

YAKIMA VALLEY REGIONAL ITS ARCHITECTURE

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*Yakima Valley
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Executive Summary

This architecture is a document illustrating what Intelligent Transportation Systems (ITS) in the Metropolitan Planning Organization (MPO) and Regional Transportation Planning Organization (RTPO) regions of Yakima County, Washington are currently deployed or are being planned for the near future. By showing what advanced technology systems are in place, this plan can illustrate opportunities for sharing resources and improve overall system functionality.

This regional architecture is built on the U.S. National Architecture version 7.0 and was developed on guidelines suggested by the National ITS Architecture team.

Within Yakima Valley's MPO boundaries, several key stakeholders have ITS systems. The municipalities of Moxee, Naches, Selah, Union Gap, and Yakima, and unincorporated areas of Yakima County all have signalized intersections. Both Yakima County (beginning in 2017) and the City of Yakima maintain their own signalized intersections while all others are maintained by the Washington State Department of Transportation (WSDOT).

WSDOT owns and maintains the majority of ITS components in the region, including several ITS system elements (fiber, variable message signs, data stations, etc.). WSDOT also collects some remote weather information, which is sent, along with transportation data, to be coordinated out of the WSDOT Traffic Management Center in Yakima. In addition, WSDOT works with the Washington State Patrol (WSP) to share real-time information. Yakima County maintains both weather station and variable message board systems.

Yakima Transit and the Yakama Nation's Pahto Public Passage Transit has ITS components in place and plans to expand systems to provide more dynamic services and improved security to their customers.

Stakeholders within the Yakima Valley's RTPO boundaries maintain a variety of ITS systems, as well. The cities of Grandview, Sunnyside, Toppenish, Wapato, and Zillah have signalized intersections.

In the U.S. National ITS Architecture, types of ITS equipment or projects are grouped into "service packages," which can be used to tie one region's architecture to the state or to specific project architectures. Several service packages have been selected to describe the kind of services stakeholders have installed, or plan to install.

Another key purpose of the architecture is to define what standards are used in ITS equipment to make it easier for one system to interact with another. The architecture defines what standards are currently being used and suggests relevant national standards, which may be chosen to help make future projects more accessible to a wider range of stakeholders. The architecture includes a list of data-sharing agreements within the region, showing how agencies work together to operate and maintain the various ITS systems.

This document, along with the broader Turbo database, fulfills the requirements set forth by the U.S. Federal Highway Administration Rule requiring regions with existing ITS applications to

have a regional ITS architecture. It will be incorporated into the regional transportation plan update cycle, with any necessary amendments made as needed.

1. Introduction

Intelligent Transportation Systems (ITS) are technology solutions to improve the functionality, safety, and cost-effectiveness of transportation systems.

This architecture serves as a plan to illustrate what ITS systems are currently in place in the Yakima Valley Metropolitan Planning Organization (MPO) and Regional Transportation Planning Organization (RTPO) boundaries; what systems are planned to be deployed in the next 10 years; and what opportunities exist to share resources and improve coordination between agencies to improve overall system functionality.

As a regional ITS architecture, it has been designed to fit the structure of the current National ITS Architecture. More information about the National ITS Architecture and architectures' physical and informational structures are available in **Appendix A: Background Information on the U.S. National ITS Architecture**.

The architecture has been developed as per the specifications provided by the U.S. Department of Transportation Federal Highway Administration (FHWA) Rule and Federal Transit Administration (FTA) Policy requiring regions with existing ITS applications to have a regional ITS architecture.¹ This document meets these federal requirements.

In addition to this document, more specific information about functional requirements, standards, and information flows can be found in the Turbo Architecture version of the Yakima Regional ITS Architecture, available through Yakima Valley Conference of Governments.

Process for developing the architecture

Following outlines suggested by National ITS Architecture guidelines, these steps were taken to develop this architecture:

1. Stakeholder meetings and a workshop were held to identify current and future ITS needs which should be incorporated into the architecture.
2. Relevant service areas, or market packages, were identified with the stakeholder agencies responsible. Information flows between services were mapped.
3. Service packages were mapped to subsystems and terminators as specified in the National Architecture.
4. A draft version of the architecture was distributed to stakeholder agencies for feedback and revised accordingly.

¹ January 8, 2001, U.S. Department of Transportation, Federal Highway Administration, 23 CFR Part 940, FHWA Docket No. FHWA-99-5899

5. The architecture was submitted to the MPO/RTPO Technical Advisory Committee (TAC) on April 10, 2014 and was recommended for approval.
6. On April 21, 2014, the architecture was presented to the MPO/RTPO Executive Committee for their review and was approved by the MPO/RTPO Executive Committee on May 19, 2014.
7. On May 11, 2017, the architecture was revised to update the Yakama Nation's inclusion within the plan for transit ITS equipment and was presented to the MPO/RTPO Executive Committee for their review. The architecture was approved by the MPO/RTPO Executive Committee on May 15, 2017
8. On December 18, 2017, the architecture was presented to the MPO/RTPO Executive Committee for review and approval of its annual (2017) update process with only minor grammatical edits. The MPO/RTPO Executive Committee approved the (2018) annual update on December 17, 2018.
9. On December 17, 2018, the architecture was presented to the MPO/RTPO Executive Committee for review and approval of its annual (2018) update process with only minor grammatical edits. The MPO/RTPO Executive Committee approved the (2019) annual update on December 16, 2019.
10. On December 16, 2019, the architecture was presented to the MPO/RTPO Executive Committee for review and approval of its annual (2019) update process with only minor grammatical edits. The MPO/RTPO Executive Committee approved the (2020) annual update on December 21, 2020.
11. On December 21, 2020, the architecture was presented to the MPO/RTPO Executive Committee for review and approval of its annual (2020) update process with only minor grammatical edits. The MPO/RTPO Executive Committee approved the (2021) annual update on December 20, 2021.
12. On December 20, 2021, the architecture was presented to the MPO/RTPO Executive Committee for review and approval of its annual (2021) update process with only minor grammatical edits. The MPO/RTPO Executive Committee approved the (2022) annual update on December 21, 2022.

2. Scope of the Architecture

The geographic scope includes all of Yakima County, which coincides with the RTPO boundary and encompasses the MPO planning area. Note that this region is also covered by the broader South Central Regional and Washington State ITS Architectures. These two architectures focus on WSDOT ITS infrastructure, projects, and initiatives. The Yakima Valley Regional ITS Architecture focuses on local agencies and organizations in Yakima Valley, the interfaces between these agencies, and specific local interfaces to the WSDOT South Central Region and other state agencies.

The Yakima Valley Regional ITS Architecture coincides with the current MPO/RTPO Long Range Transportation Plan 2040-2045 and will focus on a 10-year timeframe. The 2020-45 Plan was

adopted on March 16, 2020. The Yakima Valley Regional ITS Architecture focuses on traffic management, transit, traveler information, and public safety/emergency management-oriented services within Yakima County. Broader statewide services such as commercial vehicle operations are covered by the Washington State and South Central Regional ITS Architectures.

3. Stakeholders

Stakeholders for the Yakima Valley Regional ITS Architecture include:

Local Cities Public Works

This stakeholder represents the public works departments associated with the cities and towns in Yakima County including Sunnyside, Moxee, Naches, Selah, Tieton, Union Gap, Wapato, Toppenish, Harrah, Zillah, Mabton, Granger, Yakima, and Grandview.

Associated Elements include:

- Local City Field Equipment
- Local City Traffic Operations Center
- Local Maintenance and Construction Operations Management
- Local Maintenance and Construction Operations Vehicles

Local Police and Fire

This element represents the municipal and tribal police and fire departments in the region, including the Yakima, Union Gap, Sunnyside, Granger, Moxee, Selah, Tieton, Toppenish, Wapato, and Yakama Tribal Police and Fire Departments.

Associated Elements include:

- Local Public Safety Dispatch
- Local Public Safety Vehicles.

Media

Media include radio stations, television stations, newspapers, and news reporters. The media are responsible for gathering transportation information and disseminating it to the traveling public.

Associated Elements include:

- Media

People For People

Provides transportation services to seniors and those with special needs in the Yakima Valley.

Associated Elements include:

- People For People Paratransit Dispatch
- People For People Paratransit Vehicles

Private Information Service Providers

Information Service Providers (ISP) who provide value added transportation information to the public in the Yakima region.

Associated Elements include:

- Private ISP Centers

State Agencies

Involved for emergency response. (Yakima County is 75% federal and state lands). DNR, WDFW, Forestry, DOE. There are no current inventory elements associated with this stakeholder. It will remain in the architecture for potential future involvement.

Traveling Public

This stakeholder represents the broad, diversified group that uses surface transportation services in Yakima County, including both public and private vehicle operators, transit users, and non-motorized users including bicyclists and pedestrians.

Associated Elements include:

- Vehicles
- Personal Devices

Union Gap Transit

Provides transit services within the City of Union Gap

Associated Elements include:

- Local City Transit Center
- Local City Transit Vehicles

Selah Transit

Provides transit services within the City of Selah

Associated Elements include:

- Local City Transit Center
- Local City Transit Vehicles

Washington State DOT

Washington State DOT builds, maintains, and operates the state highway system and is responsible for the state ferry system. It works in partnership with other organizations to maintain and improve local roads, railroads, airports, and multi-modal alternatives to driving. Yakima Valley is located in WSDOT's South Central Region.

Associated Elements include:

- WSDOT Field Equipment
- WSDOT SC Region TMC

Washington State Patrol

The Washington State Patrol makes the Washington state roads and highways safe for the efficient transit of people and goods.

Associated Elements include:

- WSP District 3 Communications Center

Yakama Nation

Provides transit services to the general public within the Yakama Nation, including the community of White Swan, Town of Harrah, and Cities of Toppenish and Wapato.

Associated Elements include:

- CCV System on Transit Vehicles

Yakima City Streets and Traffic Division

The Streets and Traffic Division is responsible for maintenance, operation and traffic engineering for City of Yakima Streets.

Associated Elements include:

- Yakima Field Equipment
- Yakima Traffic Operations Center

Yakima City Transit Division

The Transit division is committed to enhancing the quality of life in Yakima County by providing outstanding, cost-effective transportation services.

Associated Elements include:

- Yakima Transit Center
- Yakima Traffic Operations Center

Yakima County Fire

Yakima County Fire includes the fire districts covering the unincorporated areas in Yakima County.

Associated Elements include:

- Yakima County Fire Communications Center

Yakima County Sheriff

The Sheriff is responsible for the provision of police services in the unincorporated portion of the County, including patrol, criminal investigation, and emergency response.

Associated Elements include:

- Yakima County Public Safety Vehicles
- Yakima County Sheriff Dispatch

Yakima County Transportation Services

The Transportation Services Division is responsible for building, operating, and maintaining the county roads, bridges, and a trail corridor. It includes the traffic engineering and road maintenance sections that are responsible for operations and maintenance of ITS devices on county roads.

Associated Elements include:

- Yakima County Field Equipment
- Yakima County Traffic Operations

Yakima Training Center

Military training installation located east of Selah. There are no current inventory elements associated with this stakeholder. It will remain in the architecture for potential future involvement.

Yakima Valley Emergency Management

The Yakima Valley Office of Emergency Management is a joint operation of emergency management between Yakima County and the towns and cities of Tieton, Naches, Selah, Yakima, Union Gap, Moxee, Harrah, Wapato, Toppenish, Zillah, Granger, Mabton, Sunnyside and Grandview. It coordinates and facilitates resources to minimize the impacts of emergencies and disasters on people, property, economy and the environment. Its mission is to help the region mitigate, prepare for, respond to and recover from natural and technological emergencies and disasters.

Associated Elements include:

- Yakima Public Safety Communications Center

YVCOG

The Yakima Valley Conference of Governments (YVCOG) is the lead agency for the federally-designated Metropolitan Planning Organization and the state-designated Regional Transportation Planning Organization for the region. It includes members from 15 jurisdictions in Yakima Valley: Cities of Yakima and Sunnyside; Moxee, Naches, Selah, Tieton, Union Gap (Area 1); Wapato, Toppenish, Harrah, Zillah (Area 2); Mabton, Granger, Grandview (Area 3); and Yakima County. YVCOG develops and maintains the Metropolitan/Regional Transportation Plan (M/RTP), the Metropolitan/Regional Transportation Improvement Program (M/RTIP), and this regional ITS architecture.

Associated Elements include:

- YVCOG Data Warehouse
- YVCOG Traffic Counting program (Tube Counts, Turning movements, and video capture counts for trails/pathways)
- YVCOG/STREETLIGHT Data, Inc. Traffic Monitoring (Origin & Destination) Program

4. Operational Concept

This section defines stakeholders' current and future roles and responsibilities regarding any ITS systems they may operate or maintain. Listed under each transportation service are the associated stakeholders' roles and responsibilities.

Archived Data Management

Stakeholders	Roles and Responsibilities
Local Police and Fire	Collect and archive emergency (incident) information from WA State Patrol and the region's emergency responders
<ul style="list-style-type: none"> • People For People • Selah Transit • Union Gap Transit • Yakima City Transit Division • Yakama Nation Transit 	Collect and archive transit data.
<ul style="list-style-type: none"> • YVCOG 	<p>Collect and archive traffic information from regional traffic management centers.</p> <p>Collect and archive traffic information from regional traffic management providers, emergency information from WSP and Yakima Valley local police, and transit information from regional transit.</p> <p>Collect and archive multimodal/intermodal transportation-based origin and destination tracking data available through public and private sources.</p>

Commercial Operations

Stakeholders	Roles and Responsibilities
<ul style="list-style-type: none"> • WSDOT 	<p>Provide permit information to regional emergency management providers and regional enforcement agencies.</p> <p>Provide permits (over-height/over-weight/hazmat) to private fleet systems.</p> <p>Provide route restriction information to private fleet systems.</p>
<ul style="list-style-type: none"> • Washington State Patrol 	<p>Provide enforcement of regional permits for over height/overweight and hazmat.</p> <p>Provide first response to commercial vehicle incidents for hazmat conditions/clean-up.</p>

Emergency Management

Stakeholders	Roles and Responsibilities
<ul style="list-style-type: none"> • People For People • Selah Transit • Union Gap Transit • Yakima Transit • Yakama Nation Transit 	Coordinate emergency and evacuation plans with emergency management/public safety agencies.
<ul style="list-style-type: none"> • Washington State Patrol 	Provide regional traffic, transit, emergency management, and maintenance operations with disaster information to disseminate to the traveling public.
<ul style="list-style-type: none"> • WSDOT 	<p>Provide traveler information to Yakima Valley region motorists.</p> <p>Responsible for providing service patrol dispatch resources to assist motorists in need on Yakima region transportation facilities.</p> <p>Aid in the coordination of State and region wide emergency plans, evacuation and reentry plans, and disaster management.</p> <p>Dispatch Washington State Patrol vehicles to incidents within their jurisdiction.</p> <p>Receive AMBER Alert and other Wide Area Alert information from Washington State Patrol Headquarters.</p>

	Receive early warning information and threat information from the National Weather Services and Local Agencies.
<ul style="list-style-type: none"> Yakima County Local Municipalities 	<p>Provide traveler information to Yakima Valley region motorists.</p> <p>Responsible for providing service patrol dispatch resources to assist motorists in need on Yakima region transportation facilities.</p> <p>Aid in the coordination of State and region wide emergency plans, evacuation and reentry plans, and disaster management.</p> <p>Receive early warning information and threat information from the National Weather Services and Local Agencies.</p>
<ul style="list-style-type: none"> Yakima County Sheriff 	<p>Dispatch sheriff vehicles to incidents within their jurisdiction.</p> <p>Dispatch Local Agency Fire/EMS/Police vehicles.</p> <p>Participate in the incident response, coordination, and reporting.</p> <p>Receive AMBER Alert and other Wide Area Alert information from Washington State Patrol Headquarters.</p> <p>Perform incident detection and verification for arterials on local routes.</p> <p>Respond to transit emergencies/alarms on-board transit vehicles or at the transit facilities of Local Transit Agencies.</p>
<ul style="list-style-type: none"> Yakima Valley Emergency Management 	<p>Coordinate with regional emergency management providers, maintenance and construction providers, and regional traffic management providers for emergency plans and evacuation and reentry plans.</p> <p>Responsible for coordinating emergency and evacuation plans with local agencies.</p>

Incident Management

Stakeholders	Roles and Responsibilities
<ul style="list-style-type: none"> People For People Union Gap Transit Selah Transit Yakama Nation Transit (<i>Pahto Public Passage</i>) Yakima Transit 	<p>Report incident information to public safety agencies.</p> <p>Operate on-board security cameras, to remotely monitor the vehicles.</p>
<ul style="list-style-type: none"> Washington State Patrol WSDOT 	<p>Coordinate incident response with other public safety agencies (local police, fire, EMS, sheriff) as well as WSDOT.</p> <p>Dispatch Washington State Patrol vehicles for incidents on highways.</p> <p>Perform incident detection and verification for the highways within the region and provide this information to traffic and other public safety agencies.</p> <p>Coordinate maintenance resources for incident response with WSDOT and Local Agencies.</p> <p>Provide incident information to regional emergency responders, including the State Patrol and WSDOT.</p> <p>Responsible for the development, coordination, and execution of special traffic management strategies during an evacuation.</p>
<ul style="list-style-type: none"> Local Police and Fire 	<p>Coordinate public safety resources for incident response on local routes.</p> <p>Dispatch the Local Agency emergency vehicles to incidents, including the Local Agency Police, Fire, and EMS/Rescue.</p> <p>Receive emergency calls for incidents on local routes.</p> <p>Perform incident detection and verification on local routes and provide this information to the local agencies.</p>

	<p>Coordinate incident response with other public safety agencies (fire, EMS, ambulance, etc.)</p> <p>Perform network surveillance for detection and verification of incidents on local routes.</p>
<ul style="list-style-type: none"> Yakima County Public Services Yakima City Streets and Traffic Division Local Municipalities Public Works 	<p>Coordinate maintenance resources for incident response.</p> <p>Provide incident information to travelers via traffic information devices on local city and county routes.</p> <p>Provide incident information to regional emergency responders, including the Washington State Patrol, Yakima Valley Emergency Management, Yakima County Sheriff, Yakima County Fire, Yakima County and other local agencies.</p>

Maintenance and Construction

Stakeholders	Roles and Responsibilities
<ul style="list-style-type: none"> Yakima County Public Services Yakima City Streets and Traffic Division Local Municipalities Public Works 	<p>Receive a request for maintenance resources for incident response from regional emergency management agencies.</p> <p>Distribute maintenance and construction plans and work zone information to regional information service providers, regional traffic operations, transit operations, emergency operations, rail operations, and the media.</p> <p>Coordinate maintenance and construction activities with other regional maintenance and construction agencies.</p> <p>Disseminate winter weather advisories via website and phone number for motorists to call.</p> <p>Dispatch maintenance vehicles.</p> <p>Perform maintenance of ITS field equipment.</p> <p>Provide winter maintenance of local routes and county routes, including pavement maintenance and construction activities.</p> <p>Coordinate maintenance resources for incidents with other regional maintenance providers.</p> <p>Manage work zones on all Yakima Valley maintenance and construction activities, as well as monitor work zone safety with Yakima field devices and vehicles.</p>

Parking Management

Stakeholders	Roles and Responsibilities
<ul style="list-style-type: none"> Yakima City Streets and Traffic Division 	<p>Operate Downtown Yakima parking management system.</p>

State Route/Highway Management

Stakeholders	Roles and Responsibilities
<ul style="list-style-type: none"> WSDOT 	<p>Exchange traffic related information with Yakima TOC.</p> <p>Monitor traffic and identify problems using CCTV cameras, traffic detectors, and traffic information provider data.</p> <p>Operate reversible lane control systems and ramp meters to help managed traffic flow and reduce congestion.</p> <p>Provide up-to-the-minute information about what is happening on the roadway and mountain passes, including weather, incidents, construction, and some travel times, to drivers through our highway advisory radios, electronic signs, the web, and the 511-traveler information phone system.</p>

Surface Street Management

Stakeholders	Roles and Responsibilities
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<ul style="list-style-type: none"> • Yakima County Public Services • Yakima City Streets and Traffic Division • Local Municipalities Public Works • WSDOT 	<p>Operate and maintain rail roadside equipment communicating with traffic signal systems or other traffic control devices at highway rail intersections.</p> <p>Coordinate traffic information and control with WSDOT and other local public works departments.</p> <p>Operate and maintain traffic signal systems on local routes.</p> <p>Operate network surveillance equipment.</p> <p>Provide security monitoring of critical infrastructure for Yakima Valley.</p> <p>Coordinate HRI signal adjustments with Private Rail Operators.</p> <p>Provide traffic information to regional agencies including transit, emergency management, maintenance and construction, and the media.</p> <p>Provide traffic information reports to regional information service providers.</p>
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Transit System

Stakeholders	Roles and Responsibilities
<ul style="list-style-type: none"> • People for People • Selah Transit • Union Gap Transit • Yakama Nation Transit (<i>Pahto Public Passage</i>) • Yakima City Transit System 	<p>Provide paratransit (demand response) bus service for the Yakima region.</p> <p>Provide schedule and fare information.</p> <p>Track and evaluate schedule performance on all fixed route and demand response vehicles.</p> <p>Coordinate emergency plans with the local public safety agencies and provide emergency transit services for evacuations, fires, and disasters.</p> <p>Provide automated transit maintenance scheduling through automated vehicle conditions reports.</p> <p>Provide transit system website and private sector traveler information service providers.</p> <p>Provide transit security on all transit vehicles and at transit terminals through silent alarms and surveillance systems.</p>

Alternative Fuel Vehicles

Stakeholders	Roles and Responsibilities
<ul style="list-style-type: none"> • WSDOT • Washington State Patrol • Yakima County • Yakama Nation • Local Municipalities Public Works • Regional Transit Agencies • Regional transportation providers (public/private) 	<p>Explore development of a regional transportation electrification/hydrogen strategy to address state's Clean Cars 2030 target;</p> <p>Identification of electric/hydrogen vehicle infrastructure grants related including state, federal, and other funds;</p> <p>Coordination of grant funding criteria across jurisdiction or agency programs;</p> <p>Provide cross-jurisdiction/agency technical assistance on design, funding, and procurement of AFV's when modernizing municipal vehicle fleets;</p> <p>Update regional and jurisdictional capital investment plans supporting development of public/agency charging facility networks</p>

Autonomous / Alternative Conveyance Vehicles

Stakeholders	Roles and Responsibilities
<ul style="list-style-type: none"> • WSDOT • Washington State Patrol • Yakima County • Yakama Nation • Local Municipalities Public Works 	<p>Explore cooperative automated transportation (CAT), including autonomous and connected vehicles, and learn how it could improve safety and enhance livability for all residents</p> <p>Explore automated enforcement opportunities</p>

<ul style="list-style-type: none"> Regional Transit Agencies Regional transportation providers (public/private) 	<p>Explore partnering with the telecom industry to identify ways to leverage the public right of way for future fiber and wireless usages</p> <p>Identifying modifications that can benefit travelers now, while also preparing the system for automated vehicle needs</p> <p>Identifying data sharing and infrastructure improvements that improve freight safety, mobility and system operations.</p> <p>Exploring truck parking and interstate truck platooning pilot projects</p>
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Solar / Alternative Fuel Generation

Stakeholders	Roles and Responsibilities
<ul style="list-style-type: none"> WSDOT Yakima County Yakama Nation Local Municipalities Public Works Regional Transit Agencies Regional transportation providers (public/private) 	<p>Explore solar power generation facilities within transportation right of ways;</p> <p>Identify best practices for integrating solar power generation infrastructure into jurisdictional transportation programs maintenance and operation activities;</p> <p>Integrate solar generation technology opportunities into jurisdiction's environmental protection policies and goals;</p>

Traveler Information

Stakeholders	Roles and Responsibilities
<ul style="list-style-type: none"> Media Private ISP Providers WSDOT Yakima County Road Program 	<p>Coordinate and share traveler information with all other traveler information providers within the region.</p> <p>Collect travel-related information from the public sector and private information sources, and broadcast that information to their customers via TV, radio stations, news media, etc.</p> <p>Provide current incident information to the media/traveler information providers</p> <p>Make available weather forecast; issue warnings related to adverse weather conditions.</p>

5. Inventory

The following stakeholder agencies operate ITS systems within the geographic region of the architecture. Note that some stakeholders may have additional ITS systems within their inventory that are not listed here because they fall out of the geographic scope of this architecture.

Stakeholder	Element Name	Element Description	Element Status
Local Cities Public Works	Local City Field Equipment	This element represents the ITS field equipment (traffic controllers, signals, CCTV cameras, dynamic message signs, detectors etc.) owned and operated by the cities and towns other than the City of Yakima.	Planned

Stakeholder	Element Name	Element Description	Element Status
Local Cities Public Works	Local City Traffic Operations Center	This element represents the center that supports remote monitoring and control of the traffic signal system and other related ITS field equipment in a local city or town. This general element represents all local cities (e.g.,) that are not represented by city-specific elements in the regional ITS architecture.	Planned
Local Cities Public Works	Local Maintenance and Construction Operations	All-year maintenance and construction activities.	Planned
Local Police and Fire	Local Public Safety Dispatch	This element represents the public safety communications and dispatch centers that dispatch police, fire, and/or EMS vehicles, operated by municipal police and fire departments in Yakima County that are not dispatched from the Yakima Public Safety Communications Center	Planned
Local Police and Fire	Local Public Safety Vehicles	Municipal public safety/first responder vehicles including police, fire, and EMS vehicles.	Planned
Media	Media	Media include radio stations, television stations, newspapers, and news reporters. The media are responsible for gathering transportation information and disseminating it to the traveling public.	Planned
People for People	People For People Paratransit Dispatch	PFP provides transportation services for the general public and special needs population. This element represents the dispatch operations that monitors and manages the paratransit vehicles.	Existing
Private Information Service Providers	Private ISP Centers	These centers provide value added transportation information to the public. Examples include (but not limited to) Mobility Technologies, MetroQuest, PublicInput, StreetlightData, and Strava.	Planned
Traveling Public	Personal Devices	Personal devices that the traveling public use to access traveler information and services. This element represents the variety of fixed and mobile computing and communications devices that travelers use to access traveler information including laptops, smart phones, and tablet computers.	Planned
Traveling Public	Vehicles	Cars and trucks operating on the road network in the region that are equipped with ITS devices.	Planned

Stakeholder	Element Name	Element Description	Element Status
Union Gap Transit	Local City Transit Center	Transit Centers serving local cities other than the City of Yakima and Selah, which are served by Yakima Transit. (Currently, only Union Gap.)	Planned
Washington State DOT	WSDOT Field Equipment	This element represents the ITS field equipment (traffic controllers, signals, grade crossings, CCTV cameras, dynamic message signs, detectors etc.) owned and operated by WSDOT.	Existing
Washington State Patrol	WSP District 3 Communications Center	The WSP District 3 Communications Center provides emergency communications and dispatch services for the Washington State Patrol and other state and federal agencies.	Planned
Yakama Nation (Pahto Public Passage Transit System)	Pahto Public Passage Cameras	This element represents the ITS field equipment (CCTV cameras) for security purposes; owned and operated by the Yakama Nation	Existing
Yakima City Streets and Traffic Division	Yakima Field Equipment	This element represents the ITS field equipment (traffic controllers, signals, CCTV cameras, dynamic message signs, detectors etc.) owned and operated by the city of Yakima.	Planned
Yakima City Streets and Traffic Division	Yakima Traffic Operations Center	This is the traffic operations center that monitors and controls the traffic signal system and other ITS devices in the city of Yakima.	Planned
Yakima City Transit Division	Yakima Transit Center	Yakima Transit provides fixed route service, paratransit, and vanpool service, offering fixed route service in Yakima, Union Gap, and Selah. This element represents the operations, administrative offices, and garage that manage, operate, and maintain the transit service.	Planned
Yakima City Transit Division	Yakima Transit Vehicles	This element represents the buses, paratransit vehicles, and vanpool vehicles operated by Yakima Transit.	Planned (Annually)
Yakima County Fire	Yakima County Fire Communications Center	The Yakima County Fire District #5 Communication Center dispatches the District #5 and District#7 Fire Stations and selected city fire department resources.	Planned
Yakima County Sheriff	Yakima County Public Safety Vehicles	Public safety vehicles (sheriff, fire, and EMS) operated by Yakima county	Planned
Yakima County Sheriff	Yakima County Sheriff Dispatch	This element represents the public safety communications and dispatch center operated by the Yakima County Sheriff's Department.	Planned

Stakeholder	Element Name	Element Description	Element Status
Yakima County Transportation Services	Yakima County Field Equipment	This element represents the ITS field equipment (traffic controllers, signals, grade crossings, CCTV cameras, dynamic message signs, detectors etc.) owned and operated by Yakima County	Planned
Yakima County Transportation Services	Yakima County Traffic Operations	This is the traffic operations equipment that monitors the traffic signals, grade crossings, and other ITS devices operated by Yakima County.	Planned
YVCOG	YVCOG Data Warehouse	Transportation data collected and archived by YVCOG, potentially includes traffic counts. This element represents an on-line data warehouse for the transportation data to be used to support transportation planning, operations analysis, and research.	Planned
Yakima Valley Emergency Management	Yakima Public Safety Communications Center	SunComm, the Yakima Public Safety Communications Center, provides 9-1-1 services and also provides dispatching services for the Yakima, Selah, and Union Gap police departments as well as for all ten fire agencies in the Upper Yakima Valley. The Yakima Public Safety Communications Center is the primary warning point for Yakima County area for the National Warning System and the operational point for the Emergency Alerting System (EAS) in the region.	Existing

6. Needs and Services

In the existing Yakima County Metropolitan and Regional Transportation Plan for 2020-2045², five regional priorities were identified:

- **Preservation:** Preservation of the existing transportation system and services will extend the life and utility of prior investments. Preservation of the system includes resurfacing roadways, ensuring safe bridges, resolving drainage problems, and improving overall operations through maintenance of traffic signs, markings, and signals.

“State of Good Repair”: (SOGR) is a federally originated initiative to maintain our transportation resources (transportation networks, equipment, assets, etc.) to their most operational and cost-effective capabilities. Use of 1) project-specific practical solutions strategies and designs when developing road or transportation systems, and 2) sharing best practices for maintenance, asset management, recapitalization, and innovative financing strategies, are ways to expend the functional life of our local, state, and federal transportation infrastructure, build or reconstruct facilities based on its specific needs and characteristics, and maximizing the economic benefit of limited financial resources.

² Yakima County Metropolitan & Regional Plan for 2020-2045, Yakima Council of Governments,

- **Safety:** Improving the safety and security of the regional transportation system is paramount to the M/RTP strategies. Almost all of the highest priority improvement projects and programs improve the safety of regional transportation customers and the transportation system. Improvements at freeway interchanges and arterial intersections are designed to reduce collisions. Roadway widening and reconstruction projects include design standards to reduce conflicts between travel modes. The M/RTP can also prioritize improvements that address and improve the region's emergency preparedness. Enforcement and transportation safety education are identified in the M/RTP strategies.
- **Economic Vitality:** Transportation projects support, enhance, and stimulate the economic development of the region. Optimizing mobility of people and goods on the transportation system supports economic development by reducing delays, improving operations, opening access to new areas of development, and addressing safety issues.

Enhancing freight distribution by truck, rail, and air is a priority for economic recovery and growth. The M/RTP supports future growth in commercial and freight air service by enhancing inter-modal connectivity through-out the region. The M/RTP includes plans for a Westside Connector study that could reduce conflicts between freight and city localized traffic, which could increase freight efficiency and provide residential safety. Railroad grade separation projects and other rail system improvements such as a study for the feasibility of a trans-load facility are also included in the M/RTP.

Freight Mobility: Enhancing freight distribution by truck, rail, and air is a priority for economic recovery and growth. The M/RTP supports future growth in commercial and freight air service by enhancing inter-modal connectivity through-out the region. The M/RTP includes an unfunded but prioritized study that could reduce conflicts between freight and localized traffic in the lower valley, which could increase freight efficiency between an Interstate and State Route and provide residential safety. Railroad grade separation projects and other rail system improvements such as a study for the feasibility of a trans-load facility are also included in the M/RTP.

The M/RTP incorporates Transportation Systems Management (TSM) and Intelligent Transportation Systems (ITS) strategies to improve the efficiency and safety of the transportation system. These include controlling access to highways and arterials, improving traffic signals and timing, and continued implementation of driver information systems.

- **Transit Enhancement and Transportation Demand Management:** Strategies to enhance transit and transportation demand management (TDM) programs are important elements of the M/RTP. These strategies include expanding fixed-route transit, paratransit, and Commute Trip Reduction (CTR) programs in the greater Yakima metropolitan area. Expanding the availability and types of transportation choices in and between communities throughout the Yakima Valley is a priority for the region. Recent successes of Yakima Transit route expansions have resulted in the independent creations

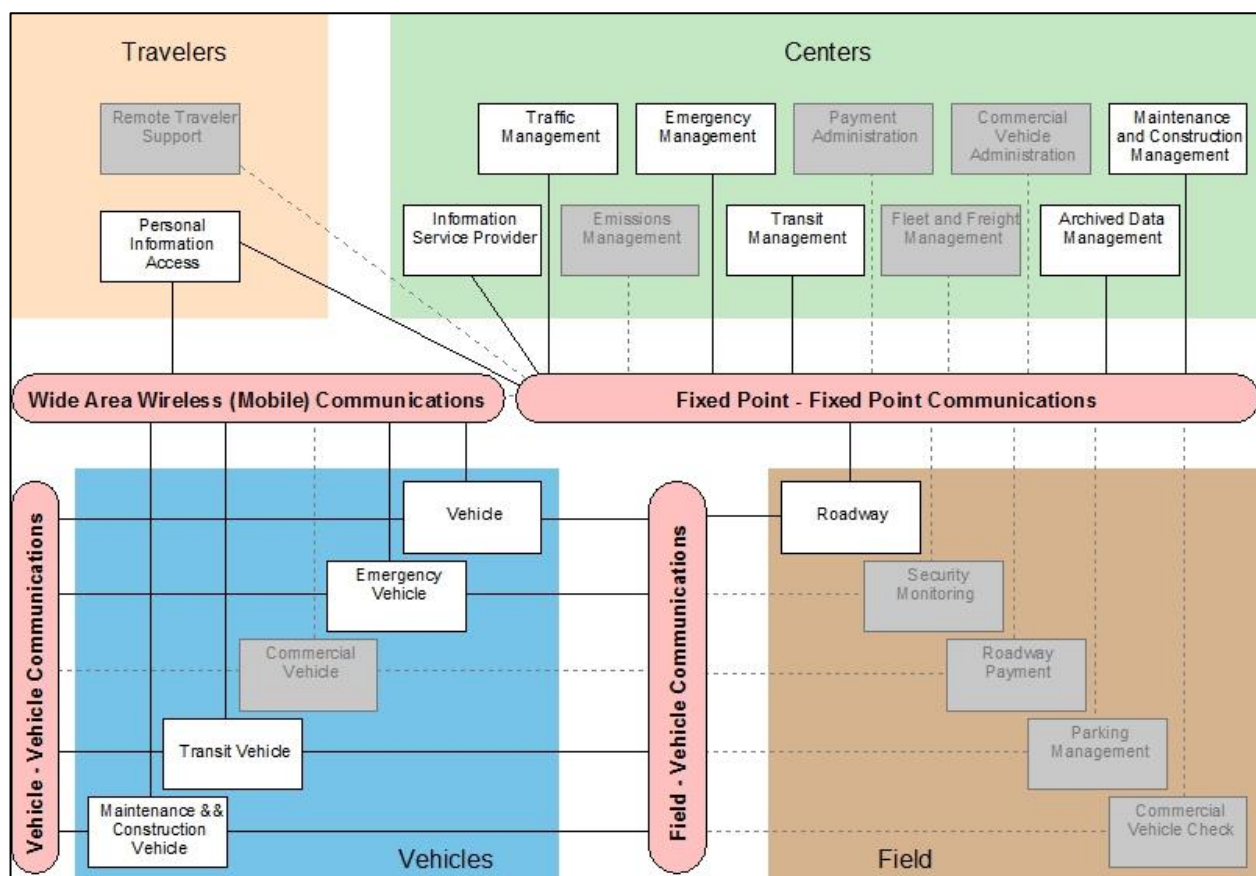
of Selah Transit and Union Gap Transit. Future expansion of transit routes into other communities are included in the M/RTP.

ITS systems may help address these transportation priorities by providing cost-effective alternatives to physical infrastructure improvements that allow for greater mobility, safety, and preservation while minimizing environmental impacts.

To respond to these needs, the following service areas were either implemented or are planned for future implementation:

7. Interfaces and Information Exchanges

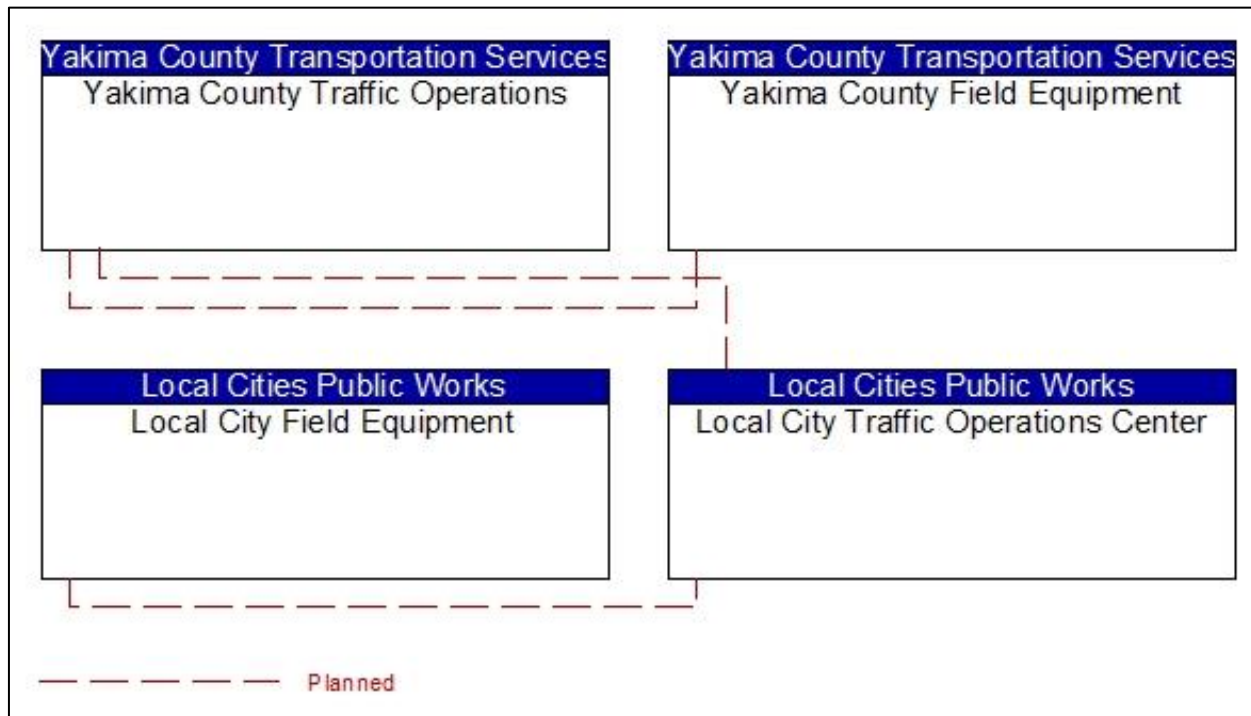
Using the National ITS Architecture as a basis and the Turbo Architecture 7.0 software to map out information flows and interfaces between systems, several diagrams can be created which represent how the various ITS systems in Yakima County interact. Below is a basic diagram illustrating the connections between ITS subsystems.



This shows the four essential elements – Travelers, Centers, Vehicles, and the Field – all of which have various subsystems that were identified during the creation of the architecture. The diagram represents how the various elements interact with each other to achieve the desired outcome(s).

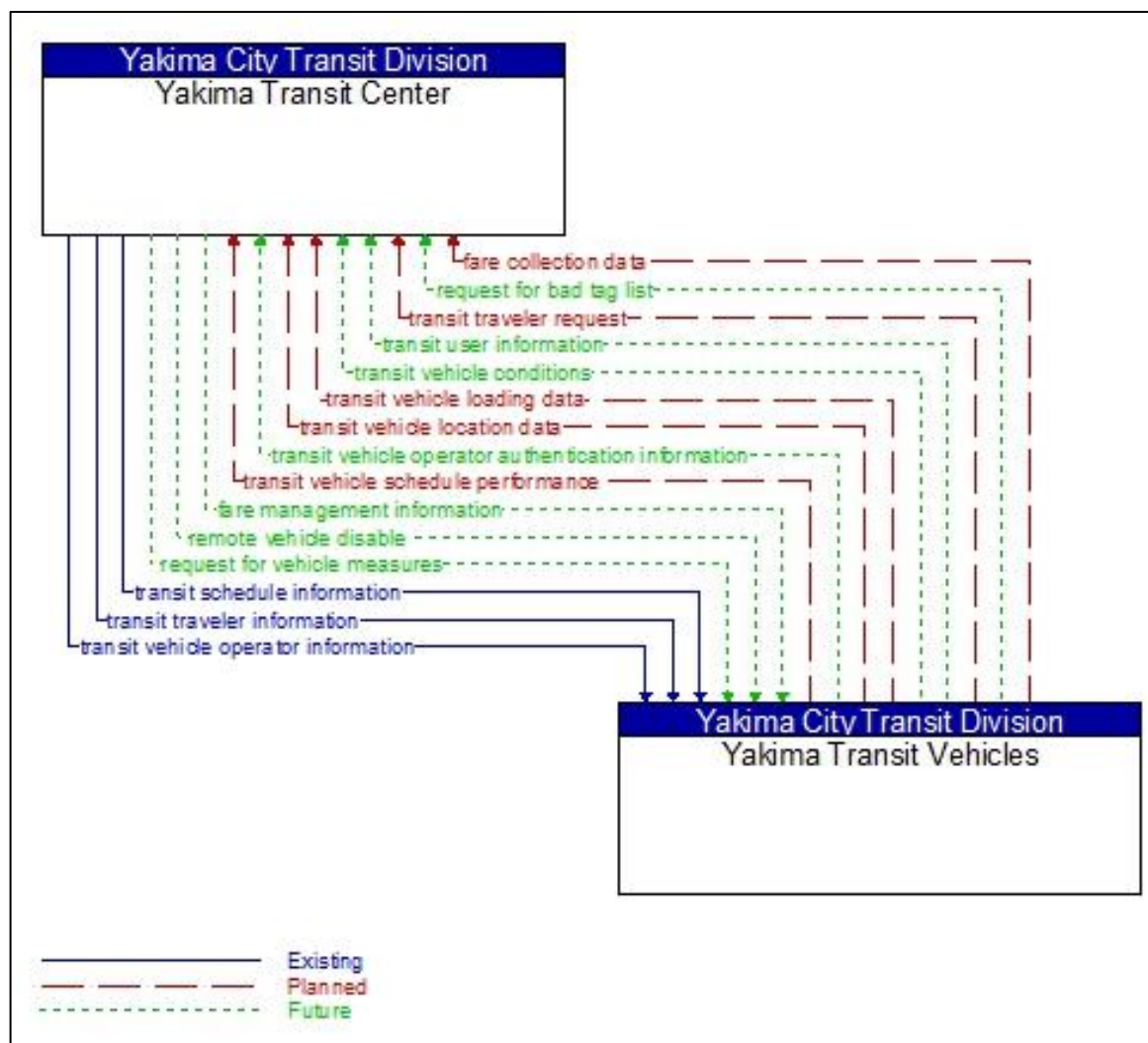
For example: Roadway information from a Traffic Management Center can be distributed through field-vehicle communications to vehicles.

Here is an example diagram of the Interconnects between systems:



The Interconnects diagram above only shows the connections between four different systems. The diagram can be tailored to show additional systems if necessary. The example above shows the connections between Yakima County Traffic Operations and Field Equipment, along with the Local Cities Traffic Operations and Field Equipment.

Finally, here is a more complex example of a flow diagram showing what specific information is exchanged between systems:



The Flow diagram shows the various existing, planned and future elements that have been identified between systems. As with the Interconnects diagram, the Flow diagram can include additional systems – but can get confusing quickly if too many are selected.

8. Functional Requirements

Functional requirements describe the activities performed by each element within the region. Given that each deployment of ITS will have specific functional requirements, they are not listed here. However, a set of generalized functional requirements have been included in the Turbo Architecture version of the architecture. More information can be found there.

9. Standards

ITS standards have been developed to allow for greater interoperability and integration of ITS components, increasing the cost-effectiveness of ITS system solutions and overall functionality. Within Yakima County, most ITS systems are owned and operated by WSDOT and therefore ascribe to WSDOT system standards. WSDOT standards include WAC 296-46A-104 and WAC 296-46B-040 for traffic management systems, and Sections 2500, 2600, and 2700 in the current Time Standards Manual M54-05.

Independent ITS solutions installed by regional stakeholders may use other internationally developed standards for implementation.

The following standards are listed as suggestions for the deployment of ITS within Yakima's MPO boundaries. For more specifics, please contact each stakeholder agency's ITS contact person to confirm whether or not the standard of the project being implemented adheres to established standards.

Group or Doc ID	Title	SDO
ATIS General Use	Advanced Traveler Information Systems (ATIS) General Use Standards Group	SAE
DSRC 5GHz	Dedicated Short Range Communication at 5.9 GHz Standards Group	ASTM/SAE
DSRC 915MHz	Dedicated Short Range Communication at 915 MHz Standards Group	ASTM
APTA TCIP-S-001 3.0.3	Standard for Transit Communications Interface Profiles	APTA
NTCIP 1207	Object Definitions for Ramp Meter Control (RMC) Units	AASHTO/ITE/NEMA
NTCIP 1205	Object Definitions for Closed Circuit Television (CCTV) Camera Control	AASHTO/ITE/NEMA
NTCIP 1204	Object Definitions for Environmental Sensor Stations (ESS)	AASHTO/ITE/NEMA
NTCIP 1208	Object Definitions for Closed Circuit Television (CCTV) Switching	AASHTO/ITE/NEMA
NTCIP 1210	Field Management Stations (FMS) – Part 1: Object Definitions for Signal System Masters	AASHTO/ITE/NEMA
NTCIP 1201	Global Object Definitions	AASHTO/ITE/NEMA
NTCIP 1202	Object Definitions for Actuated Traffic Signal Controller (ASC) Units	AASHTO/ITE/NEMA
NTCIP 1203	Object Definitions for Dynamic Message Signs (DMS)	AASHTO/ITE/NEMA
NTCIP 1211	Object Definitions for Signal Control and Prioritization (SCP)	AASHTO/ITE/NEMA
NTCIP 1213	Object Definitions for Electrical and Lighting Management Systems (ELMS)	AASHTO/ITE/NEMA
NTCIP 1214	Object Definitions for Conflict Monitor Units (CMU)	AASHTO/ITE/NEMA
NTCIP C2C	NTCIP Center-to-Center Standards Group	AASHTO/ITE/NEMA
NTCIP C2F	NTCIP Center-to-Field Standards Group	AASHTO/ITE/NEMA
NTCIP 1209	Data Element Definitions for Transportation Sensor Systems (TSS)	AASHTO/ITE/NEMA

10. Project Sequencing

A project sequence defines the order in which ITS projects within a region should be implemented. This is especially important if there are interdependencies of systems being developed between multiple agencies.

Given that there are no interdependent projects listed for future deployment at this time, and that all projects described are planned within a long-term time frame, projects have not been sequenced by priority.

11. Agreements

The following agreements currently exist between stakeholder agencies:

Agency	Agency	Agreements
WSDOT	City of Grandview	Signal Maintenance Agreement
WSDOT	City of Selah	Signal Maintenance Agreement
WSDOT	City of Toppenish	Signal Maintenance Agreement
WSDOT	City of Union Gap	Signal Maintenance Agreement
WSDOT	City of Yakima	Signal Maintenance Agreement
WSDOT	City of Zillah	Signal Maintenance Agreement
WSDOT	Yakima County	Signal Maintenance Agreement

12. Architecture Maintenance

This architecture was recommended for approval by the MPO/RTPO Technical Advisory Committee (TAC) on April 10, 2014; and was reviewed and approved by the Transportation Policy Board on May 19, 2014. It will remain current until the next update of the Yakima County Metropolitan and Regional Transportation Plan, which will incorporate an architecture component. All future architecture updates will be done as part of the plan update schedule. Until then, this architecture will be checked annually for accuracy and any amendments will be determined by the YVCOG board. The Architecture Maintenance Plan, including the required form, is available in **Appendix B: Architecture Maintenance Plan**.

Appendix A: Background Information on the U.S. National ITS Architecture

Note: this material is taken from the U.S. Department of Transportation National ITS Architecture, Version 6.1.³

Introduction

The National ITS Architecture provides a common framework for planning, defining, and integrating ITS. Specifically, it 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 is therefore employed to provide structure to the defining of general ITS functional requirements during the planning and design process.

Architecture terminology

There are numerous terms within the National ITS Architecture that may need additional explaining and are included below. All efforts have been taken to minimize architecture-specific language in the Yakima Regional ITS Architecture, but for comparing to the national architecture the terms need to be defined:

User services – These describe what an ITS system will do (i.e. provide pre-trip traveler information). These have been selected based on the needs of the stakeholders in the region.

Logical architecture – This defines the processes (activities or functions) needed to satisfy the User Services. The logical architecture uses data flows to identify information that is shared between processes.

Physical architecture – This high-level structure defines the physical entities (subsystems and terminators) that make up ITS. It uses architecture flows to connect subsystems and terminators together.

Equipment packages – These break up subsystems into deployment-sized pieces.

Service packages – These represent slices of the physical architecture that address specific services (e.g. surface street control). A market package collects together several different

³ <http://www.iteris.com/itsarch/index.htm>

subsystems, equipment packages, terminators, and architecture flows that provide the desired service.

Standards – The National ITS Architecture is a reference framework for the development of standards. The logical and physical architecture provide a starting point for ITS standards development activities by identifying the applicable architecture flows and data flows to be standardized and the way that information is exchanged across those interfaces.

Appendix B: Architecture Maintenance Plan
Architecture Development Workshop Series



Maintenance Plan

Yakima Valley Regional ITS Architecture



Architecture Maintenance Plan

1. Purpose

The Yakima Valley ITS Architecture developed for the study area addresses the Region's vision for ITS implementation at the time the plan was developed. With the growth of the region, needs will change and as technology progresses new ITS opportunities will arise. For example, at the time this architecture was developed, the Yakima Valley did not operate any toll roads. As the system expands, in future Yakima County may determine a need for tolls in specific locations and wish to install more.

Shifts in regional needs and focus as well as changes in the National ITS Architecture will necessitate that the Yakima Regional ITS Architecture be updated to remain a useful resource for the Yakima Valley Region.

The following section outlines how the Regions and its stakeholders can work with the Yakima Valley Conference of Governments (YVCOG) to ensure projects are in conformity and also provide updates as ITS evolves in the region.

2. Background

FHWA Rule 940 and an equivalent FTA policy specifies the requirements for regional ITS architecture development, use, and maintenance. Section 940.5 of the rule defines the underlying policy for architecture use, specifying that all ITS projects must adhere to the regional ITS architecture. It also specifies that the architecture should be developed consistent with the transportation planning process.

Section 940.9 defines the requirements for the content of the regional ITS architecture. It positions the architecture as a bridge between planning and project development, stating:

A regional ITS architecture shall be developed to guide the development of ITS projects and programs and be consistent with ITS strategies and projects contained in applicable transportation plans.

Section 940.11 then specifies the requirements for project implementation including the requirement to identify the portion of the regional ITS architecture associated with each ITS project. The final design of all ITS projects is required to accommodate the interface requirements and information exchanges as specified in the regional ITS architecture.

The intent of this requirement is to promote the following:

- Use of the architecture;
- Maintenance of Stakeholder dialogue and understanding;
- Support for seeking funding;
- Support for project implementation;

- Progression of regional integration;
- Support for updates to the documentation

3. Goals and Objectives

Stepping back from the regulatory requirements, the purpose of developing, using and maintaining a regional ITS architecture is to illustrate and document regional integration of ITS projects so that planning and deployment can progress in an organized and coordinated fashion. The regional transportation system is itself composed of many different systems that are planned, implemented, and operated by multiple jurisdictions and agencies. Each of these agencies must be able to effectively use the regional ITS architecture for optimal benefits. To achieve the anticipated benefits, the following objectives must be met:

- The architecture is easy to understand and easy to navigate.
- The architecture content is accurate and current.
- The architecture supports development of the long-range transportation plan and programming documents.
- The architecture includes enough detail to support project scoping and implementation.
- Clear guidance is available to support each prospective user.
- Users find it easy to document and report needed architecture changes.

4. Architecture Maintenance

YVCOG will be responsible for leading the maintenance of the Yakima Valley Regional ITS Architecture. Maintenance includes modifications to the plan as well as complete updates. Table 1 summarizes the maintenance process agreed upon by stakeholders in the Region.

Table 1: Architecture Maintenance Summary

	Modifications	Complete Updates
Time Frame for update	As Needed	Every 4 years
Lead Agency	Yakima Valley COG	Yakima Valley COG
Participants	Stakeholders impacted by the modification	Entire Stakeholders Group
Scope of Update	Project specific	Entire Architecture

Modifications to the Regional ITS Architecture will often be necessitated by ITS projects that are receiving Federal funding but do not conform to the Regional ITS Architecture. YVCOG will take the lead in working with agencies that receive Federal funding for ITS projects and will keep a record of any changes that are needed to the Regional ITS Architecture. Complete updates to the Regional ITS Architecture will occur approximately every four years and will be led by the YVCOG with support from the WSDOT and other key stakeholders. The entire stakeholder group that was engaged to develop this first Regional ITS Architecture will be reconvened for the complete updates.

5. Architecture Maintenance Procedures

The architecture will be reviewed and updated as part of the Long-Range Transportation Plan development that occurs every four years. Goals and objectives that are developed for the LRTP that are related to operations will also be included in the architecture and the relevant objectives will be mapped to service packages. The complete list of ITS service packages will be reviewed by agency planners as operational strategies are identified and prioritized. The prioritized strategies that are included in the LRTP will be mapped to the architecture.

There are several factors or events that influence the need and decision to update on ITS architecture, and as part of Yakima Valley ITS Architecture Maintenance Plan, these should be considered:

- Changes in statewide ITS priorities or objectives:
- Changes in Federal or State Policy or Legislation
- Coordination with Statewide ITS architectures in State of Washington
- Updates to the National ITS Architecture
- New Stakeholders
- ITS Deployment and Integration

Updates to the Yakima Valley Regional ITS Architecture will occur on a regular basis to maintain the architecture as a useful planning tool. Between complete plan updates, smaller modifications will likely be required to accommodate ITS projects in the Region. For situations where a change is required, an ITS Architecture Maintenance Documentation Form was developed. This form should be completed and submitted to the YVCOG whenever a change to the Regional ITS Architecture proposed. The Maintenance Documentation form identifies three categories of modifications. They include:

Category 1	Basic changes that do not affect the structure of the architecture. Examples include: Changes to stakeholder or element name, element status, or data flow status.
Category 2	Structural changes that impact only one agency. Examples include: Addition of a new service package or modifications to an existing service package that affects only one agency.
Category 3	Structural changes that have the potential to impact multiple agencies. Examples include: Addition of a new service package or modifications to an existing service package that involves multiple agencies or incorporation of a new stakeholder into the architecture, or the modification or addition of a project.

YVCOG will review and accept the proposed changes. While reviewing the proposed change, they should coordinate with any of the other agencies that may be impacted by the modification. This communication between agencies will simplify the process of performing a complete plan update.

When a complete update is performed by YVCOG, all of the documented changes will be incorporated into the regional ITS architecture. The most significant portions of the architecture will be maintained through updates in the electronic database using Turbo Architecture™. Also, the following documents would be updated at regular intervals on an as needed basis:

- Project Sequencing.
- Operational Concept.
- Functional Requirements; and
- List of Agency Agreements.

YVCOG is committed to updating the architecture every four years to support the TIP process and ensuring that they receive all necessary documentation.

Yakima Valley Regional ITS Architecture Architecture Maintenance Form

YVCOG periodically reviews the Regional ITS Architecture (Current Version - December 2021) for potential updates, changes and additions. If you have a request to add an element or modify an existing element in the Yakima Valley Regional ITS Architecture, please complete the questionnaire and submit to YVCOG for review and consideration.

Please use this form to:

- Submit a request for element update or change
- Submit a request for a new element or service package
- Modify or add a project to the Architecture

Agency Name	
Agency Contact Person	
Street Address	
City	
Telephone	
Fax	
E-mail	

1. Requested Changes and Modifications to the Yakima Valley Regional ITS Architecture:

A. Please indicate the type of change:

- ☐ New Service package (please describe or attach sketch if possible)
☐ Modification to an existing service package (please attach marked up Service package)
☐ Change status or connection of an information flow (please attach marked up Service package)
☐ New or modified project
☐ Other: _____

B. Please identify [☒] the category for the proposed modification.

	Category 1	Basic changes that do not affect the structure of the architecture. <i>Examples: Changes to stakeholder or element name, element status, or data flow status.</i>
	Category 2	Structural changes that impact only one agency. <i>Examples: Addition of a new service package or modifications to an existing service package that affects only one agency.</i>
	Category 3	Structural changes with potential to impact multiple agencies. <i>Examples: Addition of a new service package or modifications to an existing service package that involves multiple agencies or incorporation of a new stakeholder into the architecture, or the modification or addition of a project.</i>

C. Please indicate the reason for the change:

- ☐ New stakeholder
☐ New project/element(s)
☐ Status update (future to planned, or planned to existing)

D. Service Package(s) Impacted

Describe requested change	
Have you coordinated with any other stakeholders on this change? If so, who?	
Are there any additional stakeholders that could be affected by this change?	

E. Requested Changes and Modifications:

- ☐ Change status or timeframe of a project
(Please include a description of the requested changes)
☐ Project Addition

Time Frame	
Name of Project	
Description	
Lead Agency	
Anticipated Project Costs (if known)	
Service Packages associated with this project	

Submitting a request for a project on this Architecture Maintenance Form does not guarantee that the project will be included in the Statewide ITS Architecture, nor does it serve as a formal request for funding.

Please submit change forms to:

Alan Adolf
 Transportation Program Manager
 Yakima Valley Conference of Governments
 509-759-7981
Alan.adolf@yvcog.org

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