SCOG
Skagit Council of Governments

Skagit Intelligent Transportation Systems Architecture

Adopted by the Transportation Policy Board on DATE

CONTENTS

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Cover photograph courtesy of Andy Porter Photography.

Executive Summary

Skagit Council of Governments is responsible for creating and maintaining the Intelligent Transportation Systems (ITS) architecture for Skagit County. The ITS was last updated in 2011. Since that time, the boundary of the Metropolitan Planning Area (MPA) has expanded to include all of Skagit County. This update to the ITS architecture includes updated geography, stakeholders and updates to include new technology to be consistent with the Architecture Reference for Cooperative and Intelligent Technology (ARC-IT) version 9.2.

ARC-IT groups together technology to achieve transportation objectives into what is called "service packages." These service packages represent slices of the architecture and address different planning objectives such as traffic management, emergency response, traveler information and personal mobility, vehicle safety, weather, public safety and public transportation. There are over 150 different service packages as part of ARC-IT 9.2. ARC-IT is a reference architecture; it provides a way for planners and engineers with different concerns to design systems with a common language. Using this language, this plan updates the existing and planned service packages and ties it together to present a big picture view of the architecture. Components of the ITS architecture are determined by Title 23 (Highways) Chapter I, Sub-chapter K, part 940 of the United States Code of Federal Regulations (CFR).

The plan and ARC-IT service packages only consider technology that is used in the public sector that is connected. The plan does not include private technology or technology that public institutions use that is not connected. The architecture is developed to better understand how these technologies connect and to help plan for future connections by envisioning what the region will need in the future.

The timeframe for this ITS architecture update and future project list is 25 years so that it is aligned with the 2050 regional transportation plan (RTP). This longer timeframe will require regular updates with the RTP at five-year intervals so that new technology and changes to ARC-IT service packages are made so that it is aligned with current technology.

The Washington State Department of Transportation (WSDOT) owns, maintains and is responsible for a majority of the region's ITS components, including ITS system elements (fiber, CCTV cameras, data stations, etc.) on Interstate 5 and State Route 20, which run through multiple jurisdictions in Skagit County. WSDOT also collects Road Weather Information System (RWIS) and operates the Traffic Management Center (TMC) in Shoreline. WSDOT has maintenance and operations agreements for signals in multiple jurisdictions in Skagit County. Other key ITS stakeholders are Skagit Transit, Skagit911 and Skagit County Department of Emergency Management and the cities of Skagit County.

This update of the ITS architecture includes ITS components that are currently deployed in Skagit County, with an inventory of the ITS elements as well as an inventory of the ARC-IT

service packages that are deployed or partially deployed. The planning process included reaching out to various stakeholders in the region and discussing regional planning needs related to ITS services to evaluate short-term, intermediate and long-term ITS projects that support regional transportation goals.

As part of this plan, the ITS architecture defines what standards are currently being used and suggests relevant national standards, to better align technology. This plan will list standards and equipment that share data as well as some systems that do not share data but work together to achieve regional planning goals. The architecture includes a list of data-sharing agreements within the region, to illustrate how agencies work together to operate and maintain ITS systems.

This document 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 is in alignment with the regional transportation plan. The Regional Architecture for Intelligent Transportation (RAD-IT) Version 9.3 was used to compile the ITS components in its database. In addition to this plan, a RAD-IT file with the ITS components in the database is available on request.

INTRODUCTION

The purpose of this plan is to create a shared vision between stakeholders of how technology can improve our regional transportation system, contribute to meeting regional transportation goals, and the steps needed to implement the technology.

- ITS systems use technology to improve the functionality, safety and cost-effectiveness of transportation systems. As technology advances and congestion increases with population growth, technology can play an increasing role in building a more efficient and effective transportation system.

- ITS projects provide ways to implement efficient and effective solutions to the transportation system through operation and management, rather than expansion of capacity. Increasing capacity of our road system is expensive and often creates induced demand.

- ITS provides a way to add efficiency to the transportation system, reducing congestion and therefore, accommodating continued growth.

This architecture serves as a plan to illustrate the ITS systems that are currently operational in Skagit County. It will illustrate which systems are planned in the future and how they can better connect and coordinate with other regional partners.

Stakeholders

The stakeholders for the ITS planning process are those public entities that use or have systems that would be affected by ITS projects. The private sector was not included in the list of stakeholders because this plan does not include private sector projects, and therefore, that is beyond the scope of this plan. This plan also does not consider public technology that does not require connections to other providers as part of its function. The purpose of the plan is to plan for future data connections, so no planning is needed for technology services that do not connect. Appendix B of this plan details the public involvement that was done with these stakeholders.

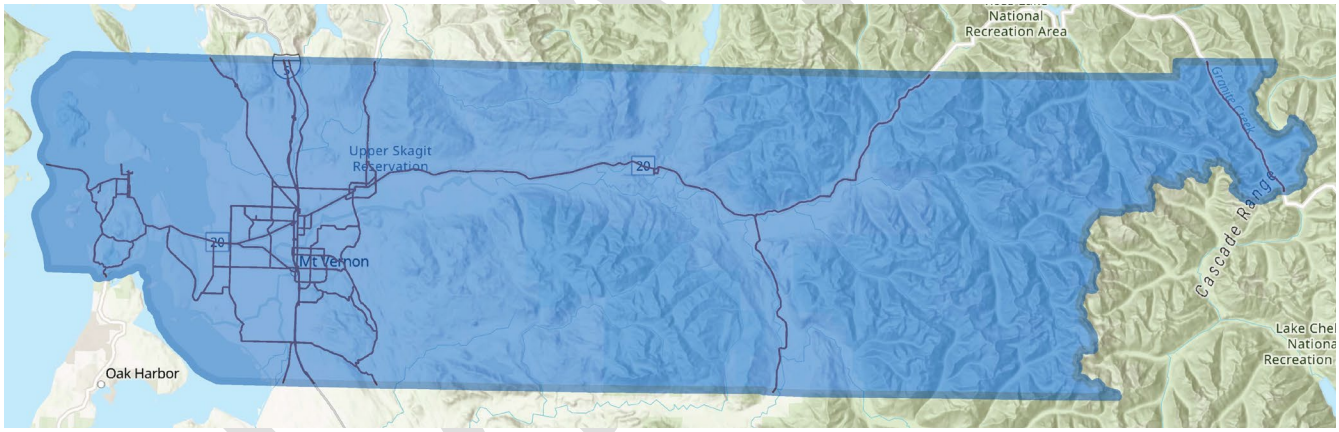
- Burlington Northern Santa Fe (BNSF)
- City of Anacortes
- City of Burlington
- Town of La Conner
- City of Mount Vernon
- City of Sedro-Woolley
- City of Lyman
- City of Hamilton
- City of Concrete
- Port of Skagit
- Port of Anacortes
- Skagit Council of Governments
- Skagit County Department of Public Works
- Skagit Transit- Skagit Public Transit Agency
- Skagit County Department of Emergency Management
- Samish Indian Nation
- Sauk-Suiattle Indian Tribe
- Swinomish Indian Tribal Community
- Upper Skagit Indian Tribe
- Washington State Ferries
- Washington State Department of Transportation (WSDOT)
- Whatcom Transportation Authority-(Transit)
- WA State Emergency Management Division

Architecture Scope

The ITS architecture includes all ITS projects within the boundaries of the jurisdictions included in Skagit's MPA. Skagit's MPA includes all of Skagit County. Skagit County is bordered to the north by Whatcom County, to the west by Island and San Juan Counties, to the south by Snohomish County, and to the east by Okanogan and Chelan counties. The population of Skagit County is approximately 131,000 and the region is served by one interstate (Interstate 5) and multiple state routes. Skagit County is also a hub for the Washington State Ferries (WSF) system, with services to the San Juan Islands and the mainland through WSF's facility at Anacortes.

The scope of the architecture only includes public agencies that have transportation related ITS systems that are connected. Private technology and technology that does not connect or that is not used for the transportation system are not included in the scope of this plan.

Exhibit A – Scope of ITS Architecture



Operational Concept / Roles and Responsibilities

Operational Concept WSDOT

WSDOT is responsible for operating and maintaining all ITS systems along Interstate 5, the State Routes in Skagit County and Washington State, and their Associated Advanced Traveler Information systems (ATIS). Additionally, because Skagit County is rural, cities contract with WSDOT for ITS related services.

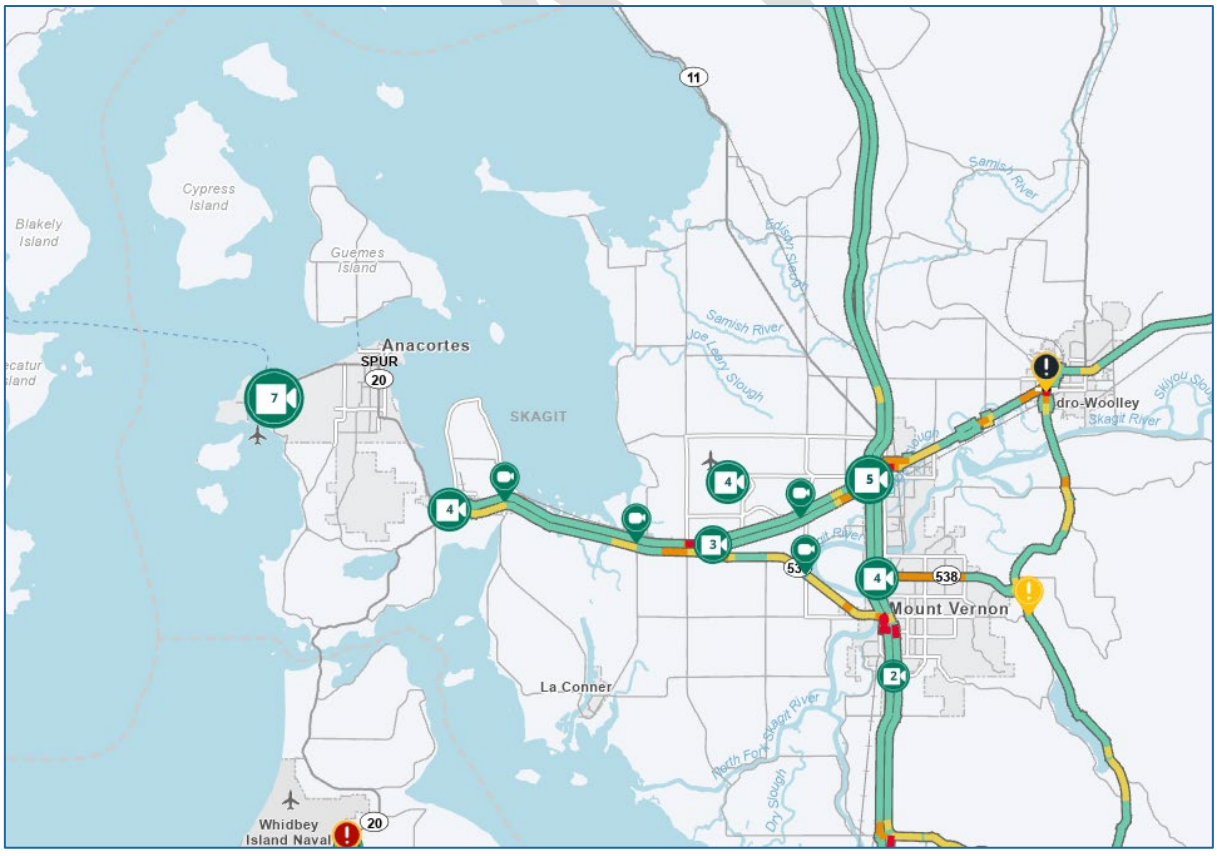
Existing Roles and Responsibilities:

- WSDOT has operations and maintenance agreements with the City of Anacortes, the City of Burlington, the City of Mount Vernon and unincorporated Skagit County. Sedro-Woolley's traffic lights are located on State highways, so no agreement is needed, but WSDOT operates and maintains their signals.
- Operate traffic management systems along I-5, SR20, SR9, SR11, SR530, and SR534.
- Coordinate all advanced traffic management data through the Traffic Management Center (TMC) in Shoreline.
- Shoreline TMC functions include monitoring traffic, identifying and providing travelers with information on roadway incidents using cameras located on the highways (I-5, SR20, SR536 and SR538). Shoreline TMC uses data from traffic detectors on the highway to observe traffic conditions for real-time data.
- Shoreline TMC coordinates the response of WSDOT's Incident Response Team.
- Shoreline TMC coordinates responses with Washington State Patrol (WSP) and other law enforcement and emergency response crews when responding to incidents.
- Share information with WSP and Washington Fire Chiefs per 2024 JOPS agreement.
- Shoreline TMC coordinates with Public Information Officers (PIO's) to provide up-to-the-minute information about what is happening on the highway system, including weather conditions, travel alerts, and travel times.
- Maintain the Road Weather Information Systems (RWIS) currently in place.
- WSDOT's RWIS monitors local roadway and weather condition information and alerts public sector agencies and the traveling public about inclement weather conditions. The full menu of sensors that can be deployed by a RWIS station can allow for real-time measurement of temperature and pavement conditions. There are about a dozen different RWIS locations currently in Skagit County operated by WSDOT.
- Traffic flow data collection and measurement is done by WSDOT along I-5 and SR20. Traffic flow metrices and information are measured through WSDOT automated traffic counters. These devices typically utilize induction loop detectors, which are installed directly into the pavement. This data is then made available

through WSDOT's Traffic Count Database System (TCDS), and includes hourly or sub-hourly vehicle volume, classification, speed and weight data. The online TCDS provides daily, hourly, and 15-minute data collected at each location.

- Traffic monitoring is done by the Shoreline TMC by maintaining Closed-Circuit Television Cameras (CCTV) to provide visual coverage of roadways. In Skagit these are strategically placed on high volume corridors and near locations with high concentrations of collisions that require incident management and response. CCTV are located on I-5, SR20 and SR536 and at the Anacortes Ferry terminal.
- WSDOT uses Highway Advisory Radio (HAR) devices to communicate with the traveling public. These devices are used to inform drivers to tune into a radio station to hear important travel advisory messages.
- WSDOT uses modular communications hubs (HUB) to support communications system operations. There is a mini-HUB utilizing cabinet near I-5 and SR20. This mini-HUB is connected to the WSDOT Burlington office through fiber.

WSDOT Webpage with CCTV Camera Locations and Traffic Monitoring Information



WSDOT Future roles and Responsibilities:

- Add more CCTV locations to increase traffic monitoring and better incident response.
- Add additional weather sensor data components along select routes in Skagit County to add to the RWIS system.
- Install additional ITS components (including but not limited to fiber, detection, cameras, ramp meters, and coordinated signals) on State Routes and I-5.
- Increase the redundancy of internet capabilities in Skagit County and install fiber along I-5 to allow for more ITS projects like ramp metering on I-5. Install additional ITS components (including but not limited to fiber, detection, variable message signs (VMS), cameras, integrated signals, HAR, RWIS, and ramp meters) on I-5 throughout Skagit County.
- Add the capability for VMS to provide drivers with crucial travel information in real time. This would allow for future service packages such as variable speed limits, queue warnings, and real-time roadway hazard warnings.
- Future ITS projects would require more real-time traffic information whether through increasing loop detectors or adding data from connected vehicles. Long-term ITS projects for safety, such as Queue Warnings and Variable Speed Limits, require real-time and connected vehicle data.
- Replace mini–Modular Communications Hubs (HUB) with full sized HUBS containing all necessary support equipment for communications operations at the SR532 and SR20 interchanges.
- Share in I-5 corridor planning to reduce congestion, including ramp metering and variable speed limits.
- Coordinate with Bellingham TMC for regional traffic management. This is a long-term project that will be needed when there are VMS in the I-5 corridor that would allow for driver warnings of congestion or hazards in Whatcom County.
- Deploy dynamic roadway warnings for fog, heavy rain or other severe weather conditions and other hazards like large animals on the roadway on parts of SR20 where this is a safety concern.
- Offer traffic signal prioritization to Skagit Transit through Shoreline TMC.
- Allow signal prioritization for freight to ease congestion and add safety through Shoreline TMC.

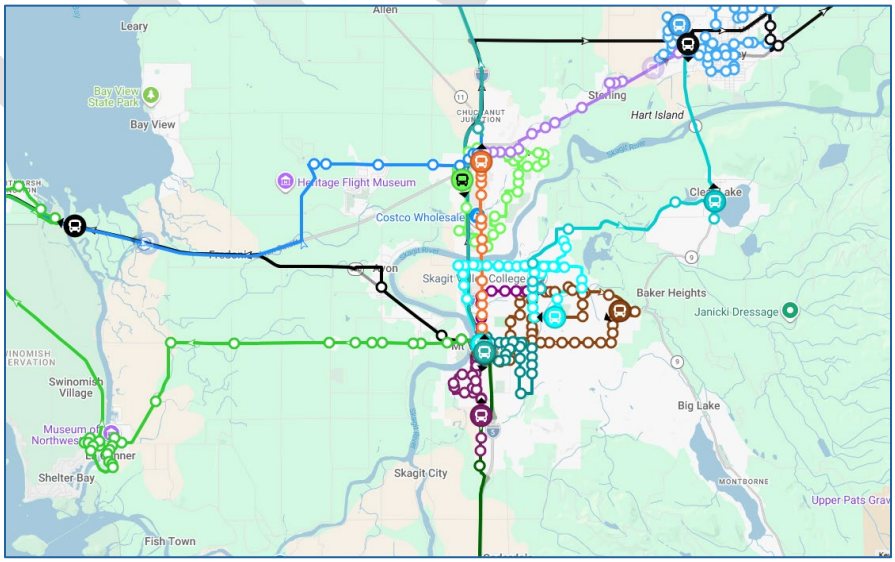
Operational Concept Skagit Transit

Skagit Transit operates public transportation systems which serve Skagit County, and some routes outside of the MPA that serve Whatcom County and Snohomish County.

Existing Roles and Responsibilities:

- Maintain Advanced Vehicle Location systems (AVL) for all transit vehicles.
- Maintain camera systems on all vehicles and at some Park and Ride locations.
- Use monitoring systems for safety at the Skagit Station, South Mount Vernon Park and Ride, Chuckanut Park and Ride, Sedro-Woolley Park and Ride, and March Point Park and Ride.
- Park and Ride kiosks have 15" monitors with real-time information on location of buses at Skagit Station, Chuckanut Park and Ride, Sedro-Woolley Park and Ride, and March Point Park and Ride.
- On demand transit services are available for paratransit using Trapeese Trip Smart with NOVUS software, and Skagit Transit is investigating software solutions that will optimize paratransit.
- Electronic ticketing is done with GFI and Card/App with UMO; currently expanding its contract with UMO to implement open payment capabilities, under this system users will have "wallets", tap to pay, or cash on coaches equipped with GFI systems as well as card and app-based transactions.
- Traveler trip planning is available on the website with real-time information.

Skagit Transit Real Time Information for location of Buses on Routes (AVL)



Future Roles and Responsibilities:

- Get on same bandwidth (800 MHz) with Skagit 911 and Skagit County DEM.
- Explore software capabilities that implement dynamic real-time manifests on vehicles to enhance efficiency for paratransit and micro transit.
- Extend Park and Ride Kiosk System with real-time information on bus times to Alger and South Mount Vernon Park and Ride locations.
- Implement a smart park and ride system that can let travelers know in advance how much parking is available at Park and Ride locations. This would complement plans to implement pay to park model for riders who are leaving their cars for longer trips.
- Coordinate trip planning and information with WA State Ferries, Whatcom Transit Authority, and other regional agencies.
- Develop transit signal priority system with local jurisdictions depending on where congestion hinders on-time performance.
- Add transit stop request, which would allow a transit passenger to send a stop request to an approaching transit vehicle with a personal device.
- Add route ID services for the visually impaired. Skagit Transit would have to prioritize which bus stops to include and install Wi-Fi at those locations (solar panels needed).
- Add transit connection protection services; this technology allows travelers to initiate a request for connection protection anytime during the trip using a personal device or on-board equipment.
- Add technology for personalized traveler information that can span multiple modes to include walking routes or other public transportation and real-time traffic information.
- Integrating Multi-Modal Payment Capability (IMMEP) service package would allow for payment of multiple modes and agencies with a single account. This allows the rider a seamless trip with multiple modes and agencies.

Operational Concept City of Anacortes

Existing Roles and Responsibilities:

- Contract with WSDOT for signal operations and maintenance. For future signal ITS projects like freight or signal priority, use Shoreline Dayton TMC as the center.

Future Roles and Responsibilities:

- Work with Skagit Transit, WSDOT and Shoreline TMC to give signal priority to transit vehicles.
- Work with WSDOT to implement signal prioritization for freight during ferry traffic on Oaks Ave and Commercial.
- Work with WSDOT on more CCTV locations and more loop detectors to help identify congestion on SR20 to better notify the public of incidents and traffic congestion.

Operational Concept City of Mount Vernon

The City of Mount Vernon owns 33 traffic signals, including a Hawk crosswalk signal on College Way.

Existing roles and responsibilities:

- Contract with WSDOT for signal maintenance and operations. For future ITS services such as freight or bus priority for signals, or traffic metering use Shoreline Dayton TMC as the center.

Future roles and responsibilities:

- Share information and control of cameras (CCTV), VMS, or other information sharing devices such as loop detectors to help with congestion by providing real-time information.
- Collaborate with I-5 corridor planning to reduce congestion in conjunction with WSDOT, including ramp metering and variable speed limits.
- Work with WSDOT on queue warning on I-5 for safety and traffic management.
- Work with WSDOT to collect more real-time traffic data on I-5 through connected vehicles or in other ways to provide data for Queue Warning and Variable Speed Limits service packages.
- Work with WSDOT on dynamic roadway warning for weather conditions and other traffic conditions as part of I-5 and Hwy 20 corridor planning.
- Offer traffic signal prioritization to Skagit Transit through Shoreline TMC.
- Work with WSDOT to implement prioritization for freight signals to ease congestion and increase safety.
- Work with WSDOT on regional traffic management to better coordinate congestion and incidents that affect traffic regionally.

Operational Concept City of Sedro-Woolley

Existing roles and responsibilities

- The traffic signals in Sedro-Woolley are owned and operated by WSDOT because they are on state routes. If signal operations for freight priority or signal priority are implemented, use Shoreline Dayton TMC as the center.

Future roles and responsibilities

- Work with WSDOT to increase CCTV coverage on SR20, development of VMS signs on SR20, data collection via loop detectors on SR20 or data collection from connected vehicles if available.

- Offer traffic signal prioritization to Skagit Transit through the Shoreline TMC.
- Work with WSDOT to implement signal prioritization for freight through Shoreline TMC to assist with congestion reduction and safety.

Operational Concept City of Burlington

Existing Roles and Responsibilities:

- Contract with WSDOT for signal operations and maintenance. If signals require connection for future ITS applications use Shoreline Dayton TMC as the center.

Future roles and responsibilities:

- Share control with WSDOT CCTV cameras, VMS, or other information devices like loop detectors to reduce congestion and provide better safety and accident alerts by giving drivers more real-time information.
- Collaborate with WSDOT in I-5 corridor planning to reduce congestion in conjunction with ramp metering and variable speed limits.
- Work with WSDOT to collect more real-time traffic data to support services like Queue Warnings and variable speed limits.
- Work with WSDOT on dynamic roadway warning for weather conditions like fog or extreme weather conditions.
- Give Skagit Transit signal prioritization through Shoreline TMC.
- Give signal prioritization to freight at key intersections through Shoreline TMC.
- Implement regional traffic management to better coordinate traffic congestion and incidents regionally on I-5 and State Routes.

Operational Concept Skagit County

Existing Roles and Responsibilities:

- Contract with WSDOT for signal operations and maintenance.

Future Roles and Responsibilities:

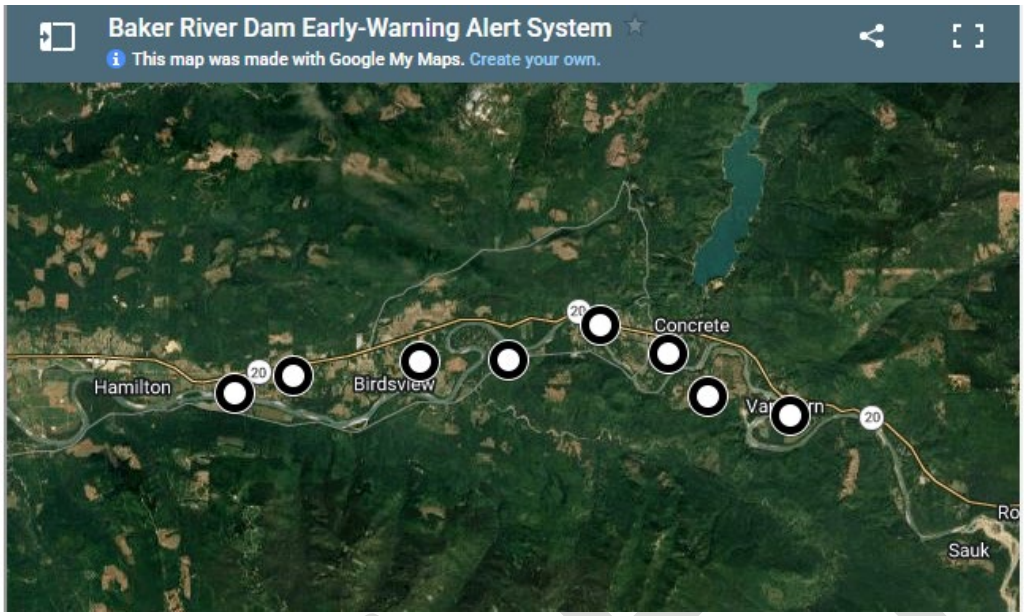
- Work with WSDOT to share control of CCTV and VMS to increase safety.
- Collaborate with WSDOT on I-5 corridor planning to reduce congestion in conjunction with ramp metering and variable speed limits.
- Collaborate with WSDOT on Queue Warning on I-5 for safety and traffic management.
- Work with WSDOT to implement signal prioritization for freight through Shoreline TMC.
- Work with WSDOT to identify locations on SR20 where dynamic roadway warning could be used to warn of wildlife on the highway and increase safety.

Operational Concept Skagit 911 and Emergency Management

Existing Roles and Responsibilities:

- Emergency call taking and dispatching.
- Opticom is used on all signals for emergency signal preemption, except for signals with crosswalks.
- Automatic crash notification is given to Skagit 911 from connected vehicles.
- Incident pre-arrival staging guidance is partially existing, which allows real-time navigation and information about the accident, implemented through Fire Districts that have the technology.
- Skagit Ready is an alert system deployed by Skagit County DEM. The user is required to sign up and is encouraged to upload a safety profile that can be shared with 911.
- The Integrated Public Alert and Warning Systems (IPAWS) is a federal alert system that does not require sign up for notification.
- City of Anacortes does alerts with Civic Ready, which can geographically sort alerts.
- Skagit County DEM uses Rave software, which allows alerts to be geographically sorted.
- Skagit County has an early warning system (wide area alert) managed by WA EMD as part of the Tsunami network. This has 9 sirens along the coast including the Bow/Edison area, Samish Island, multiple alarms on Fidalgo Island and an alarm at Padilla Bay near the Swinomish Chanel, and two alarms in the Shelter Bay/La Conner area, a map of these sirens is located here.
- PSE has sirens from Concrete to Birdsview for dam alerts (8 total).
- The Anacortes Refinery has a siren located at its facility.
- Skagit County DEM acquired a Mobile Information Technology Resilience Unit (MITRU) to protect communication vulnerabilities in a disaster. A MITRU can be transported to any location needed. If there is a failure of a communication network in a disaster, this unit can be deployed to that location. The MITRU has Starlink capability to provide Wi-Fi and it has the capacity for two bands- one public and one that can be limited to emergency responders. DEM is working on a "mini" version that fits in a wheeled case to be more portable. The trailer has large rechargeable batteries and a solar panel to be more reliable in remote areas.

Early Warning Alert Siren System-East County Locations



Future Roles and Responsibilities:

- Add sirens in Anacortes, Hamilton, Cape Horn and Marblemount as part of wide area alerts and PSE dam warning siren system.
- Increase adoption of pre-arrival instructions for emergency responders.
- Add capability for incident scene monitoring to provide better safety for emergency responders. This is technology that would give warnings and alerts related to the incident to drivers to warn them. This also allows the TMC to respond to incidents by closing lanes or slowing traffic with variable speed limits.
- Add more capability for disaster traveler information to assist in evacuation and reentry and operation of the transportation system in a disaster, using VMS and the Shoreline Dayton TMC.
- According to Skagit 911, there is a need for better interoperability during an emergency with radios; different agencies do not have their neighboring agencies frequency programmed into their radios. Make sure that emergency responders have multi-band radios, with neighboring jurisdictions frequency programmed in.

Inventory of ITS Systems

The ITS systems in Skagit County are broken out into the ARC-IT components of centers, field devices, vehicles, and personal devices and summarized in this section. A more detailed inventory of existing and planned ITS elements can be found in Appendix F.

Centers

A center is defined by ARC-IT as an entity that provides application, management, administrative, and support functions for ITS services from a fixed location not in proximity to the road network. The different centers discussed in this plan are the physical locations and organizations where the data support and administrative functions for the ITS services are accomplished. The center is a hub that provides vital links to accomplishing ITS functions.

Shoreline Dayton TMC (WSDOT)

WSDOT operates the Shoreline Dayton TMC. This TMC is operational 24 hours a day, every day to monitor traffic and direct and support incident response. TMC's are a critical component of coordinated response to accidents and emergencies. The Shoreline TMC monitors traffic and identifies problems using CCTV. They use data from traffic detectors to observe traffic conditions in real time. They coordinate with WSDOT incident response teams, the Washington State Patrol and other law enforcement and emergency response. They provide up-to-the-minute information about what is happening on the highway system, including weather conditions, travel alerts and travel times. They are the communication hub that provides Amber/Silver alerts to the ITS communications systems.

The Shoreline TMC is the center for the following elements and RWIS and Wide Area Alerts.

Traffic Signals	Road Monitoring
Anacortes	I-5
Burlington	SR20
Mount Vernon	SR9, SR536
Sedro-Woolley	SR534
Skagit County	SR583, SR536

Skagit Transit – Transit Management Center Elements: Skagit Transit owns and operates ITS systems for its transit fleet and at the Stations and information kiosks. Their technology department manages and maintains the following elements:

- Transit data
- Performance monitoring,
- Fixed and dynamic route operations
- Automatic vehicle location (AVL) on all vehicles except service vehicles
- Transit security systems- these feeds go to Skagit Transit Staff who then report incidents
- Passenger Counting
- Electronic Ticketing
- Traveler Information and Trip Planning

Skagit 911 – Emergency Management Center Elements

- Emergency call taking and dispatching
- Emergency response
- Emergency vehicle preemption
- Incident management center
- HAZMAT emergency notification to Skagit County DEM or any other agency that requires a response

Field Devices

Roadway Equipment	Security Monitoring Equipment	Weather Detection Equipment	VMS	Skagit Transit Vehicles	Emergency Vehicles
Traffic Signals	Cameras Skagit Station	RWIS at a dozen locations	WSDOT Anacortes Ferry Terminal	Wi Fi Access	GPS location on some equipped with MTD's
Loop detectors	Cameras Park and Ride			Security Cameras	Vehicle status tracked with Computer Aided Dispatch System
Weather data collection				Electronic Counting and Payment System	Communication through radios in vehicles
Opticom				AVL	
Connected Vehicle					

Support

This category of ITS equipment includes software solutions, data solutions, communication systems and other elements needed to connect field equipment with TMC, vehicles and users.

Transit Performance Measurement- Skagit Transit maintains transit data to help measure performance and evaluate changes needed in operations, technology and services.

Wide-Area Information Dissemination System- Puget Sound Energy manages a wide area alert siren system to provide early warning of dam failure. Washington State Emergency Management Division WA EMD manages a Tsunami alert system along Skagit's coastal areas.

Mobile Information Technology Resilience Unit – Skagit County purchased a mobile information technology resilience unit (MITRU). This unit is an emergency communications trailer that is equipped with advanced communication technologies that enable effective primary and redundant means of communication among emergency responders, government agencies, and the public during disasters or emergencies. This unit is deployable to all Skagit County municipalities and preparedness response partners.

Personal Objects

This ITS component includes physical objects or systems that convey information to individual travelers either through personal devices such as smart phones, connected vehicle systems, area alert systems, or between employers and personnel.

Skagit Transit Traveler Information: Personalized route guidance with real-time information on bus arrival is available through trip planning available on personal devices.

Washington State Department of Transportation Traveler Information: Traffic information, weather information, travel alerts and amber/silver alerts are on personal devices.

Skagit County Department of Emergency Management: Personalized alerts are available from Skagit County DEM through Skagit Ready. The alerts are geographically sorted to only go to relevant residents on their personal devices or whatever form of communication they have chosen. Users must sign up for this service to receive the alerts.

City of Anacortes Emergency Management: Personalized alerts are available from the City of Anacortes using Civic Ready software. The alerts are geographically sorted to only broadcast relevant warnings via cell phone or email depending on the notification system the user signs up for.

Swinomish Indian Tribal Community Emergency Management: Currently researching using Civic Ready or similar software to provide emergency alerts.

REGIONAL ITS SERVICES- INVENTORY OF ITS SYSTEMS

Categories of ITS systems, solutions and/or equipment deployed together for a purpose are called service packages by ARC IT 9.2. This provides national standards and protocols for providing different ITS services. This inventory will list what ITS services are provided and which "service package" in ARC IT 9.2 those services fit into.

ARC-IT 9.2 identifies twelve major categories of ITS systems with over 150 different individual service packages within those twelve categories.

Of those twelve categories of ITS systems in ARC IT 9.2 eight of them have existing or planned ITS services in this plan. The categories of ITS services that have ITS components deployed or planned are:

- **Commercial Vehicle Operations**,
  - One planned ITS package of ITS services.
- **Parking Management**,
  - One planned ITS package of ITS services.
- **Public Safety**,
  - Eight existing ITS packages of ITS services and two planned ITS packages of ITS services.
- **Public Transportation**,
  - Seven existing ITS packages of services and four planned ITS packages of services.
- **Traveler Information and Personal Mobility**,
  - Two existing packages of ITS services and three planned packages of ITS services.
- **Traffic Management,**
  - Four existing packages of ITS services and five planned packages of ITS services.
- **Vehicle Safety,**
  - Two planned packages of ITS services.
- **Weather,**
  - One existing package of ITS services.

The existing and planned service packages for each of these categories will be discussed in detail. Some of the ITS packages of services in ARC IT 9.2 are partially implemented or planned so the status of the implementation will be discussed as well as the description of the local implementation of these ITS services.

COMMERCIAL VEHICLE OPERATIONS

There is one planned commercial vehicle operations service package CV006 Freight Signal Priority. This is a grouping of ITS systems and components that relate to commercial vehicle operations.

CV006 Freight Signal Priority Service Package		
Status	**Regional Planning Goal**	**Stakeholders**
Planned	• Included as part of adaptive signal priorities in I-5 Study, • Congestion reduction • Safety	WSDOT, Sedro-Woolley, Burlington, Mount Vernon, Anacortes
Local Implementation: The purpose of this service package is to give signal priority from the TMC to freight. Benefits are: • Reduction of congestion at freeway intersections. • Increased safety at intersections where implemented. This service package could be used on Highway 20 to allow a better flow of freight traffic through the towns of Sedro-Woolley and Burlington. It also could be used in Anacortes along Highway 20 for freight traffic that is going to the Ferry. This would require working with WSDOT and Shoreline TMC to give priority to freight traffic through ITS Roadway Signal Controls. This could be used in conjunction with freeway ramp metering to have better traffic flow on State Highways and I-5. It was listed as a strategy in the WSDOT I-5 study. It is an intermediate project as it requires high speed internet for connection to TMC and would make sense to consider doing it parallel with other ITS strategies like ramp metering.		

Parking Management

There is one planned parking management package of ITS services: PM02 Smart Park and Ride Systems. This is a grouping of ITS systems and solutions that relate to parking management.

PM02 Smart Park and Ride System		
Status	**Regional Planning Goal**	**Stakeholders**
Planned A lack of parking at Skagit Station and plans to go to park and pay make this location a good candidate for implementation	• Reduce congestion, • Enhance integration and connectivity, • Improve efficiency of transportation systems by increasing transit use	Skagit Transit, Mount Vernon (Skagit Station), Sedro-Woolley Park and Ride (Sedro-Woolley), March Point (Anacortes), Alger Park and Ride (Bellingham), Chuckanut Park and Ride (Burlington), Cook Road Park and Ride (Burlington)
Local Implementation: This service package offers real-time information about parking capacity at Park and Ride locations, which helps drivers understand if a lot is full and they need to find an alternative park and ride. Currently real-time locations of buses allow transit users to understand if the bus is on time, but as the population grows, drivers also will want to know if there is parking capacity in real-time to understand which Park and Ride to use. This is an intermediate term project as Skagit Transit plans to implement a pay-to-park model for Skagit Station users who are leaving their car overnight or for long-term. Having this system in place would be complementary to the pay to park system when developed.		

PUBLIC SAFETY

There are eight existing or partially existing packages of ITS services related to public safety and two planned packages of ITS services related to public safety. This is a grouping of ITS solutions that relate to public safety.

PS01 Emergency Call Taking and Dispatch Service Package		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Reduce fatalities and injuries • Improve security, • Reduce congestion, • Enhance integration and connectivity, • Improve efficiency, and improve response time to accidents and emergencies	Skagit 911, WSP, Emergency Responders, WSDOT TMC (depending on emergency)
Local Implementation: Skagit 911 is the emergency management center which handles the management of public safety call taking and dispatch services and coordinates emergency response among various agencies.		

PS02 Emergency Response Service Package		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Reduce fatalities and injuries, • Improve security, • Enhance integration and improve efficiency and response times	Skagit 911, Law Enforcement, Medical Responders, Fire Departments, DEM
Local Implementation: Skagit 911 provides emergency response information about an incident to law enforcement, fire departments and emergency response personnel. This includes information about the incident and if required Skagit 911 will contact Skagit County DEM to respond to HAZMAT or other incidents that may require incident commands to coordinate multiple agencies to response. Skagit DEM has a line open with Skagit 911 that has 24/7 monitoring.		

PS03 Emergency Vehicle Preemption Service Package		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Reduce fatalities and injuries, • Improve response times for emergency medical personnel to an accident, • Improve efficiency and safety for non-emergency vehicles.	Skagit 911, Emergency Vehicles that respond to accidents
Local Implementation: Signal preemption in Skagit County for emergency vehicles is done through Opticom. All signals in Skagit County except for a pedestrian crossing in Mount Vernon have Opticom for emergency vehicle preemption.		

PS04 Mayday Notification Service Package		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Reduce fatalities and injuries. • Improve response times to accidents	Skagit 911, Law Enforcement
Local Implementation: Skagit 911 and law enforcement receive connected vehicle information and can coordinate a response to incidents. This allows for response to remote accidents that may not be noticed and called in by bystanders and faster response times.		

PS05 Vehicle Emergency Response		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Reduce fatalities and injuries. • Improve security and safety	Skagit 911, Law Enforcement, Fire, DEM
Local Implementation: Skagit 911 will determine if an incident requires HAZMAT or Skagit DEM response. Skagit DEM has an emergency line open 24/7 and coordinates a response with other agencies if needed, for any HAZMAT incident.		

PS06 Incident Scene Pre-Arrival Staging Guidance Service Package		
Status	**Regional Planning Goal**	**Stakeholders**
Partially Existing – Planned Expansion	• Reduce fatalities, • Injuries, • Improve security, • Enhance integration, connectivity.	Skagit 911, Law Enforcement, Fire Department, Emergency Medical Professionals, Skagit County DEM
Local Implementation: Active 911 is an application on a smart phone that allows real time navigation to an accident location for emergency responders. This means they can avoid traffic congestion or other accidents that may delay response. This gives the person with the smart phone application a map and route to the call and computer aided dispatch. Skagit County has Active 911 for HAZMAT incidents. Not all emergency response districts have Active 911.		

PS07 Incident Scene Safety Monitoring Service Package		
Status	**Regional Planning Goal**	**Stakeholders**
Planned	• Reduce fatalities and injuries, • Improve security, • Enhance integration and connectivity, • Improve efficiency.	Law Enforcement, Emergency Medical Response Teams, Fire, Emergency Management
Local Implementation: This is a planned service package that would use communication technologies to provide warnings and alerts relating to incident zone operations to both the emergency responders and to the vehicle approaching the incident zone. This provides safety to both the emergency responder and to the driver who may be unaware of an approaching incident. This service would provide an in-vehicle messaging of incidents to drivers to warn them that they are approaching an incident scene. It also alerts emergency personnel if a driver enters the safety zone, which gives them warning that a vehicle is not aware of the perimeter and to take caution.		

PS11 Early Warning System		
Status	**Regional Planning Goal**	**Stakeholders**
Existing with planned expansion	• Reduce fatalities from emergencies that have a lead time that allows for evacuation	Skagit County DEM, Puget Sound Energy PSE, State Emergency Operations Center (SEOC)
Local Implementation: Skagit County's early warning system is managed by WA EMD as part of the tsunami network. Puget Sound Energy has sirens from Concrete to Birdsview (8 total). For Tsunami sirens, there are 3 on Fidalgo Island, 1 in Padilla Bay area, and 1 north of Edison on Highway11. Planned projects are to add sirens at the Port of Anacortes, Hamilton, Cape Horn and Marblemount. The Anacortes refinery has a siren system.		

PS10 Wide Area Alert		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Reduce fatalities, and injuries, • Improve security, • Reduce congestion, • Enhance integration and connectivity, improve efficiency	WSDOT Shoreline TMC, State Emergency Operations Center (SEOC), Skagit County DEM
Local Implementation: WSDOT provides emergency information to personal devices and on their website, this is done through Shoreline TMC, and the State provides a reverse 911. The Alert and Warning Center (AWC) are a function of the SEOC which provides 24-hour, 7 days a week coverage for notifications, alerts and warnings of emergency events and incidents affecting Washington State. Wide area alerts are distributed locally by different agencies. Skagit County has a Skagit Ready alert notification system. Integrated Public Alert and Warning System (IPAWS) is a federal alert system that doesn't require registration to push alerts. Other alerts provided are weather emergency alert (WEA) and Emergency Alert System (EAS), amber/silver alerts and non-weather emergency messages (NWEM). The Skagit County DEM can initiate a message in those systems, that once approved can be put out. Those messages are then picked up by radio and TV stations.		

PS14 Disaster Traveler Information		
Status	**Regional Planning Goal**	**Stakeholders**
Planned	• Reduce fatalities and injuries, • Improve security, • Enhance integration and connectivity • Improve efficiency	WSDOT, Skagit County DEM, any cities that are on State Routes that have or will have VMS or CCTV
Local Implementation: This service package would allow drivers to be alerted in real time of road closures or emergency evacuation routes or hazardous road conditions or accident locations. This would be done by putting the information on a VMS notification board on key travel routes and sending that information to a personal device. The implementation of this service package requires VMS infrastructure on key regional transportation routes of importance. It would also be helpful to have more CCTV locations so that the TMC has more real-time information to provide these alerts. It is therefore a long-term project. This service package supports the flexibility needed to have flexible evacuation routes. As these routes will vary with each emergency event. It also would aid in the deployment of information on detours, accidents and hazardous weather events by getting that information out in real-time to the public.		

PUBLIC TRANSPORTATION

There are seven existing or partially existing public transportation services packages and five planned service packages. This is a grouping of ITS systems that relate to public transportation.

PT01 Transit Vehicle Tracking Service Package		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Reduce congestion, • Enhance integration and connectivity, • Improve efficiency, • Improve resiliency and reliability, and • Support more transit use by making it easier to use	Skagit Transit, transit users
Local Implementation: Skagit Transit Automatic Vehicle Location (AVL) is on all buses and coaches for Skagit Transit. This allows Skagit Transit to offer real-time locations and lets riders know the status of their bus and if there are delays. It is used on the website and at the kiosk sites and Park and Ride locations to give real-time information. Skagit Transit is in the process of certifying the accuracy of data collected through dispatch CAD/AVL system and ensuring that all fixed-route vehicles are fully equipped with this calibrated, in-vehicle technology. Staff are evaluating alternative software solutions to meet the agency's needs.		

PT02 Transit Fixed Route Operations		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Reduce congestion, • Enhance integration and connectivity, • Improve efficiency, resiliency and reliability, • Support Transit Use.	Skagit Transit, transit users
Local Implementation: Skagit Transit performs automated dispatch and system monitoring for fixed-route and flexible-route transit services. This service monitors the transit vehicle trip performance against the schedule and provides information displays at the various kiosks that have real-time information. There are plans to expand the network of rider kiosks at transfer locations – including Skagit Station, Chuckanut, March Point and the Sedro-Woolley Park and Ride.		

PT03 Dynamic Transit Operations Service Package		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Reduce congestion, • Enhance integration and connectivity, • Improve efficiency, resiliency, reliability, • Support transit use	Skagit Transit for Para-transit, paratransit users which includes popula-tions with disabilities
Local Implementation: Dynamic Transit Operations functions as a way for users of Para-transit to request trips using a personal device, phone or computer and uses computer aided dispatch/ advanced vehicle locations (CAD/AVL) systems and automated scheduling soft-ware to provide coordination functions to dynamically schedule and dispatch a Paratransit vehicle. Skagit Transit is investigating software solutions that will optimize paratransit sched-uling and vehicle utilization to meet the region's growing demand for paratransit services. This includes implementing dynamic, real-time manifests on vehicles to enhance efficiency and improve service delivery.		

PT04 Transit Fare Collection Management		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Reduce congestion, • Enhance integration and connectivity, • Improve efficiency, resiliency, reliability, • Support transit use	Skagit Transit, transit users
Local Implementation: Electronic fare payment for Skagit Transit is done with GFI through a card or App with UMO. Skagit Transit is expanding its contract with UMO to implement open payment capabilities- moving beyond the previous system, which only supported phys-ical fare cards and mobile fare ticketing. Under this enhanced system, passengers will be able to pay fares using mobile device "wallets", tap to pay, or cash on coaches equipped with GFI systems, as well as through card and app-based transactions with UMO. This solution was selected to strengthen regional coordination and improve rider convenience; however, Skagit Transit will continue to evaluate additional fare solutions to ensure meeting needs of riders.		

PT05 Transit Security		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Improve security, • Reduce fatalities and injuries, • Assist users to feel safer so they are comfortable taking transit.	Skagit Transit, transit users
Local Implementation: A networked security camera system is deployed across Skagit Transit facilities, including Skagit Station, MOA, Chuckanut, South Mount Vernon, March Point, and Alger; providing integrated, cloud-based video monitoring. The system supports secure, offsite digital access, real-time surveillance, and centralized data storage to enhance operational visibility, system reliability, and incident response capabilities. These cameras are not connected to law enforcement but are monitored by Skagit Transit Staff.		

PT07 Transit Passenger Counting		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Reduce congestion • Improve efficiency	Skagit Transit
Local Implementation: Skagit Transit currently has Automatic Passenger Counters (APC's) installed on its coaches that are not yet certified; however, certification is underway and expected to be completed early 2026. In the meantime, the agency continues to utilize a combination of GFI and UMO ridership data for passenger counting. Once certified, the APC system will provide detailed stop level data to better inform planning decisions.		

PT08 Transit Traveler Information		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Reduce congestion, • Enhance integration, connectivity, • Improve efficiency	Skagit Transit, transit users
Local Implementation: Skagit Transit offers a variety of tools to help riders access real-time information and plan their trips with ease. Their online real-time map uses AVL technology to display live bus locations, and up-to-date route information is also available and kiosks throughout the system. Riders can plan their trip directly through the Skagit Transit website or uses SMS (Short Message Service), which allows users to text a route number and receive real-time departure times for their stop. The agency is investigating options for a white labeled app that will support all transportation modes offered by the agency.		

PT09 Transit Signal Priority		
Status	**Regional Planning Goal**	**Stakeholders**
Proposed	• Improve efficiency and reliability of transit by allowing transit vehicles to get through congested intersections more efficiently. • This keeps transit on time and improves the reliability of transit services.	Skagit Transit, transit users, WSDOT- TMC
Local Implementation: This service package would allow a transit vehicle to request priority at one or a series of intersections. The Shoreline TMC would be the center to give permission to the driver. The driver would get feedback from the TMC on whether the signal priority has been granted or not. As Skagit County grows and congestion increases, priority intersections that keep routes from achieving on-time schedules could be considered. This is a long-term project, to ensure that as population and traffic congestion increase, transit routes can maintain on-time service.		

PT15 Transit Stop Request		
Status	**Regional Planning Goal**	**Stakeholders**
Proposed	• Reduce fatalities and injuries, • Improve security, reduce congestion, • Improve the experience for the passenger using transit	Skagit Transit, Transit users
Local Implementation: This service package allows a transit passenger to send a stop request to an approaching vehicle. The transit vehicle receives the request and notifies the vehicle operator of the stop request. This would be a beneficial service for some rural fixed routes, where routes tend to have low ridership, so the bus driver is ready to stop. Currently this is not needed, as there are protocols for bus drivers to stop, but it may be evaluated in the future, as Skagit Transit's routes change.		

PT16 Route ID for the Visually Impaired		
Status	**Regional Planning Goal**	**Stakeholders**
Proposed	• Increase accessibility for special needs populations and make transit more accessible for all. • Increase ridership.	Skagit Transit, special needs populations- seniors and those with disabilities
Local Implementation: This service package assists visually impaired travelers to identify their bus route and provides information to bus stop infrastructure to visually impaired travelers portable devices that can be converted to audible information. It also allows the visually impaired traveler to query the portable device to identify route operations. This service would allow more people to use fixed route bus services by increasing accessibility.		

PT17 Transit Connection Protection		
Status	**Regional Planning Goal**	**Stakeholders**
Proposed	• Make longer, cross-county trips using different modes, including multiple transit agencies, bus and ferry connections or Amtrack train. • These connections are easier for the rider by using technology to help the rider make the connections needed for the trip.	Skagit Transit, WSF, WTA, Community Transit, transit riders
Local Implementation: This service allows passengers to request connection protection for their trip. This means the rider gets notified in advance if they cannot make a connection and an alternate connection is proposed. Alternatively, if waiting time to connect is small, the connecting mode would be notified to wait for the arriving passenger. This would be useful for connections from bus service to the Anacortes Ferry terminal or connections to transit in Snohomish or Whatcom County. Some informal versions of this exist with the 80X route on Skagit Transit.		

Traveler Information and Personal Mobility

TI01 Broadcast Traveler Information		
Status	**Regional Planning Goal**	**Stakeholders**
Existing- WSDOT provides traveler information via website, 511 and Highway Advisory Radio (HAR)	Real time information for weather, emergency notifications and detours help drivers navigate the best routes which decreases congestion	WSDOT, Shoreline TMC
Local Implementation: WSDOT provides real-time traffic information on congestion, weather, and emergency notifications on their website and with 511 services. This information can also be broadcast on highway advisory radio (HAR). The radio advisory can be used for remote areas in the County that do not have good cellular communications access.		

TI02 Personalized Traveler Information		
Status	**Regional Planning Goal**	**Stakeholders**
Partially Existing	• With more real time information, a traveler can better plan for their trip. • Encourages transit use.	Skagit Transit, transit users
Local Implementation: This service package is partially existing as Skagit Transit has a trip planner that can provide route guidance in real- time to riders. Expansion of this service package would include real-time interactive request/response systems and information services that "push" a tailored stream of information that could include traffic congestion, ride/share match for micro transit, parking management or other real-time information about their proposed trip.		

TI04 Trip Planning and Payment		
Status	**Regional Planning Goal**	**Stakeholders**
Planned	• Encourage transit use by making longer transit trips with multiple modes easier, • Make payment for a trip easy by allowing it to be done in advance • Support ridership and accessibility	Skagit Transit, WTA, Community Transit, Sound Transit, Amtrak, Transit riders
Local Implementation: This would allow trip planning across multiple transit agencies to be put together by a trip planning service. This helps those who have a long-distance trip figure out different ways they could accomplish their trip with different transit agencies. This service package also allows the user to pay for their trip in advance using the website. In planning for micro transit, the ability to pay in advance may be part of the application, so that portion of this service package may be implemented as part of that project.		

TI05 Integrated Multi-Modal Electronic Payment		
Status	**Regional Planning Goal**	**Stakeholders**
Planned	• Encourage transit use by making transit trips with multiple agencies easier. • Support ridership and accessibility by allowing riders to use one card for multiple modes of transit use with different agencies.	Skagit Transit, WTA, Community Transit, Sound Transit, Amtrak, WSF
Local Implementation: This project would integrate a payment system that would allow for multiple transit agencies and rideshare apps to allow one universal card that could allow multiple choices for trips with different transit agencies or other private transportation to be purchased with one payment card. It allows more flexibility for the user with only one payment card for multiple transit options. Skagit Transit will continue to evaluate additional fare solutions and payment methods to meet the evolving needs of ridership.		

TI06 Shared Use Mobility and Dynamic Ridesharing		
Status	**Regional Planning Goal**	**Stakeholders**
Planned for Micro Transit	• Reduce congestion, • Improve efficiency, • Improve mobility for rural or hard-to-reach areas for transit.	Skagit Transit, transit riders
Local Implementation: Skagit Transit has plans to acquire software that allows for more robust dynamic ridesharing capabilities for its pilot of micro transit. This service package supports software capabilities specifically for micro transit demand responsiveness; however this software may also be used for paratransit. Skagit Transit is research the options for software with these capabilities.		

TRAFFIC MANAGEMENT

TM01 Infrastructure Based Traffic Surveillance		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Reduce congestion, • Enhance integration and connectivity, • Improve efficiency, • Support transit use.	WSDOT, Burlington, Mount Vernon, and Skagit County CCTV locations. Public that uses WSDOT's real-time traffic information.
Local Implementation: WSDOT operates sixteen Closed-Circuit Television Cameras (CCTV) for monitoring in Skagit County. These cameras are located along I-5 through Mount Vernon and Burlington, along Highway 20 east of Burlington, I-5, and one camera on Highway 536. There are also cameras at the Anacortes Ferry terminal. Most of these cameras are old and need to be upgraded in the future. However, these cameras provide video feed to the Shoreline TMC for passive monitoring and early detection of non-routine congestion. During incidents, CCTV cameras provide information on how an incident is being managed and allows for accurate real time dissemination of information to the public.		

TM02 Vehicle Based Traffic Surveillance		
Status	**Regional Planning Goal**	**Stakeholders**
Partially Existing	• Increase accessibility and mobility of people and freight; • Enhance the integration and connectivity of the transportation system across and between modes; • Promote efficient operation and management of the transportation system.	WSDOT, Skagit 911
Local Implementation: Skagit 911 currently receives information from connected vehicles to notify them of an incident. However, with more connected vehicles on the road, a broader implementation of this service package in the future may include getting more data from connected vehicles to measure traffic congestion. This data could assist in implementing ITS planned services -variable speed limits and queue warnings.		

TM03 Traffic Signal Control		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Support economic vitality by reducing congestion • Promote an efficient transportation system	Anacortes, Burlington, Mount Vernon, Sedro-Woolley, Skagit County, La Conner, WSDOT
Local Implementation: The cities of Anacortes, Burlington, and Mount Vernon have operation and maintenance agreements with WSDOT for their signals. Skagit County has an agreement that covers signals in unincorporated areas. Signals on State Routes in Sedro-Woolley and La Conner are owned and operated by WSDOT.		

TM05 Traffic Metering		
Status	**Regional Planning Goal**	**Stakeholders**
Planned	• Reduce congestion on I-5 and promote more efficient freeway operations. • Recommended as part of WSDOT I-5 study for I-5 operations. • Recommended as part of the WSDOT TSMO Active Traffic Management.	WSDOT, Mount Vernon, Burlington
Local Implementation: This is a planned ITS element to address increasing congestion on I-5. This planned implementation is dependent on reliable high speed internet connection. This project would control arterial traffic flow on and off I-5 exits. This was recommended as part of the WSDOT I-5 study to help manage congestion on I-5 during peak hour traffic and during events. The Shoreline TMC would give priority for the traffic metering on freeway on-ramps.		

TM07 Regional Traffic Management		
Status	**Regional Planning Goal**	**Stakeholders**
Planned	• Support economic vitality and increase accessibility and mobility, • Enhance integration and connectivity of the transportation system. • Promote better management and operations of the system. • Improve reliability and resiliency	WSDOT, Shoreline TMC, Bellingham TMC
Local Implementation: This service package would allow notification from the Bellingham TMC of accidents or other disturbances on regional routes that connect to Skagit County. This would allow for notification well in advance of an incident on Highway via VMS, which would give the driver time to plan an alternate route. This would also allow for warnings about hazardous weather events outside of Skagit County that have compromised the transportation system. This is a long-term project as it would require VMS infrastructure in place.		

TM12 Dynamic Roadway Warning		
Status	**Regional Planning Goal**	**Stakeholders**
Planned	• Increase safety of the transportation system.	WSDOT, Jurisdictions on I-5, Areas of Highway 20 that are prone to accidents with wildlife, TMC
Local Implementation: This service package can dynamically warn drivers and other users of hazards on the roadway. Such hazards include weather conditions, wildlife, or other hazards. This system can be monitored and controlled by a TMC or be autonomous. There are areas of Highway 20 upriver in Skagit County that have had severe accidents due to wildlife. A system such as this one could provide the driver with a warning of wildlife ahead. This service package would be long-term as VMS infrastructure is necessary and could work in conjunction with emergency notification service packages.		

TM13 Standard Railroad Grade Crossing		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Increase the safety of railroad crossings for both motorized and nonmotorized users.	WSDOT, BNSF, Skagit County, Sedro-Woolley, Burlington, Mount Vernon
Local Implementation: This service package manages highway traffic at highway-rail intersections (HRI's). This service package is used at intersections with busy State highways and other high traffic areas to assure safety.		

TM20 Variable Speed Limits		
Status	**Regional Planning Goal**	**Stakeholders**
Planned	• Increase safety by slowing down traffic for accident or severe weather, • Promote efficient system management and operations, • Improve resiliency and reliability.	WSDOT, Burlington, Mount Vernon, Skagit County
Local Implementation: This service package sets variable speed limits along a roadway to create more uniform speeds, to promote safer driving during adverse conditions such as fog, snow or hail or an upcoming accident. The system can be centrally maintained through a TMC or autonomous. This service package was recommended as part of the WSDOT I-5 study.		

VEHICLE SAFETY

VS08 Queue Warning		
Status	**Regional Planning Goal**	**Stakeholders**
Planned	• Increase safety of I-5, • Increase mobility by decreasing congestion, • Promote efficient system operations and management. • Improve the resiliency and reliability of the transportation system.	WSDOT, Burlington, Mount Vernon, Skagit County
Local Implementation: This service package utilizes connected vehicle technologies, including vehicle to infrastructure (V21) and vehicle to vehicle (V2V) communications, to enable vehicles within the queue event to automatically broadcast their queued status information. This service package was recommended in the WSDOT I-5 study and this strategy for congestion management and safety is recommended by WSDOT TSMO as part of their ITS strategies. This is a long-term project as infrastructure like VMS systems would need to be in place before it could be implemented.		

Weather Data Collection

WX01 Weather Data Collection		
Status	**Regional Planning Goal**	**Stakeholders**
Existing	• Increase the safety of the transportation system by giving real-time information on weather. • Enhance the integration and connectivity of the transportation system across and between modes.	WSDOT, users of WSDOT website for weather information
Local Implementation: WSDOT's Road Weather Information System (RWIS) has 12 weather stations in Skagit County. These stations monitor roadway weather conditions and alert public sector agencies and the traveling public about inclement weather conditions.		

PROJECT SEQUENCING

A project sequence defines the order in which ITS projects within a region should be implemented. This is important if there are interdependencies of systems being developed between multiple agencies. Projects are sequenced in the order of short-term (5-10 years), intermediate term (10-15 years), and long-term (15-20 years).

Short term projects are not dependent on other projects, and many are already partially existing, meaning the implementation of this project has already begun. Intermediate projects require infrastructure or other implementation requirements before they can be started. For example, ramp metering is dependent on reliable internet before implementation.

Long-term projects have more work needed before implementation. For instance, VMS message board infrastructure is needed on I-5 before variable speed limits and queue warnings can be implemented.

Short Term Planned ITS Projects

Proposed Short Term Project

- **Incident Scene Pre-Arrival- Staging Guidance for Emergency Responders-** this is partially existing so continuing adoption for full implementation.
- **Early Warning System-** this is existing with planned expansion
- **Trip Planning and Payment-** These ITS services exist with planned addition to services.
- **Personalized Travel Information-** These ITS services exist with planned addition to services.
- **Shared Use Mobility and Dynamic Ridesharing-** Additional ITS services to support micro-transit
- **Vehicle Based Traffic Surveillance-**Partially existing, expansion of these existing ITS services to include connected vehicle data.
- **Integrated Multi-Modal Electronic Payment-** These integrated multiple payment systems from various transit agencies or modes to make it easier for riders to travel cross-county.

Proposed Planned Intermediate ITS Projects

- **Freight Signal Priority-** Needs high speed fiber connection to get priority from Shoreline TMC this strategy works with other I-5 strategies.
- **Traffic Metering-** Needs high speed fiber connection to be managed by Shoreline TMC, this strategy works with other I-5 strategies.
- **Disaster Traveler Information-**The installation of VMS reader boards in Skagit County are needed before these ITS services can be deployed.
- **Transit Connection Protection-** ITS services to allow a rider that is taking a cross-County trip to have digital assistance to let connecting services and modes know if they are late or this service can provide assistance in finding another connection if transit connection is missed.
- **Smart Park and Ride System-**Skagit Station is often at parking capacity and plans to implement a pay-to-the-park model for longer-term parking. These ITS services would allow transit riders who would like to park at Skagit Station to check digitally to know if there is available parking.
- **Incident Scene Safety Monitoring-** These ITS services will allow for safety for emergency responders and drivers.

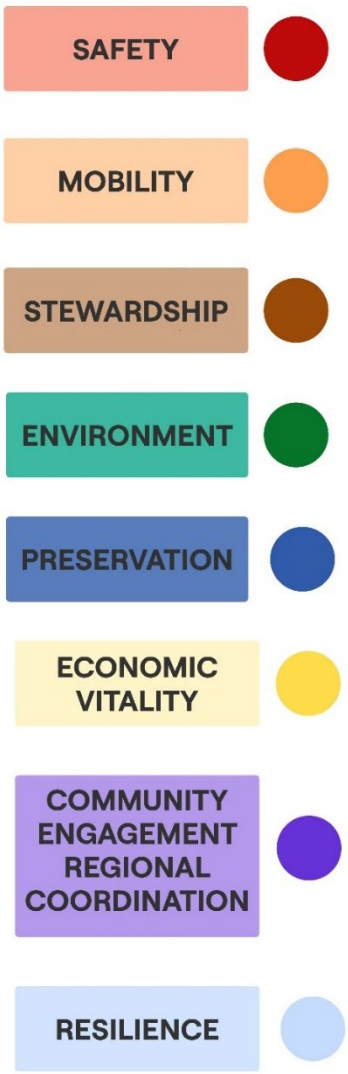
Proposed Planned Long Term ITS Projects:

- **Transit Stop Request-** This project would require an analysis of what rural stops would need these services and would benefit from these ITS services. This analysis needs to be done before implementation.
- **Regional Traffic Management-** This would allow for communication with Bellingham TMC to warn drivers of hazards in Whatcom County. Having VMS infrastructure is needed for implementation
- **Dynamic Roadway Warning-**This project would help increase safety in the I-5 corridor and on parts of SR 20 that have accidents with wildlife. VMS infrastructure is needed before implementation.
- **Queue Warnings-** VMS infrastructure is needed and data collection to feed into TMC or autonomous system to give real-time information is needed.
- **Variable Speed Limits-** VMS infrastructure is needed before implementation.
- **Transit Signal Priority-**This will be needed as traffic congestion grows in the area and it does not allow buses to keep their schedules.
- **Route ID for the Visually Impaired** Skagit Transit would need to prioritize which bus stops to include (as these would include Wi-Fi connections). Given that this infrastructure is needed, a priority list would need to be developed first, so analysis is needed first.

Regional Planning Priorities

Regional transportation priorities are preservation, safety, mobility, economic vitality, environment, community engagement and regional coordination, and transportation resilience.

The ITS service packages both existing and planned work together to achieve these priorities for the transportation system. A description of the regional transportation priorities is below, and corresponding, dot to represent these priorities will be used to graphically show how ITS services that are existing and planned for future work, further regional transportation priorities.



Safety: To provide for and improve the safety of those using the regional transportation system.

Mobility-To improve the predictable movement of goods and people throughout the Skagit Region, including congestion relief and improved freight mobility.

Stewardship- To continuously improve the quality, effectiveness and efficiency of the regional transportation system.

Enviornment- To enhance regional quality of life through transportation investments that promote energy conservation.

Preservation: To maintain, preserve and extend the life and utility of prior investments in regional transportation systems and services.

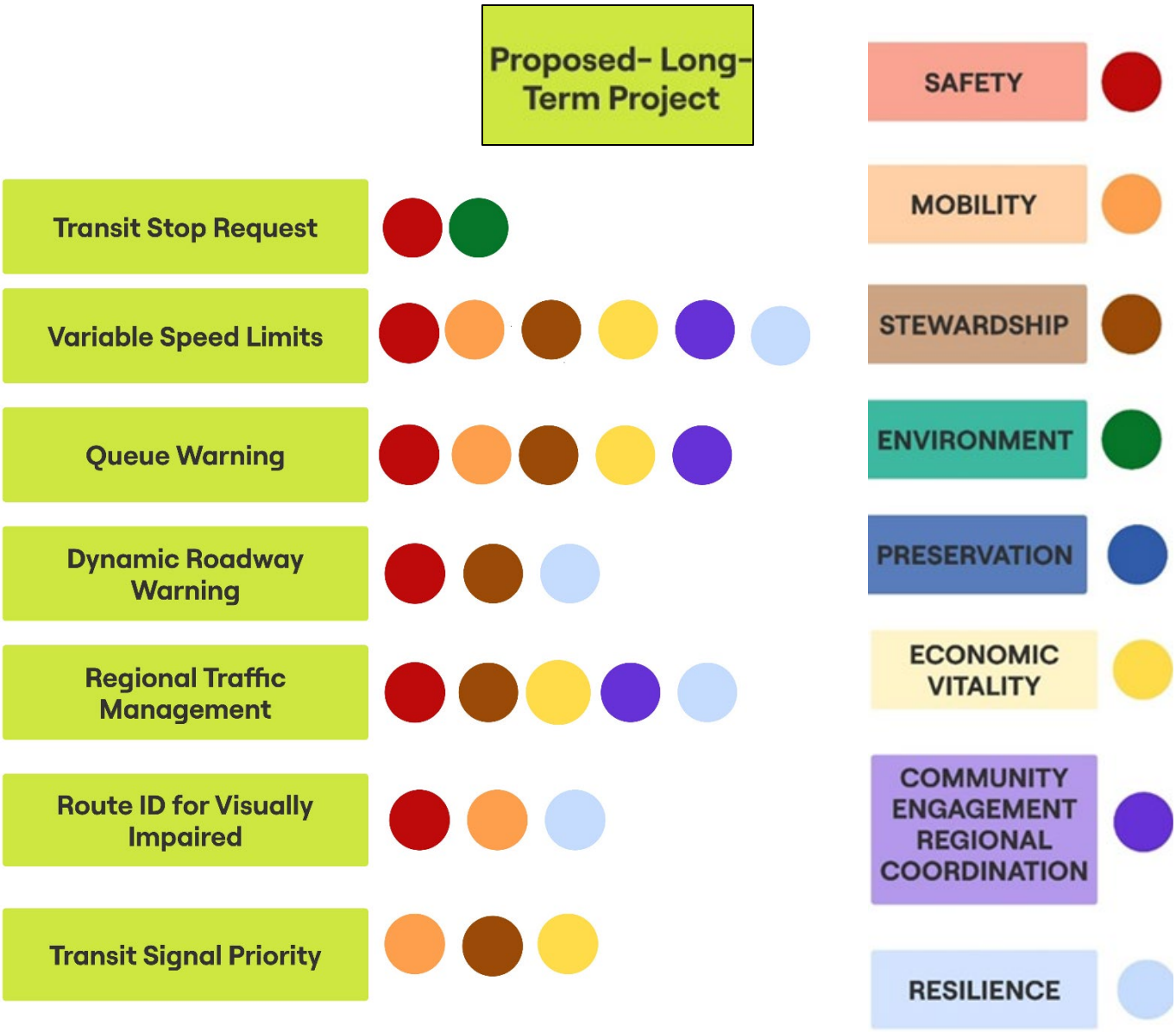
Economic Vitality- To promote and develop transportation systems that stimulate, support and enhance the movement of people and goods, to ensure a prosperous regional economy.

Community Engagement and Regional Coordination- Foster inclusive community engagement and strengthen regional coordination to ensure transportation decisions reflect shared priorities, promote

Transportation Resilience- Foster a reliable and resilient transportation system that maintains essential mobility and access during disruptions and supports long-term sustainability and recovery.

Existing ITS services are currently at work to promote regional planning priorities. Listed below are the existing ITS services in blue boxes. The dots correspond to the ways that these services accomplish regional planning priorities.

Planned ITS Services -both short term, intermediate term and long-term are planned to achieve Regional Planning Priorities. Listed below are planned ITS projects graphically represented by color to represent their timeframe for implementation and the dots illustrate how they contribute toward accomplishment of regional planning priorities.


Proposed- Long-Term Project
Transit Stop Request
Variable Speed Limits
Queue Warning
Dynamic Roadway Warning
Regional Traffic Management
Route ID for Visually Impaired
Transit Signal Priority
SAFETY
MOBILITY
STEWARDSHIP
ENVIRONMENT
PRESERVATION
ECONOMIC VITALITY
COMMUNITY ENGAGEMENT
REGIONAL COORDINATION
RESILIENCE

System Interfaces- Emergency Management, Skagit Transit, Shoreline TMC and Subsystems

Mapping information flows is an important part of ITS planning. Information flows show how ITS services are connected to different centers, and how to optimize future flows to maximize efficiency.

Figure one Transit and TMC flows, illustrate the flows originating from the Shoreline TMC and transit center run by Skagit Transit. The flows for these service packages include the connection to regional transit provider Skagit County and future flow to the Bellingham TMC, once the long-term project, regional project management is implemented.

Figure two, Emergency Management flows, illustrates existing flows to and from Skagit 911, which include direct emergency call taking and dispatch, emergency response staging, and mayday notification from connected vehicles to alert the Washington State Patrol and Shoreline TMC of an accident.

A graphic representation of emergency notification flows is shown. These alerts can happen at multiple levels, the local level through a City or County or through the State or some emergency alerts are done at the federal level.

Figure 1 Shoreline WSDOT Dayton TMC and Transit TMC Flows

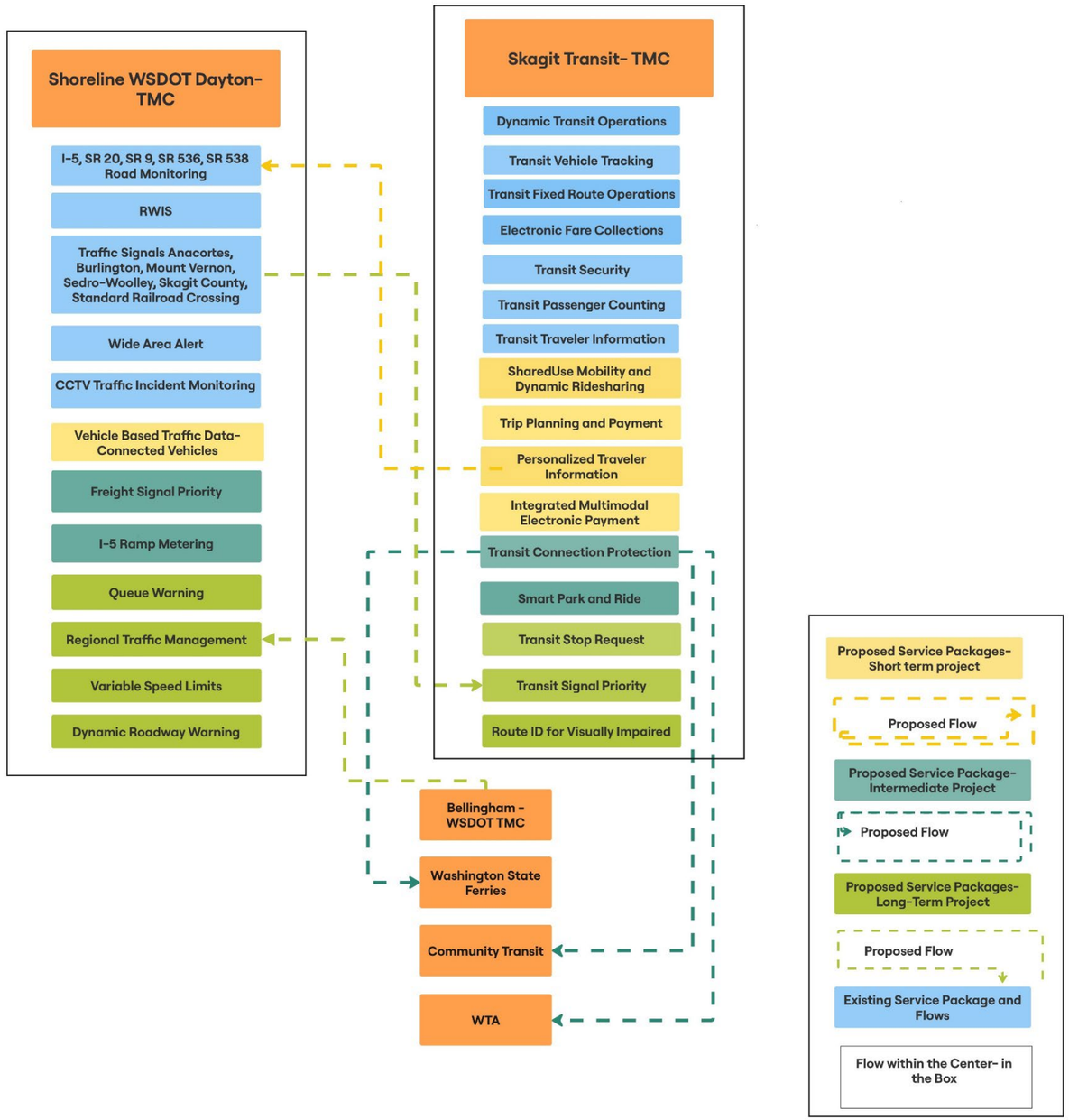


Figure 2 Emergency Management Flows

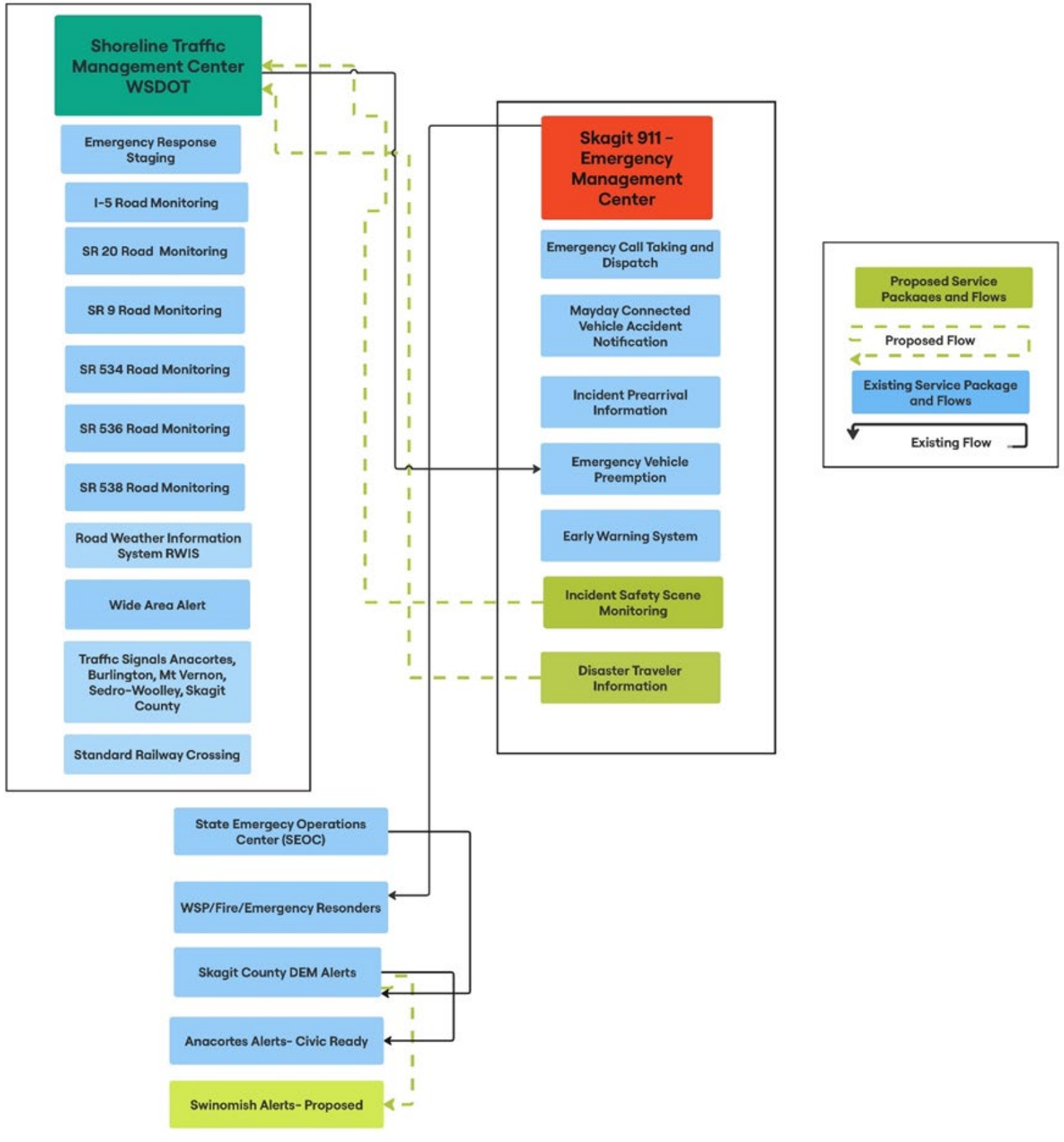
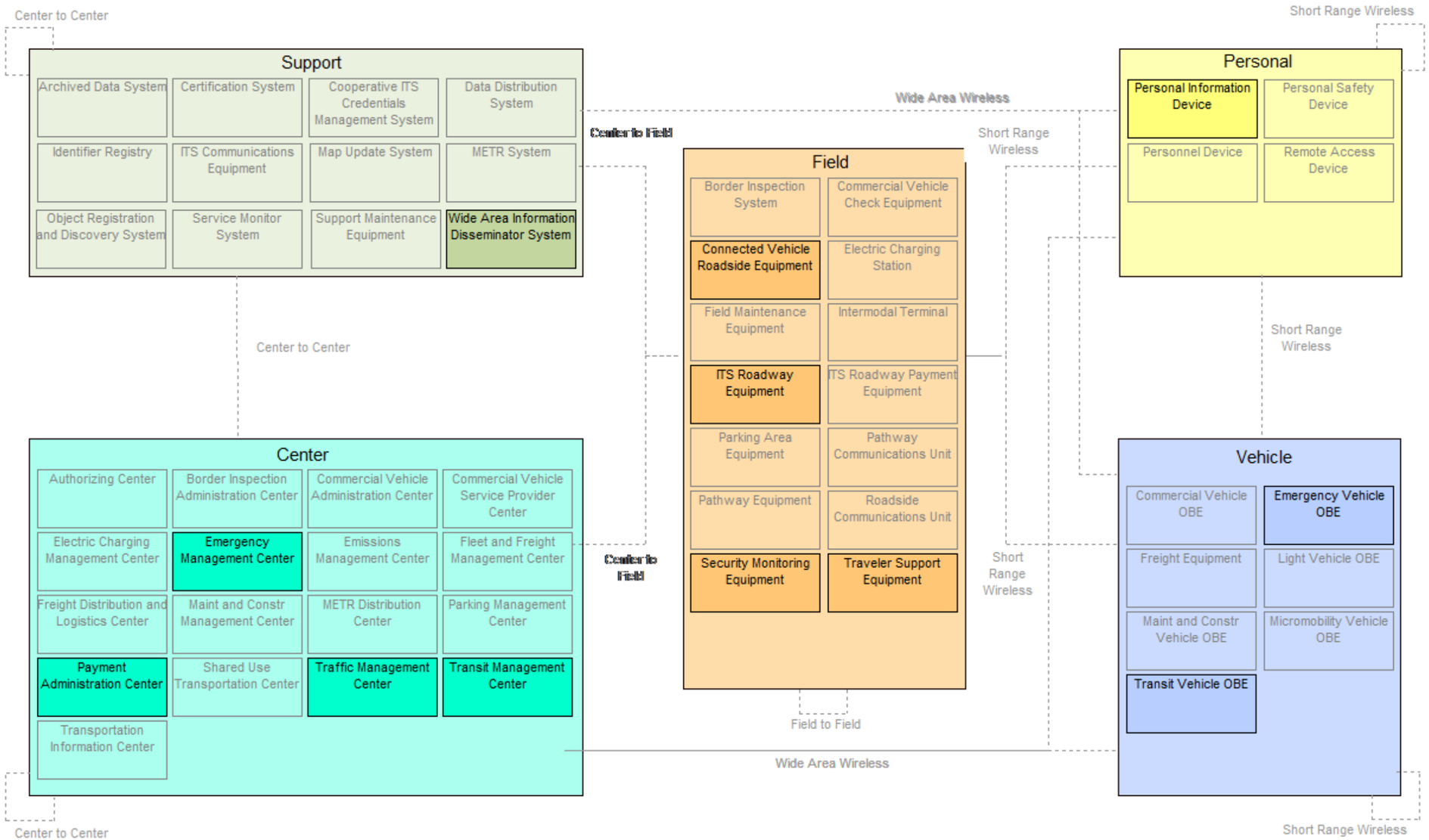


Figure 3 Graphic from Regional Architecture Development for Intelligent Transportation (RAD-IT) Software: Highlighted Boxes show active ITS components and how they connect.



Functional Requirements and Physical Objects

Functional requirements describe the activities performed by each element within the region. Given that each deployment of ITS has specific functional requirements, and associated physical objects, this is listed in the Appendix for each existing and planned service package.

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 Skagit County, all traffic signals and operations are owned and operated by WSDOT. Additionally, most other ITS systems like weather and CCTV are owned and operated by WSDOT, and therefore, ascribe to WSDOT system standards. Signal preemption for emergency vehicles is done by Opticom for all signals except one pedestrian crosswalk in Mount Vernon. This plan assumes that ARC-IT 9.2 standards will be used for future ITS services implementation.

Appendix A lists standards that ARC-IT 9.2 uses for existing ITS services. Skagit County DEM uses 800 Mhz radios as the standard for communication in an emergency event. Skagit Transit plans to match those standards for consistency.

Interagency Agreements

The following agreements exist to allow for data sharing between stakeholder agencies:

Stakeholder Agency	Stakeholder Agency	Agency Agreement Title
WSDOT	City of Anacortes	Signal Maintenance Agreement GM 1391
WSDOT	City of Burlington	Signal Maintenance Agreement GMB 1035
WSDOT	City of Mount Vernon	Signal Maintenance Agreement GMB 1197
WSDOT	City of Sedro-Woolley	None; signals are owned maintained and operated by WSDOT
WSDOT	Skagit County	Signal Maintenance Agreement 1393
WSDOT	Washington State Patrol and Washington Fire Chiefs	Joint Operating Policy Statement (JOPS). Updated in 2024, this document outlines data sharing and communication between the agencies.
WSDOT	Washington State Ferries	None
Skagit Transit	Emergency Management EOC Skagit County	Skagit Transit acts as a support agency with guidance from other agencies in the EOC. Skagit Transit is a resource to provide damage assessments. The Interlocal agreement was updated in 2021 between Skagit County and Skagit Transit.

Architecture Maintenance

This architecture will be presented to the Transportation Policy Board TPB on DATE for approval. It will remain current until the next update of the Skagit Council of Governments Metropolitan and Regional transportation Plan (RTP). The regional ITS architecture will be updated parallel with the update of the regional transportation plan on a 5-year schedule.