle to late stages of alternatives analysis/prioritization planning. The most complex are the multiresolution/multiscenario methods, which provide a high level of confidence, but require the highest cost and staff training. Multiresolution/multiscenario methods are most appropriate during the final stages of the alternative analysis/prioritization planning due to the level of detail required.

The tools that have been selected as possibilities for Treasure Valley operational assessments are summarized in Table 1, including the strategies covered, year developed, where each tool has been most recently implemented, data required, type of tool, and the level of effort/ease of use. The following subsections provide a brief description of each tool included in Table 1 organized by operational assessment categories.

Table 1. Analytical Tools for Treasure Valley Operational Assessment

Method	***Strategies**** Public Transit	Arterial Mgmt	Freeway Mgmt	Incident Mgmt	Traveler Info	***Year Developed***	***Implementation***	***Data Required***	***Tools***	***Level of Effort/ Ease of Use***
Sketch Planning										
Tools for Operations Benefit/Cost (TOPS–BC)[1] *FHWA*	•	•	•	•	•	2012	New tool expected in Fall 2013		Spread-sheet	<u>Budget</u> Low (Up to $25K) <u>Staff Expertise</u> Medium <u>Data Availability</u> Low
Screening Analysis for ITS (SCRITS)[2] *FHWA*	•	•	•	•	•	1999		Traffic volumes	Spread-sheet	
ITS Benefits/Cost Database[3] *FHWA*	•	•	•	•	•	1995	N/A		Database of case studies	
Results from other before and after studies	•	•	•	•	•	N/A	Various		Varies	
Post-Processing Methods										
Intelligent Transportation Systems Deployment Analysis System (IDAS)[4] *FHWA*	•	•	•	•	•	1995	Eugene-Springfield, Oregon 2003	Travel Demand Model	Spread-sheet	<u>Budget</u> Medium/High ($5K - $50K) <u>Staff Expertise</u> Medium/High <u>Data Availability</u> Medium
Highway Economic Requirements System – State Version (HERS–ST)[5] *FHWA*		•	•	•		2004	Indiana, New Mexico & Oregon 2006	Traffic volumes and geometry	Software	
BCA.Net[6] *FHWA*		•	•			2007	Montana, Arkansas & Connecticut 2009	Travel Demand Model	Web-Based	
Surface Transportation Efficiency Analysis Model (STEAM)[7] *FHWA*		•	•	•	•	1990s	City of Bakersfield, California 2009	Travel Demand Model	Software	
IMPACTS[8] *FHWA*		•				1996	Salt Lake City, Utah 1999	Travel Demand Model	Spread-sheet	
Multiresolution/multiscenario										
Dynameq[9] *INRO*	•	•	•	•	•	2004	Widely used	Traffic volumes, geometry, signal timing, etc.	Software	<u>Budget</u> High ($50K - $1.5 Million) <u>Staff Expertise</u> High <u>Data Availability</u> High
VISSIM[10] *PTV*	•	•	•	•	•	1992	Widely used	Traffic volumes, geometry, signal timing, etc.	Software	
Paramics[11] *Quadstone*	•	•	•	•	•	1990s	Widely used	Traffic volumes, geometry, signal timing, etc.	Software	
Cube Avenue[12] *Citilabs*	•	•	•	•	•	2001	Widely used	Traffic volumes, geometry, signal timing, etc.	Software	

*Only strategies that apply to COMPASS have been included, the information is from FHWA's Operations Benefit/Cost Analysis Desk Reference, May 2012

[1] FHWA's Operations Benefit/Cost Analysis Desk Reference, May 2012
[2] http://www.fhwa.dot.gov/steam/scrits.htm
[3] http://www.itskrs.its.dot.gov/
[4] http://idas.camsys.com/
[5] http://www.fhwa.dot.gov/infrastructure/asstmgmt/hersdoc.cfm
[6] http://www.fhwa.dot.gov/infrastructure/asstmgmt/bcanet.cfm
[7] http://www.fhwa.dot.gov/steam/
[8] http://www.fhwa.dot.gov/steam/impacts.htm
[9] http://www.inro.ca/en/products/dynameq/
[10] http://vision-traffic.ptvgroup.com/en-us/products/ptv-vissim/
[11] http://www.paramics-online.com/
[12] http://www.citilabs.com/products/cube/cube-avenue

Sketch-Planning Tools

There are four possible tools that may be used in the preliminary planning level stage of a project, including:

- Tool for Operations Benefit/Cost (TOPS – BC)[1]
  This spreadsheet-based tool includes a database of transportation systems management and operations (TSM&O) strategy impacts in various areas. Life-cycle costs are included in the assessment. This tool helps to quantify strategies at an early stage. Local weather station data can be used in evaluation of non-recurring events and to calibrate to local conditions. TOPS-BC can be used to evaluate emissions for Congestion Mitigation and Air Quality (CMAQ) funds assuming that there is a local emissions model/tool that can also be used. The most common tool used for emissions modeling is MOVES, which was developed by the US EPA.
- Screening Tool for ITS (SCRITS)[2]
  This spreadsheet-based tool developed by FHWA is similar to TOPS-BC, but has not been updated since 1999. For this reason, the tool has limited capabilities for 16 ITS applications and can only provide a daily analysis as the smallest time increment.
- ITS Benefits/Cost Database[3]
  This website based tool developed by US DOT provides a database of previous studies for various strategies. The user must sort through the data to find similar benefits or costs to apply, which can be time consuming.
- Results from other before and after studies
  This tool uses the results from other before and after studies from the implementation of similar strategies. When this approach is applied, caution must be taken in terms of finding a similar implementation (geographic, location, scope, etc.). The tool provides a basis for quantifying the benefits of a strategy based on collected field data from a project that has already been implemented. Access to this type of data can be somewhat limited as not all before and after studies that have been conducted will openly share their results with other agencies. This tool may work well for phased ITS projects planned for the Treasure Valley (e.g. arterial travel time information system, transit signal priority) because the initial phase could be evaluated prior to proceeding with additional phases.

Post-Processing Method Tools

There are five possible tools that may be used in the middle to late stages of alternatives analysis/prioritization planning stage of a project, including:

- ITS Deployment Analysis System (IDAS)[4]

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[1] FHWA's Operations Benefit/Cost Analysis Desk Reference, May 2012
[2] FHWA Surface Transportation Efficiency Analysis Model (STEAM), Screening for ITS (SCRITS), http://www.fhwa.dot.gov/steam/scrits.htm
[3] US Department of Transportation Research and Innovative Technology Administration, Knowledge Resources, http://www.itskrs.its.dot.gov/
[4] Intelligent Transportation Systems Deployment Analysis System (IDAS), http://idas.camsys.com/

This tool was developed by FHWA and incorporates travel demand modeling to estimate the benefits and cost of various strategies (up to 60 types). Life-cycle costs include capital and operations and maintenance costs as part of the analysis. The benefits include evaluation of performance measures including travel time, emissions, accidents, and travel time reliability.

- Highway Economic Requirements System – State Version (HERS-ST)[5]
  This tool was originally developed by FHWA for traditional capacity improvements. However, it has been updated to include additional types of strategies. ITD has extensive experience with HERS-ST as a planning tool to determine the economic benefit of a project.
- BCA.Net[6]
  This tool was developed by FHWA and is a web-based analysis tool for highway project decision making. BCA.Net is free and does not require a download. It provides the ability to compare various project alternatives.
- Surface Transportation Efficiency Analysis Model (STEAM)[7]
  This tool interfaces with travel demand model information to quantify a value of the benefits from a project. It was developed by FHWA with a focus on mobility and safety needs.
- IMPACTS[8]
  This tool is related to STEAM and is made up of a series of spreadsheets to be used in the screening process. The tool requires travel demand estimates by mode for each alternative in order to execute the comparison.

Multiresolution/Multiscenario Tools

There are four possible tools that are most appropriate during the final stages of the alternative analysis/ prioritization planning of a project, including:

- Dynameq[9]
  This tool involves mesoscopic traffic simulation and dynamic traffic assignment (DTA). The model can be used to evaluate various scenarios, such as ramp metering, transit signal priority, and signal coordination. Dynameq handles congested conditions. Dynameq can be used in conjunction with MOVES emissions modeling. It has recently been used on projects in the United States, such as in Washington, California, and Oregon.
- VISSIM[10]

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[5] FHWA Transportation Performance Management Documentation http://www.fhwa.dot.gov/infrastructure/asstmgmt/hersdoc.cfm
[6] FHWA Transportation Performance Management Economic Analysis Introduction to BCA.NET, http://www.fhwa.dot.gov/infrastructure/asstmgmt/bcanet.cfm
[7] FHWA Surface Transportation Efficiency Analysis Model (STEAM), http://www.fhwa.dot.gov/steam/
[8] FHWA Surface Transportation Efficiency Analysis Model (STEAM), IMPACTS Spreadsheet, http://www.fhwa.dot.gov/steam/impacts.htm
[9] INRO, Dynameq, Traffic simulation for wide-area networks, http://www.inro.ca/en/products/dynameq/
[10] PTV Group, PTV Vissim, http://vision-traffic.ptvgroup.com/en-us/products/ptv-vissim/

This tool involves microscopic traffic simulation for multimodal traffic and can handle congested conditions under different traffic scenarios. It is capable of handling dynamic route choice and realistic differences in driver behavior. VISSIM can analyze capacity, traffic control, signal systems and re-timing, and public transit. VISSIM can handle adaptive traffic control (such as SCATS). It has the capabilities to handle multimodal networks, including pedestrians, bicyclists, and transit. It can be linked to various emissions models as well.

- Paramics[11]
  This tool involves microscopic traffic simulation and can handle congested conditions under various traffic scenarios. Paramics can be applied on freeways, intersections, roundabouts, for ITS applications, public transportation, pedestrian modeling and environmental/emissions. Paramics can evaluate various ITS strategies, such as variable speed limits, high occupancy tolling, vehicle actuated signals and incident management.
- CUBE Avenue[12]
  This tool involves mesoscopic traffic simulation and dynamic traffic assignment (DTA), much like Dynameq. CUBE Avenue uses a dynamic equilibrium traffic assignment model for traffic signals, roundabouts, stop-controlled intersections, and ramp merges to optimize the network. It is capable of handling congested networks and can be used for operational scenarios. The software's ability to model time is a benefit that can be used to evaluate freeway incident management plans, for example. This software is used worldwide and has recently been acquired by Ada County Highway District (ACHD).

[11] Quadstone, Paramics, http://www.paramics-online.com/
[12] Citilabs, Cube Avenue, http://www.citilabs.com/products/cube/cube-avenue

Appendix C

Regional ITS Architecture Assessment Checklist

Regional ITS Architecture Assessment Checklist

Architecture Name: Treasure Valley Regional ITS Architecture
Architecture Location: Treasure Valley region (see 1a)
Architecture State: Idaho
Type of Architecture: Regional
Date Architecture Originally Developed: 1999
Date Architecture Last Updated: 07/11/2013
Reviewer: Treasure Valley ITS Technical Working Group
Review Date: July 25, 2013 Meeting
Artifacts Reviewed: all

Answering Questions:
Each lettered question is essentially a yes/no question but there are places where you will 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 you determine that an architecture is close to being complete in a particular area or Partly if it appears to partially address the criteria but still needs significant enhancement. Unknown may be used if you cannot tell from the documentation whether the architecture satisfies the criteria. Not Applicable is an appropriate answer if an item truly doesn't apply to that architecture – there are no adjacent regions, for instance.

1. Architecture Scope and Region Description		
General Architecture Scope and Region Description Comments Here		
Question	**Answer**	**Comments**
a. Is the geographic region of the architecture clearly defined? If so, are the boundaries still accurate and applicable for the next update?	Yes	The Treasure Valley encompasses the urbanized area within northern Ada and Canyon Counties in southwestern Idaho and includes the cities of Boise, Caldwell, Eagle, Garden City, Kuna, Meridian, Middleton, Nampa, and Star.
b. Has a timeframe for the architecture been defined? If so, is the timeframe adequate to support intended use in planning, programming, and project implementation?	Yes	10 Years (2013 – 2023)
c. Has the range of services included in the regional architecture been defined? If so, is the range of services still applicable to the next update?	Yes	12 ITS service areas are included.
d. Are all adjacent/overlapping ITS architectures that should be considered in the next update identified?	Yes	This architecture uses common elements where there is overlap with the ITD Statewide, ITD District 3, and Oregon Statewide architectures.
2. Stakeholders		
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	
b. Is the stakeholders list up-to-date? Is it still commensurate with the anticipated scope of the updated regional architecture?	Yes	
c. Were the key stakeholders all involved in the architecture development process? Will the same stakeholders be involved in the update?	Yes	COMPASS led a technical working group comprised of the key stakeholders for this architecture update and plans to continue meeting with this group in the future.
d. Was a champion established, either individual or group, to lead the development of the architecture? Will the same champion lead the update?	Yes	COMPASS

3. System Inventory

General System Inventory Comments Here

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. Is the inventory up-to-date? Is it still commensurate with the anticipated scope of the updated regional architecture?	Yes	
c. Have the National ITS Architecture subsystems and terminators been correctly linked to regional elements?	Yes	
d. Does the inventory take into account all current adjacent or overlapping regional ITS architectures?	Yes	
e. (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

General Needs and Services Comments Here

Question	Answer	Comments
a. Are transportation needs for the region defined and described? If so, are the documented needs consistent with the current needs of the region?	Yes	Needs are defined in the Needs Assessment chapter of the ITS Plan.

b. Are transportation services, derived from the needs, defined and described? If so, do the documented services still cover the region's needs?	Yes	
c. Are the services adequately represented in the regional architecture? (e.g., Are services linked to inventory elements?)	Yes	
5. Operational Concept		
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	Note: The Operational Concept is not included in the Turbo Architecture database because it is included in the ITS Plan in more detail than can be input into Turbo Architecture.
b. Are the documented roles and responsibilities consistent with current operations strategies of stakeholders in the region?	Yes	
c. Are the roles and responsibilities of the operational concept appropriately reflected in the architecture?	Yes	
6. Functional Requirements		
General Functional Requirements Comments Here		
Question	**Answer**	**Comments**
a. Have high-level functions been defined for each regionally significant element in the architecture?	Partly	High-level functional requirements for ITS services have been included in the Turbo Architecture database with the expectation that detailed requirements for system implementation will be developed project by project.
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		
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	

c. Does the architecture address the significant integration opportunities implied by the inventory, needs/services, and the operational concept? Are the identified interfaces up-to-date?	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		
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?	Yes	The ITS Plan includes a detailed project list and the Turbo Architecture database has been updated in conjunction with the development of this list.
b. Is the list of projects up-to-date and consistent with ITS projects that are programmed and planned for the region?	Yes	
c. Have the relationships to the regional architecture and the interdependencies between projects been defined?	Yes	
d. Has an initial sequencing of currently defined projects been established?	Yes	
e. (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 and as part of COMPASS's regional planning processes.
9. Agreements		
General Agreements Comments Here		
Question	**Answer**	**Comments**
a. Have existing interagency agreements in the region been identified/considered by the regional architecture? Is the list of existing agreements up-to-date?	Yes	
b. Have future agreements been identified to implement the regional architecture and support project interoperability? Is the list of future agreements complete and up-to-date?	Yes	A project has been identified to develop a master interagency agreement for ongoing management and operations of ITS in the region.
10. Standards Identification		
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	The region plans to use national ITS standards as applicable and to confer on regional projects to confirm which standards to use.
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

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?	Yes	
b. Is there a detailed description for incorporating and using the regional ITS architecture in the regional and/or statewide planning process? Does the description reflect your current Concept of Use?	Yes	
c. Are planners using the regional ITS architecture as described? If not, why not?	Yes	
d. Is the relationship between the regional ITS architecture and the project implementation process well defined? Does the documentation reflect your current Concept of Use?	Yes	
e. Are project sponsors accessing and using the regional ITS architecture as described? If not, why not?	Mostly	The 2013 ITS Plan includes a chapter on Linking Planning and Operations to help facilitate this process.

12. Maintenance Plan

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?	Yes	
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	
f. Has the architecture been updated per the plan, periodically and/or consistent with scheduled LRTP updates?	Yes	Periodic updates have been made. The 2013 ITS Plan includes an updated maintenance plan.