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4 OPERATIONAL CONCEPT

4.1 Introduction

This Operational Concept is the fourth in the series of six chapters that comprise the body of Alaska's *Iways* Architecture. The Operational Concept describes at a high-level how statewide agencies, through the various Intelligent Transportation System (ITS) elements they own and operate, interconnect to perform transportation services. This includes an understanding of key agency roles and responsibilities for deploying, operating, and maintaining ITS elements. To ease understanding and to facilitate an environment where inter-agency consensus can be more easily achieved, key agency roles and responsibilities are presented in this chapter as a series of mini Operational Concepts that correspond directly to National ITS Architecture Market Packages. Market Packages simply represent the physical infrastructure that corresponds, and is needed to implement a particular transportation service. By using Market Packages, it is not only easier for stakeholders to understand where they fit in terms of the context of ITS activity, but also links Alaska's architecture development effort to the National ITS Architecture – a common, consistent, and required (if Federal Funds are being used) approach for planning and implementing ITS.

Due to the extensive number of stakeholders in Alaska, the operational concept focuses on key agencies, where stakeholder participation and input has been sufficient to clearly articulate agency ITS roles and responsibilities. Key agencies can be defined as those that have a major role in ITS activities, and which are both providers and receivers of information. Although effort was made to include as many agencies as possible, development of this Operational Concept has been primarily driven by the stakeholder input collected at the time this document was initially drafted and though stakeholder outreach efforts conducted throughout the period in which this document was updated. Input for the update was collected primarily through stakeholder participation at the Operational Concept Workshop (May 2007), phone and e-mail correspondence, and through extensive review of existing documentation made available since the initial development of this document.

4.1.1 Purpose

An ITS Operational Concept is a high-level understanding of how agencies and the various ITS elements they own and operate interconnect to form an integrated "system of subsystems". In Alaska this understanding consists of descriptions of key agency roles and responsibilities for deploying, operating, and maintaining statewide ITS elements, as well as narrative describing how key agency ITS elements interconnect to deliver specific transportation services. These descriptions serve as the high-level framework that fosters statewide ITS integration and improves inter-agency communication, cooperation, coordination and commitment. In other words, this chapter provides

agencies the ability to easily understand where in the regional context they fit in terms of performing ITS activities. This reduces confusion and breeds an environment where inter-agency consensus can be achieved. Additionally, the ITS Operational Concept accomplishes the following:

- Identifies possibilities for institutional cooperation and coordination, laying the foundation for institutional agreements or memoranda of understanding.
- Ensures conformance with 23 CFR Part 940.9 Section D of the Federal Highway Administration (FHWA) Final Rule (referred to herein as "Rule 940") and a similar Federal Transit Authority (FTA) Policy covering transit ITS projects (the "FTA ITS Policy").
- Supports project design by providing a starting point that systems engineers can reference when designing systems, which is also a Rule 940 requirement.

Although the Operational Concept begins to provide details needed to develop the physical ITS architecture, it is not intended to provide the specific details needed to implement ITS at the project level. Instead, the Operational Concept should be considered as the initial step taken to begin this process and to foster inter-agency agreement and understanding.

Together the Operational Concept, along with the Physical ITS Architecture (Chapter 5), provides the information needed to develop the ITS Implementation Plan. The Physical ITS Architecture will build upon the interconnects identified in this chapter and will identify the various types of information that flow over them (i.e., between systems). The ITS Implementation Plan, on the other hand, will present a phased approach for implementing ITS within the state over the next 10 years or as funding permits.

4.2 Overview of Agency ITS Operations

The following section provides an overview of current agency operations. Embedded within this discussion are current agency roles and responsibilities pertaining to existing ITS elements. These roles and responsibilities helped to formulate future ITS roles and responsibilities, which are discussed in Section 4.6 (Operational Concepts).

4.2.1 State of Alaska

Alaska Department of Transportation and Public Facilities

The Alaska Department of Transportation & Public Facilities (ADOT&PF) is organized by Headquarters and three regional offices in Juneau, Fairbanks and Anchorage. The Regional Offices each have planning, engineering, traffic data and maintenance & operations staff that support their regional goals and objectives in meeting the overall mission of the Department. Headquarters also has planning, engineering and traffic data staff, in addition to commercial vehicle operations/enforcement and Alaska Marine Highways that support the Regional Offices and manage the overall mission of the Department.

The sections and divisions outlined below are the ones identified as the key players in implementing ITS (e.g., agencies that are integral to technical aspects such as developing, implementing, monitoring, maintaining, operating ITS related technologies). Other individuals and agencies are often involved or benefit from ITS technologies, but since they do not have a role in any of these ITS activities (besides collecting and using information produced by systems) they not are documented in this Chapter. Transportation system users, the Media, transportation services providers, and transportation planners are all examples of individuals or agencies that lie on the

periphery of ITS activity that benefit of ITS-related information, but do not directly influence how ITS technologies are developed, operated or maintained. Of these agencies and individuals, ITS planners are somewhat more unique in that they play a more high-level role in helping to plan, program and secure funding and may be serve as champions for ITS deployment. More information about the role of planners is available in Chapter 6, Implementation Plan.

Regional Maintenance and Operations Divisions

ADOT&PF's Regional Maintenance and Operation (M&O) responsibilities include all the activities to keep the State's highways, bridges, airports, buildings and harbors in good condition and safe for the traveling public. This includes routine and emergency maintenance. Other activities include:

- Deploying and programming portable Dynamic Message Signs (DMS)
- Bridge Maintenance
- Avalanche abatement/clean-up
- Equipment maintenance
- Resurfacing and chip sealing
- Operating airports and aircraft accident response facilities
- Ensuring National Pollutant Discharge Elimination System permit compliance
- Street sweeping
- Clearing culverts and maintaining drainage
- Patching potholes
- Performing activities to prolong pavement life such as crack sealing
- Installing/ maintaining guardrails, guardrail ends, signage, and luminaries
- Installing highway pavement markings
- Installing/ maintaining delineators and barriers
- Provide information to the traveling public via the Condition Acquisition and Reporting System (CARS) to advertise on the 511

There are 3 M&O regions in the State: Juneau, Anchorage and Fairbanks. They supervise the maintenance activities of their regions and report to their respective regional directors. The ADOT&PF Headquarters is located in Juneau where the State Maintenance Engineer resides within the Commissioners office.

In the event of major incidents, the M&O staff assist the Alaska State Troopers (AST) upon request. M&O also provide and use weather information to schedule staff and equipment. M&O districts have agreements with cities that enable them to share each others' equipment.

Statewide and Regional Design and Engineering Services

Design and Engineering Services provide technical services to ADOT&PF, other state and federal agencies and governments. The department's ITS-related operations primarily apply to three of its sections. These sections are identified below and their applicable operations in terms of ITS are described.

1) Traffic and Safety – This section focuses on improving highway safety and operations. Staff are grouped into statewide and regional offices.

Statewide Traffic and Safety - Statewide traffic and safety staff, located in Juneau, manage the Highway Safety Improvement Program (HSIP) and develop and implement policy on traffic safety, operation, and traffic control devices. They provide traffic engineering support to regional staff and complete special projects for headquarters management.

Regional Traffic and Safety - Regional traffic and safety staff, located in Fairbanks, Anchorage, and Juneau manage regional components of the HSIP. Staff provide support to other ADOT&PF divisions including:

- Program Development (planning),
- Preliminary design,
- Design,
- Construction, and
- Maintenance.

Regional staff also provide expertise in signing, striping, signals, lighting, traffic control, and safety. Additionally, they provide recommendations and analysis for geometrics, intersection capacity, signal warrants, lighting warrants, sight distance, channelization, capacity, traffic control plans, guardrail warrants, and speed limits. Variations in responsibly between regions are described below.

Northern Region Traffic provides timing for traffic signals in the Fairbanks area but does not operate them. Regional highway data staff are responsible for traffic data collection for the Highway Performance Monitoring System (HPMS).

Central Region Traffic has the largest share of both traffic and crashes in the state. They provide timing for traffic signals in Central Region outside of the Municipality of Anchorage (MOA) but do not operate them. Regional highway data staff are responsible for traffic data collection for the HPMS.

Southeast Region Traffic operates and establishes timing for the regional signal system. They are responsible for traffic data collection for the HPMS and are currently the only region to publish an annual traffic and safety report.

2) Bridge Design - This section carries out two primary functions:

- Design services and consultant oversight for new bridge and/or bridge rehabilitation construction projects.
- Services associated with the existing inventory of the State's 980 public highway bridges.

From an operational perspective, this office monitors data from bridge scour detection systems. ADOT&PF & the USGS collaborate to install, collect and monitor bridge scour data. Data is monitored at the following website:

http://ak.water.usgs.gov/usgs_scour/index.php?pageId=2

There are 18 scour sites located statewide and future sites planned.

The Bridge Design staff is also responsible for the following activities:

- Perform biennial bridge inspections;
- Perform emergency inspections following natural or man-made disasters;
- Develop repair recommendations for existing bridges;
- Work with M&O staff to prioritize bridge repairs;
- Design repairs for M&O staff;
- Perform load ratings on bridges;
- Work with the Weights and Measures staff to optimize hauling of overloads across bridges;
- Load posting and closing of deficient bridges; and
- Provide comments and suggestions to the Division of Program Development staff for programming funds for bridge replacements and repairs.

3) Statewide Materials - This section is responsible for monitoring pavement conditions and reporting pavement condition information. Pavement condition reports are accessible at the following website:

http://www.dot.state.ak.us/stwddes/desmaterials/mat_pvmtmgt/pvmt_pcreports.shtml

Regional Construction

Regional construction oversees construction events, manages contractors, and provides information to the traveling public. They input construction information on their Navigator website, as well as enter information into the Condition Acquisition and Reporting System (CARS) to advertise on the 511. The construction staff maintains the following website where current construction activities are posted:

http://www.dot.state.ak.us/creg/const_nav/index.shtml

Statewide GIS Mapping

Statewide GIS Mapping is located in the Headquarters office and provides the base maps and other spatial data necessary to support many ITS projects. They are currently collecting road centerline data statewide in order to provide better quality maps for the Department. They are also involved in the Highway Analysis System (HAS)/Geographic Information System (GIS) integration project so that data is synchronized.

Statewide & Regional Highway Data

Highway and traffic data staff reside in all three Regions and Headquarters. Overall, staff are responsible for developing and maintaining transportation management and data systems to:

- Aid in highway design, operation, and maintenance;
- Provide road network and feature information to various government agencies to support their planning purposes; and
- Meet federal reporting requirements.

Specifically, the highway and traffic data staff collects and processes the following types of data:

- Road network data (road character data, video log)
- Traffic data (Annual average traffic, vehicle classification, speed, turning movements)
- Accident data ("Alaska Traffic Accidents" annual publications)

These types of data are stored in the HAS transportation legacy database and are maintained by Headquarters highway data staff. The HAS is an interactive, menu-driven, hierarchical mainframe

database coded in the Natural programming language and managed with an ADABAS database management system. HAS provides for on-line and batch road network maintenance, inquiries, and reports. Access to batch reports, maintenance, and confidential information is user-id controlled.

Regional Traffic data staff are responsible for collecting, processing, and reporting highway inventory data which include:

- Regional traffic volume reports
- Traffic forecasts
- Traffic classification summaries
- Road temperature at selected sites

The Weigh-in-Motion (WIM) program is the truck weight monitoring portion of the State's traffic monitoring system for highways. Of all the traffic monitoring activities, WIM requires the most sophisticated data collection sensors; the most controlled operating environment (strong, smooth, and level pavement in good condition); and the most costly equipment set-up and calibration. WIM systems are designed to measure the vertical forces applied by the truck axles to sensors in the roadway, thereby providing an estimate of the axle weights.

WIM data is used:

- for secondary weight enforcement by the ADOT&PF Division of Measurement Standards & Commercial Vehicle Enforcement (MS&CVE)
- to calculate Equivalent Axle Load (EAL) for pavement and bridge design
- to calculate average annual daily traffic (AADT) volumes and generate vehicle classification reports
- to meet federal reporting requirements

The WIM program manager resides with the Division of Program Development at Headquarters and works with regional planning and MS&CVE staff on planning and funding WIM sites and the statewide data collection. The regional staff install WIM sties and collect and process the data.

The Headquarters Highway Data staff are responsible for providing a database of reported motor vehicle traffic accidents that occurred on public roads. Motor vehicle crash information is first recorded on an accident report form by the AST, local police officers, or the accident participants. Law enforcement agencies and participants forward the reports to Driver Services, Division of Motor Vehicles (DMV), Alaska Department of Administration. DMV forwards a copy of each accident report to ADOT&PF's Division of Program Development, Highway Data staff at Headquarters. Once at the Headquarters, accident staff process each vehicle crash report, verify the information of the report and log information into the HAS for permanent record keeping.

To expedite the entry of accident information, ADOT&PF has initiated a program for electronic crash submissions from involved drivers and law enforcement. The first deployment of this program was a web-enabled driver crash report. This deployment will be followed by a web-enabled police report, a state standard format for electronic submission, and potentially Traffic and Criminal Software (TRACS) deployment.

The Highway Data staff collaborate with the GIS/Mapping staff to develop AADT maps that are published. This data is provided to developers, local public sector agencies, the ADOT&PF Design Group, and local residents.

Division of Measurement Standards and Commercial Vehicle Enforcement

ADOT&PF Division of Measurement Standards and Commercial Vehicle Enforcement (MSCVE) is responsible for the overall administration of commercial vehicle operation (CVO) activities. The Division's mission is to:

> *"…ensure accurate trade measurements and to enforce commercial vehicle regulations."*

Operationally, the Division is responsible for the following activities:

- Vehicle inspections at state border crossings, weigh stations and other roadside locations;
- Implementation and operation of the State's Commercial Vehicle Identification System and Network (CVISN);
- Operating the Commercial Vehicle Information Exchange Window (CVIEW) database;
- Operating weigh stations and associated equipment;
- Operating WIM systems and equipment;
- Operating portable scales; and
- Operating the Infra-red Inspection System (IRIS) van. IRIS uses infra-red to detect faulty breaks.

MSCVE is working on the core level deployment of the Commercial Vehicle Information System and Network (CVISN). Several projects exist under CVISN:

- Remote Video Monitoring System (RVMS) allows MSCVE to identify errant commercial vehicle operators. RVMS will be installed at the Seward Highway and Port of Anchorage weigh- in-motion sites.
- Commercial Vehicle Exchange Window (CVIEW) allows the enforcement officers to check carrier credentials in real time using the internet. The program automatically flags credential problems, and high inspection selection scores.
- Automated Vehicle Identification (AVI) weighs commercial vehicles at highway speeds and flags commercial vehicles to pull over if they are overweight or have credential problems. AVI is installed on the inbound and outbound Glenn Highway weigh station.

The Department of Public Safety (DPS), Department of Administration (DOA) Division of Motor Vehicles, and the State's Enterprise Technology Services (ETS) support the MSCVE in these activities. MSCVE also has formal agreements with the following local police departments to assist in performing vehicle inspections.

- Anchorage
- Homer
- Juneau
- Skagway
- Valdez
- Wasilla

Alaska Marine Highway System

The Alaska Marine Highway System (AMHS) is responsible for providing safe, reliable, and efficient movement of people, goods, and vehicles among Alaska communities, Canada, and the contiguous United States. The AMHS is used by both tourists and local residents, and essentially serves as an extension of the state's highway system.

The AMHS provides regularly scheduled passenger and vehicle service to 30 communities in Alaska, from Dutch Harbor to Ketchikan and regular service to Bellingham, Washington, and Prince Rupert, British Columbia. The AMHS fleet currently consists of 11 vessels including 2 "fast" ferries.

AMHS uses a vessel tracking system that provides near real-time vessel location information. The system is being expanded to allow shore-based staff to send e-mails to vessels and even transmit data from vessel-based weather equipment to the National Weather Service (NWS). In the future, public access to vessel location information may be integrated into the AMHS website information system to provide travelers with a better picture of real-time vessel arrival and departure information.

AMHS operates security cameras at a number of its ferry terminals enabling terminal and security staff to monitor the facilities, surrounding waters, and vehicle and passenger traffic. Plans are currently underway by AMHS to develop direct access to parts of the AMHS security camera system by local law enforcement agencies. During times when terminals are closed, the camera system is capable of generating alerts and recording "events" when it detects unusual motion in security sensitive areas at terminal facilities.

The AMHS operates the following website:

http://www.ferryalaska.com

From this website the public can gain access to the following types of information:

- Ferry schedules and fares.
- Itineraries.
- Terminal information (phone number, location and hours of operations).
- Schedule changes and travel advisories.
- Links to port cities' websites.
- Tourism services.

The AMHS owns, operates and maintains an internet-based reservation system. The system allows the public to obtain availability of services information and to make reservations. The website also allows the public to pay for services electronically.

The AMHS headquarters facility is located at 7559 North Tongass Highway in Ketchikan, Alaska. Administrative and operations personnel in the headquarter facility oversee vessel and facility operations, as well as crew dispatch.

Department of Public Safety, Division of Alaska State Troopers

The primary function of the AST is to provide law enforcement and public safety services to the public. They are responsible for a broad range of enforcement duties, including the significant task of providing search and rescue on a statewide level (there are vast areas with no other law enforcement agencies). Entities that AST regularly share data with include:

- Other police agencies throughout the state via the Alaska Public Safety Information Network (APSIN). This data includes information to support search and rescue efforts and intelligence data. It also includes information exchanges with the Federal Bureau of Investigation (FBI).
- Health and Social Services (Emergency Medical Services).
- ADOT&PF – radio traffic, roadway conditions and crash reports. AST also enter roadway conditions and accident advisories into CARS, where it is then transmitted to the State's 511 system.
- ADOT&PF Maintenance – In the event of major accidents.
- While managing major accidents, they interact with fire department and HAZMAT enforcement agencies.

The department provides Amber Alert information to public radio and television emergency alert system and enters the information into CARS which is then transmitted to 511 Travel-in-the-Know for public dissemination. They also assist commercial vehicle enforcement by performing commercial vehicle inspections.

Department of Military and Veterans Affairs, Division of Homeland Security and Emergency Management

The Division of Homeland Security and Emergency Management operate the State Emergency Coordination Center (SECC). The center, located at Fort Richardson, "gathers, processes, and reports emergency situation intelligence to aid in State policy and decision making, support local communities as they direct and control disaster emergency response operations, and account for the State's response support costs."[i] The SECC is activated when events occur that are beyond the response capabilities of local response teams. These events may include natural events (earthquakes, major floods and wildfires) or man-cause events (terrorist attacks, hazardous materials spills) that pose a threat to public safety or require significant inter-agency coordination. During these events, the center coordinates response activities with local, state and federal agencies, including the ADOT&PF. Coordination with ADOT&PF occurs primarily to access and repair damage to transportation infrastructure. Coordination will primarily occur via existing communication methods (e-mail, phone, face-to-face).

The Division of Homeland Security and Emergency Management is also responsible for statewide activation of the Alaska Statewide Emergency Alert System (EAS). System activation occurs whenever situations develop that threaten life or property. These include but are not limited to; earthquakes, avalanches, tsunamis, heavy snows, floods, and civil disorder. The Division is also responsible for maintaining the equipment needed to provide information to up-link stations.

More information on the Alaska Statewide EAS, including specific sub area procedures for activating the system can be found at:

http://www.ak-prepared.com/IMAWS/eas.htm

Alaska Railroad Corporation

The Alaska Railroad Corporation (ARRC) is responsible for providing year-round passenger and freight service from Seward to Fairbanks. The Alaska Railroad operates out of its new state-of-the-art operations center located at 825 Whitney Avenue in Anchorage. The center which opened in 2005 is roughly 20,000 square feet in size and houses dispatch and crew operations personnel. Operators within the center are responsible for monitoring Anchorage rail yard operations and activities occurring along the entire rail line.

The ARRC is developing a program to design and implement a communication-based train control system that uses data radio communications between train dispatchers and train crews/workers. The system uses VHF packet data radio technology combined with Computer Aided Dispatch (CAD) and Global Positioning Systems (GPS) to detect potential collisions so an appropriate response can be taken to prevent them. The system will also be able to detect infrastructure failures. It is too early to determine the impact of this system on highway transportation, but the potential exists to use this technology to prevent collisions at rail/highway grade crossings.

The ARRC also owns and operates an avalanche warning system and a highway-rail intersection warning system. Additionally, they track hazardous materials.

The Railroad also maintains the following website:

http://www.akrr.com/default.html

From this website the public can gain access to the following types of information:

- Schedules and fares
- Travel guides and packages
- Depot locations and contact numbers

The public can make reservations via this website.

Alaska Department of Administration, Division of Motor Vehicles

The DMV registers and titles motor vehicles and licenses drivers statewide. The DMV is also responsible for administering the safety responsibility law and driver improvement point system, and collecting motor vehicle taxes. Driver licensing and vehicle registration information is shared with AST.

In terms of ITS-related operations, the DMV is responsible for forwarding accident reports received from AST to ADOT&PF's Division of Program Development, Highway Database Section.

Alaska Division of Tourism

The Division of Tourism provides traveler and tourism information. This information is disseminated primarily through the Division's website:

www.travelalaska.com

From this website travelers and tourists can obtain a wide range of traveler and services information, including:

- Food and lodging information
- Statewide and Regional events including:
  - Sight seeing tours
  - Seasonal activities
  - Shopping
  - Recreational activities
- Transportation information
- Links to cities and towns

The Alaska 511 travel-in-the-know website links to the Division's website via the ADOT&PF's Traveler Information website (http://www.dot.state.ak.us/traveler.shtml).

Department of Health & Social Services, Injury Prevention & EMS

Emergency medical services (EMS) decreases morbidity/mortality through appropriate medical care, appropriate use of data, emergency transport, and injury prevention. When responding to crashes, EMS is in radio communications with hospitals and dispatch. While on-scene, EMS interacts and communicates with police and fire agencies.

The Injury Prevention and EMS (IPEMS) has received an ITS earmark to develop a statewide EMS Data System. The proposed project will allow Health and Social Services (H&SS) to capture data from the largest urban EMS services as well as to provide a web-based reporting feature for smaller rural services. The EMS Data System will also permit integration of data with partner agencies (e.g., the Highway Safety Office) and create linkages with the Alaska Trauma Registry (ATR), the Fatal Accident Reporting System (FARS), and the HAS traffic crash data. Currently, ATR data is combined with information from the Alaska Bureau of Vital Statistics to provide information about highway fatalities in Alaska; however, detailed information on patients treated and transported by EMS services (but not admitted to a hospital) is not available. Data linkages will enable quicker and more accurate data sharing with the Alaska Highway Safety Office (AHSO) and will enable the Section of Injury Prevention and EMS Division of Public Health, Dept. of Health and Social Services (IPEMS) to provide the AHSO with dispatch, scene and transport times. Linkage will also permit the utilization of HAS data for development of a trauma care system and injury prevention programs. Finally, linkage with the ATR will allow IPEMS to provide timely outcome information to EMS services on hospitalized trauma patients.

4.2.2 Municipality of Anchorage

Traffic Department

Division of Transportation Planning

The Division of Transportation Planning staffs the Anchorage Metropolitan Area Transportation Solutions (AMATS) which is a coordinated planning group that sets priorities for spending federal funds. This division prepares the community's Long Range Transportation Plan, which is a tool to implement the comprehensive plan. Additionally, the division has prepared a Regional ITS Architecture for the MOA and is responsible for maintaining/updating this plan so that the plan remains a viable up-to-date document and so that ITS projects can continue to receive federal funds. The Anchorage Regional ITS Architecture can be found at:

http://www.muni.org/transplan/ITSLibrary.cfm

Division of Traffic Engineering

The Division of Traffic Engineering is comprised of the following three sections:

- Safety
- Data
- Signal

The latter two sections play a role in statewide ITS operations. Their current operations are described below.

Data Section - This section is responsible for the collection of traffic data to support traffic analysis, and design and planning of traffic improvements. The types of data collected by this section include:

- Roadway volume counts (vehicular and pedestrian)
- Trail volume counts
- Vehicle speed studies
- Traffic gap studies
- Travel time delay studies
- Vehicle classification studies
- Other studies (circulation, cut through, travel behavior, license plate, etc.)
- Intersection safety analysis
- Accident information
- Other traffic related information

Information that the Data Section shares/receives includes:

- Traffic volume and crash data is shared with the MOA's Planning Department and the Public.
- Traffic counts are shared with the Health Department for air quality analyses.
- Crash and speed data is collected from the MOA Police Department to help identify problem locations.
- Accident information is obtained from MOA Police Department, AST, University of Anchorage Police, and Ted Stevens International Airport Police.

Signals Section - This section is responsible for the implementation, operation and maintenance of all traffic signals located within the Municipality's boundaries. Per agreement with ADOT&PF, operations and maintenance responsibilities extend beyond the 69 signals owned by the MOA and include the 189 state owned traffic signals located within the Municipality. Through this agreement, the Signal Section can operate signals more effectively.[ii] The MOA Signal Section also provides technical support to ADOT&PF for signals located on the Kenai Peninsula and in the Matanuska-Susitna Valley. Most of the Municipality's traffic signals are centrally controlled, which enables operators at the traffic department office to remotely control traffic signals and adjust signal timing plans according to real-time conditions occurring in the field. Other responsibilities of this section include:

- Monitoring and maintaining signal pre-emption equipment
- Operating and maintaining the traffic detection system

Information Technology Department

The MOA Information Technology Department is currently developing an integrated GIS transportation network called Roadnet. When fully deployed, Roadnet will be integrated into the Municipality's Land Information System so as to develop a centralized GIS database that can be used by all Municipal departments and sections. It is envisioned that the Roadnet project will provide compatibility between MOA and ADOT&PF GIS data to facilitate data sharing and also be tied into ADOT&PF's CARS/511 system to enhance current data.

Maintenance and Operations Department, Street Maintenance

The Division of Park and Street Maintenance is responsible for maintaining the Municipalities' roads, parks and other infrastructure. The Division operates a dispatch center for responding to citizen calls. The center is operational from 5:30am to 10:00pm, seven days a week from Mid October through Mid May. During this span, maintenance activities are scheduled 24 hours a day, seven days a week. The dispatch center also operates a summer schedule for performing summer maintenance activities (e.g., general maintenance, street sweeping, chip sealing, etc.). The

Division's website provides a link (http://www.muni.org/streets/CBERRRSA.cfm) with information on current and planned maintenance activities.

The department desires to communicate to the citizens of Anchorage the progress of their snow removal and street sweeping activities. Utilization of Automatic Vehicle Location (AVL) technology will allow this information to be posted to the Internet and reduce the number of phone calls required to manually answer citizens' questions. The AVL will also track road conditions and adjust the snow removal activities, record blade down-and-up locations and times, record sanding and deicing location and times, and monitor the status and health of street maintenance equipment. The Street Maintenance Department would also like to use a common GIS Transportation Network as the foundation for many of their maintenance activities such as pavement type, condition, number of lanes, curbing, guard rails, culvert locations, ditches or other drainage features, trail characteristics, and brushing activities.[iii]

People Mover

People mover is the public transportation provider for the MOA. The agency's mission is:

"…to meet the public transportation needs of all Anchorage residents and visitors."

People Mover operates a fleet of 55 vehicles on 15 fixed routes and 4 dial-a-ride routes. The People Mover Website provides the following types of information that can assist users in planning trips:

- Schedules
- Route Maps
- Fares and Pass information
- Instructions for Riding
- Detours

In addition to its fixed route service, People Mover also operates a para-transit service called Anchor-Rides. This service operates curb-to-curb and is intended for individuals who have a disability that prevents them from using fixed-route service.

As People Mover grows its services, it will be evaluating for possible implementation the following types of systems:[iv]

- Automated Vehicle Location
- Signal Priority
- Mobile Data Terminals
- Automated Passenger Counters

In addition to the above systems, People Mover may in the future look to improve security of its buses and facilities through application and use of ITS-related systems.

Anchorage Police Department

The Anchorage Police Department (APD) is the largest police department in the state. The Department is responsible for responding to and investigating emergencies and disasters. The APD Emergency Communications Center initially receives all 911 calls within the Municipality and transfers fire and EMS calls to the Anchorage Fire Department. The Center also uses the CARS/511 system to advise of current road conditions, closures and other information important to motorists. APD vehicles are equipped with Mobile Data Terminals (MDTs) for communicating with officers in

the field. APD is planning to implement digital video cameras within a select number of patrol cameras starting in 2008. To meet the increased communications bandwidth needed to upload digital video images, the APD will also be improving its communications infrastructure in 2008.

Anchorage Fire Department, Division of Fire and EMS Operations

The Anchorage Fire Department (AFD) is responsible for 911 dispatch of fire, rescue and EMS for the 277,000 residents within the MOA, including the Girdwood and Chugiak Fire Departments and non-emergent medical transports. Fire Dispatch also coordinates fire response with the RCC, APD, AST, University of Alaska Police Department, Anchorage International Airport Police and Fire, Alaska Division of Forestry and the Joint Base Elmendorf Richardson Fire Department. Besides fire and EMS, AFD has specialized training in complex incident management, Hazmat, swiftwater rescue, urban search and rescue, trench rescue, public safety diving and backcountry rescue. AFD seasonally staffs a helicopter during wildfire season. The Department utilizes several methods of communications for responses; radio, pagers and mobile status terminals (MST).

Anchorage Office of Emergency Management

The Office of Emergency Management (OEM) is responsible for 2 primary functions 1) coordinating emergency preparedness activities, and 2) facilitating emergency response and coordination during large scale emergencies. Specifically these two functions entail:

- Coordinating response during major emergencies.
- Disseminating emergency information to the public.
- Identifying evacuations routes and coordinates with municipal governments with which routes transverse.
- Coordinating re-entry with APD and AFD.
- Developing long-term planning for emergency communications and acceptance of standards.
- Maintaining an inventory of communications resources (e.g., equipment, frequencies, and locations).
- Coordinating with local hospitals when there is a mass casualty incident.
- Coordinating the gathering, verification, and dissemination of public information for dissemination through media.

The Anchorage OEM is housed in the Emergency Operations Center (EOC) located at 1305 E Street in Anchorage. The EOC is used to facilitate multi-agency coordination of incident response during large scale emergencies. Large scale emergencies are defined as emergencies that surpass the capacity of individual agencies. During periods of normal activity, the center houses EOC staff, however, during large scale emergencies the center is staffed by other municipal departments as well as partner agencies (e.g. fire, police, and media) to coordinate response to emergencies.

In 2007, the OEM completed the most recent version of its Emergency Operations Plan. This plan, like this document, summarizes agency roles and responsibilities for managing major natural, technological and human/societal emergencies. The Emergency Operations Plan, which is updated annually, can be found at: http://www.muni.org/oem/EOP.cfm.

4.2.3 City of Fairbanks

City of Fairbanks Police Department

The City of Fairbanks Police Department provides law enforcement services to the City of Fairbanks. In 2005, the Department in cooperation with the City of North Pole Police Department installed

Mobile Data Terminals in all of their patrol vehicles. The mobile data terminals are essentially laptop computers installed within the patrol vehicle that allow officers to directly query multiple databases, as well as completing reports and uploading them electronically to their central records-management system via a wireless network. In general the MDTs allow officers in the field to better communicate with other officers and central dispatch.

Fairbanks Emergency Communications Center

The Fairbanks Emergency Communication Center, located within the Fairbanks Police Station, performs all dispatch services for the Fairbanks Police, Fire and EMS Departments, including those of nearby communities.[v] The center is fully integrated with the State's Land Mobile Radio.

4.2.4 City and Borough of Juneau

Capital Transit

Capital Transit operates a fleet of 16 fixed route vehicles, many of which are aging and need to be replaced and 8 para-transit vans. Although none of Capital Transit's vehicles are equipped with automated fare collections systems, the agency is considering using this technology in the future to reduce the responsibilities of transit operators. Additionally, these systems will provide ridership data to be used in future planning.

City of Juneau Police Department

The City of Juneau Police Department provides law enforcement services to the City of Juneau. Operationally, the Juneau Police Department is responsible for operating the Juneau Police Department Communication Center. The center is staffed 24 hours a day, 365 days a year. Center is responsible for monitoring multiple radio channels, answering 911 calls for the Juneau Region, dispatch services for police, and fire and rescue. The department also has trained officers to support commercial vehicle inspections and enforcement.

4.2.5 Federal Aviation Administration, Alaska Region

The Federal Aviation Administration (FAA) is the lead agency for the Capstone Program. This program's main goal is to improve communications and navigation for commercial aircraft that travel at lower altitudes. It includes avionics that will provide a data link to the pilot to supply near-rear time weather information. Communications will be conducted via ground radio.

Capstone is an accelerated effort to improve aviation safety and efficiency by installing government-furnished GPS-based avionics and data link communications suites in most commercial aircraft serving the Yukon-Kuskokwim delta area. FAA will equip up to 200 aircraft along with providing compatible ground systems, equipment, and services. In addition to the avionics equipment packages, Capstone will deploy ground infrastructure for weather observation, data link communications, surveillance, and Flight Information Services (FIS). This will help improve safety and enable the eventual implementation of new procedures.

Currently, the FAA Alaska Region is supporting an initiative to deploy and operate cameras to assist pilots in determining weather conditions, before flying. There are a total of 67 weather camera sites, with most sites having at least 2 cameras positioned to monitor conditions in different

directions. In some cases cameras are collocated with weather sensors that detect wind direction and speed, visibility, and temperature. Camera images can be view at the following site:

http://akweathercams.faa.gov

The FAA and ADOT&PF have an agreement to share RWIS images to support the FAA weather cam program. ADOT&PF provides skyline images for this purpose.

Even though FAA cameras are intended to be used by the aviation community, they can also be used by users of the surface transportation network to make travel-related decisions before embarking on a trip.

4.2.6 National Weather Service, Alaska Region Headquarters

The National Weather Service (NWS) provides weather, hydraulic, and climate forecasts and warnings. The NWS and the ADOT&PF have an agreement where the NWS will donate tipping buckets to Road Weather Information System (RWIS) sites. In return, the ADOT&PF provides an FTP site for NWS to access the real-time RWIS data. ADOT&PF provides a link to NWS observation and forecast information from the following website:

www.roadweather.alaska.gov

4.2.7 University of Alaska

The University of Alaska and ADOT&PF have a cooperative partnership to address needs, cost, and maintenance of RWIS deployments across the state. The agreements are detailed below.

University of Fairbanks Geophysics and Geology Centers

The University of Fairbanks Geophysical Institute supports ADOT&PF's RWIS program though equipment donations, which supplement the various weather condition information collected by these systems. In return, the ADOT&PF provide the university center with RWIS data for research purposes. Under the Memorandum agreement, the Geophysical Institute will provide the sensors that will be added to existing temperature data probes sites and Phase 2 RWIS sites.

Alaska University Transportation Center

The Alaska University Transportation Center supports transportation research education and technology transfer activities. The center's research efforts are focused primarily at addressing cold weather impacts on the various transportation modes important to Alaska. The center has strong working relationships with ADOT&PF, USDOT, FAA, and FHWA, and coordinates with state transportation centers on cold weather research.

The Alaska University Transportation Center is sponsoring a $3 million ITS Earmark to install additional RWIS and develop a network of remote automated weather stations.

4.2.8 Elmendorf Air Force Base

Elmendorf Air Force Base is actively involved in the collection of weather data, which may be shared to improve transportation operations and decision making in Alaska. Elmendorf AFB currently receives RWIS data per an agreement with ADOT&PF. The weather data received are used to improve local forecasting and determining driving conditions near the base.

4.2.9 Other Local/Regional Agencies

City of Wasilla Police Department

The City of Wasilla Police Department operates the MatCom Dispatch Center and provides dispatch services for City Police and AST.

City of Palmer Police Department

The City of Palmer operates the Emergency Dispatch Center for the Matanuska-Susitna Borough and is responsible for taking 911 calls. The Dispatch Center dispatches for the Palmer Police Department, 11 fire departments, and 12 emergency medial service providers.

4.3 ITS Element Inventory

Transportation, emergency and transit management agencies are deploying ITS-related elements throughout the state. An analysis of current, legacy systems is critical for evaluating whether these systems have the potential to provide the desired transportation functions identified in the ITS Long-Range Vision. Additionally, this analysis helps evaluate the opportunity for integrating current systems with those that are desired or planned.

This section provides a brief discussion of the various ITS elements that currently exist within the State. ITS elements are categorized into four classes:

- Field-based Elements
- Center-based Elements
- Vehicle-based Elements
- Personal Information Access

4.3.1 Field-based Elements

Field-based elements consist of the technologies and other associated technology that are deployed in the field, primarily along the roadside. Field elements are typically controlled by operators located in a remote facility and are used to either disseminate information to travelers or collect information from the field in order to make better operational decisions. Field elements currently deployed across the state are described below.

Dynamic Message Signs

The ADOT&PF owns 4 permanent DMS and 15 portable DMS. One permanent DMS is located at the Port of Anchorage, and another is located at a weigh station near Fox, Alaska, just north of Fairbanks. Both of these signs are used primarily for commercial vehicle purposes. The other two permanent DMS are located on the Glenn and Seward Highways near Anchorage. These signs are used primarily to improve safety and decision making during adverse weather. The 15 portable DMS are used primarily in construction and work zones around Fairbanks and Anchorage.

The Port of Anchorage DMS is operated by ADOT&PF, MSCVE and is used by commercial vehicles approaching the WIM site. The ADOT&PF, AST and APD have entered into a formal agreement whereas APD staff will operate the 2 DMS on the Glenn and Seward Highways. ADOT&PF M&O personnel own and operate the 15 portable DMS.

The ADOT&PF South Central Region has published a "Changeable Message Sign Operations Manual," which includes further details pertaining to agency roles and responsibilities for operating permanent DMS. This document can be found at:

http://www.dot.state.ak.us/stwddes/dcstraffic/assets/pdf/misc/permanent_cms_manual.pdf

Roadway Weather Information Systems

In 2001, ADOT&PF began designing and deploying RWIS in 2 phases. The 1st phase, which installed 8 RWIS in the Anchorage Bowl Area, served as a prototype to establish the type of equipment, site construction standards, and operational issues for the future RWIS installations of phase 2. Phase 1 designed and installed 8 RWIS stations in the Anchorage Bowl Area. Phase 1 was funded in large part through a 1.215 million U.S. DOT Earmark. Additional funds to the amount of 253,000 were secured through the Statewide Transportation Improvement Program.

Phase 2 of the statewide RWIS deployment began in late 2002, and included an additional 38 RWIS sites located throughout the State. Phase 2 was funded through another 2 U.S. DOT Earmarks. Earmarks roughly in the amounts of 1,875,000 and $698,000 were used to implement RWIS at 31 new sites, and 7 closed maintenance stations respectively.

Today the ADOT&PF owns and operates a RWIS that consists of 49 environmental sensor stations (ESS) and one cooperative site strategically located along major transportation corridors across the state. Data collected by the RWIS are used to improve the safety and efficiency of travel and to support statewide maintenance operations. The RWIS collects the following types of atmospheric and pavement data:

- Pavement temperature
- Sub surface temperature at 17 inches
- Precipitation occurrence and amount
- Snow depth
- Ambient air temperature
- Relative humidity
- Dew point
- Wind speed and direction

Data from RWIS sites are pulled every 15 minutes and stored on ADOT&PF servers in Anchorage and Juneau. Maintenance and operations staff can view RWIS data through an internal website. Data are also posted to an FTP site, where data are pulled and posted to an external website for public consumption.

ADOT&PF shares RWIS data with the following agencies:

- National Weather Service
- Federal Aviation Administration
- The University of Alaska Fairbanks (Geophysical Institute)
- Elmendorf Air force Base

Although ADOT&PF own each of the environmental sensor stations, there have been specific add on equipment donated by the University of Alaska Fairbanks and the National Weather Service at several ESS.

Additional information on ADOT&PF's RWIS program can be obtained at:

http://roadweather.alaska.gov

ADOT&PF plans to install 2-3 ESS per year as M&O or partners request them. [vi]

Temperature Data Probes

Temperature data probes (TDP), installed below the roadway, collect sub-surface temperature data along a 72 inch vertical profile. Temperatures are recorded at the pavement surface (some sites), just under the pavement, every 3 inches for the first foot, and every 6 inches for the next five feet.[vii] There are over 80 TDPs in Alaska. Many TDP's are collocated with the automatic traffic recorder (ATR) installation, while others are stand-alone or collocated with RWIS. Maintenance and operations personnel use the subsurface temperature data from these devices to determine seasonal weight restrictions. TDPs are maintained by ADOT&PF's Traffic Section (Central Region). Probe data are posted on the external RWIS web site (http://roadweather.alaska.gov).

Cameras

There are a number of agencies that own and operate cameras that can be used to monitor conditions in real-time and make better travel-related decisions.

Most ADOT&PF RWIS are equipped with cameras to verify weather conditions occurring in the field. Cameras automatically capture still images 1 to 4 times an hour. Images are stored on ADOT&PF's servers for 2 days, however, with increasing emergency management and homeland security needs these images may be retained longer. Additionally, ADOT&PF is deploying infrared illuminators (IR) and IR sensitive cameras to capture night-time images where luminaries do not exist. The IR deployment will help maintenance and operations to view camera images taken at night or during winter when darkness is persistent.

ADOT&PF camera images and links to other transportation related camera images can be viewed at: http://roadweather.alaska.gov

ADOT&PF also installed cameras at nine of the state's largest ferry terminals. The cameras are used by AMHS to monitor activities at nine of the largest ferry terminals in south Alaska. Specifically, staff, security and local law enforcement use the cameras to monitor ferry facilities, surrounding waters and vehicle and passenger traffic via the Internet. When the terminals are closed, local law enforcement officials and other authorized users can access the system remotely and can receive alerts if unusual motion is detected in the facilities.[viii] Cameras are located throughout each of the 9 terminal facilities.

The FAA has deployed closed circuit television (CCTV) cameras at 71 locations within the state, each offering real-time directional views of the location. The cameras have been deployed to enhance safety for the flying public by providing observations on prevailing weather conditions. Although the primary use of this information is for air travel, it may also be effective in supporting surface transportation. However, it should be noted that the FAA does provide a disclaimer that emphasizes that these images are not intended to replace weather data and are intended only to serve as an additional source of information.

FAA camera images, as well as a listing of camera sites, can be found at:

http://akweathercams.faa.gov

The MOA, Signal Section is considering installing cameras on traffic signal masts or other location near signalized intersections. Cameras would assist in traffic management and emergency response. For instance, cameras can be used to verify that traffic signals are operating properly and to verify the impact to traffic patterns when traffic signal timing patterns are changed in response to real-time conditions.

Mobile Data Terminals

Mobile Data Terminals (MDTs) are essentially laptop computers installed in patrol cars that allow officers to complete a series of tasks remotely within their vehicle. They are used for vehicle-to-vehicle and vehicle-to-center communication. In doing so, they greatly reduce radio communications between officers and dispatch personnel, freeing up radio communications for emergency situations. Specifically, MDTs allow officers to directly query multiple databases, and file reports electronically. MDTs also play a role in CAD and AVL functions. CAD combines computer and communications technologies to better manage

communications between personnel in the field and at dispatch centers.

AVL systems provide the ability to track vehicle movements through time and space. Emergency vehicle management, transit operations, and maintenance operations have applied this technology to maximize the operational efficiency of vehicle fleets.

In 2005, the Fairbanks Police Department in cooperation with the City of North Pole Police Department deployed 50 mobile data terminals.

The APD is looking to upgrade its MDTs in 2010. As part of this upgrade, the APD will be adding point of sale application to MDTs to recover payments for non contested violations.[ix]

Traffic Signal Systems

The traffic signal systems identified by ADOT&PF and their regional stakeholders include:

- The MOA owns and operates a closed-loop signal system
- ADOT&PF operates the City of Fairbanks' traffic signal system

Avalanche Detection Systems

ADOT&PF is considering the implementation of a GIS-based avalanche occurrence and prediction system. The system will consist of remote automated weather stations (RAWS) in avalanche prone areas that will help forecast avalanches. RAWS are planned for areas along the Seward and Richardson Highways and on Thane Road in Juneau.[x] The RAWS will integrate with the RWIS program.

The ARRC owns and operates an avalanche detection and prevention system, comprised of several weather stations, installed along an avalanche zone from Girdwood to Moose Pass.[xi] The weather stations sense movement when an avalanche releases and then triggers an alarm. Operators at the Railroad's Operations Center, located in Anchorage, use the system's software to monitor the weather stations and receive alerts. The same software platform is shared with the ADOT&PF to disseminate timely weather forecasts and avalanche data.

Animal/Vehicle Warning System

ADOT&PF recently participated in a Pooled Fund study to examine the effectiveness of roadway or vehicle based technologies that provide advance notification and warning of animals crossing the roadway. Although the study is over and ADOT&PF no longer contribute funds to this project, technologies similar to this may be deployed in Alaska as a means to reduce the number of collisions that occur between vehicles and wildlife that frequently cross roadways.

Automated Anti-Icing Systems

ADOT&PF Central region Maintenance and Operations manages an automated anti-icing system located on the Glenn Highway at the Knik River Bridge. The system consists of sensors installed in the bridge pavement which detect and record weather and pavement conditions (e.g., temperature, humidity, precipitation on the pavement). If current measurements favor the formation of ice, the system will activate nozzles that release ice fighting chemicals. The chemicals essentially mix with the standing precipitation, lowering the freezing point of pavement moisture. In the future, ADOT&PF may add additional automated anti-icing systems.[xii]

Automatic Traffic Data Recorders

An Automatic Traffic Data Recorder (ATR) is essentially an electronic counting device connected to inductive loops buried in the pavement. Alaska's ATRs are used to meet federal reporting requirements and provide year-round, hourly traffic data to the ADOT&PF planning department. The data collected includes:

- Volume
- Speed
- Classification

ADOT&PF's Highway Data Section is responsible for implementing, monitoring, and collecting data from ATRs. Data from ATRs are collected either by dial-up communications, the internet or physically at the site. There are 89 permanent ATRs deployed throughout the state. The total number of ATRs deployed in each of Alaska's 3 regions and statewide are shown in Table 4-1.

Table 4-1:
Total Number of Automatic Traffic Data Recorders by Region

Region	Number of Automatic Traffic Data Recorders
Northern Region	29
Central Region	45
Southeastern Region	15
Total Statewide	89

At some locations ATRs are collocated with temperature data probes.

Bridge Scour Detection System

The U.S. Geological Survey Alaska Science Center is responsible for operating, deploying and maintaining the statewide network of Bridge Scour Detectors. The Federally mandated bridge scour program is in place to identify bridge foundations that may be vulnerable to loss or damage during periods of increased scour, such as those caused by floods. To date there have been 149 bridges statewide identified as being affected by scour. 24 of these locations have been tagged for active monitoring. Currently, Alaska's bridge scour program contains of a network of 19 scour monitoring stations. Another 3 stations are planned. Data from scour monitoring stations are available via the following website:

http://ak.water.usgs.gov/usgs_scour

Data are typically collected every 30 minutes and transmitted every 6 hours, though the data collectors can be custom-programmed as needed. When bed elevation or stage thresholds are exceeded, the frequency of the data transmissions increases.

Signal Preemption Systems

The MOA and ADOT&PF have installed signal pre-emption receivers at 27 intersections within the MOA.[xiii] Similar systems are also deployed within the City of Fairbanks.[xiv] These systems improve emergency response by giving emergency vehicles a green signal indication as they approach a signalized intersection, eliminating the need to slow down or stop. Signal emitters installed on emergency vehicles emit an infrared signal that is detected by the receiver which is tied into the traffic signal; and once detected gives a "green" indication to the emergency vehicle approaching the equipped intersection. Recently funding has been requested to complete the MOA system by installing preemption equipment at remaining signalized intersections over the next two years.[xv]

Public agencies may also consider implementing signal preemption systems for transit and maintenance operations. Signal preemption systems used for these purposes will be given a lower priority than emergency vehicle signal preemption.

Weigh-in-Motion

ADOT&PF's Division of MSCVE own and operate 9 WIM stations located throughout the state. WIM data is stored in an Oracle database that has a web interface with the State's Highway Data Port (HDP). The HDP is a user friendly web interface that ADOTPF personnel can use to access WIM and other data from the State's HAS. WIM data is used by MSCVE to study commercial vehicle traffic patterns and to determine period of increased activity.[xvi]

Electronic Screening

ADOT&PF's Division of MSCVE, in conjunction with the Federal Motor Carrier Safety Administration (FMCSA), is working to improve the overall safety of commercial vehicle traffic in the state. As a part of this effort, MSCVE has installed the first of several Automated Vehicle Identification (AVI) E-Screening sites to be positioned along highways throughout Alaska. Located at the Glenn Highway Inbound and Outbound Weigh Stations, just north of Anchorage, this first AVI E-Screening system (consisting of overhead antennas and roadside cameras, coupled with in-vehicle transponders) will automatically check the safety rating and credentials of participating motor carriers and vehicles and, if all is in order, allow those vehicles to proceed down the highway without stopping.[xvii]

Train Whistle Noise Reduction Systems

ARRC tested and is installing train whistle noise reduction systems at at-grade road-rail crossings in Anchorage. The system involves wayside horns located at the crossing, which direct a whistle-like warning toward vehicle traffic. The purpose of this project is to reduce noise and confirm that the whistle reduction systems can operate reliably in the Alaska environment.[xviii,xix]

4.3.2 Center-based Elements

Computerized Materials and Maintenance Management System

The ARRC has a fully integrated computerized materials and maintenance management system (CMMS) that helps support and manage equipment, facilities maintenance, purchasing and inventory. The CMMS ties into accounting and project management software systems, and provides information necessary to meet operational accounting and maintenance needs in several areas, including heavy equipment, mechanical, bridges and buildings, facilities, signals and crossings.

Maintenance Management System

ADOT&PF's Maintenance and Operations Division (Headquarters) operates and maintains a Maintenance Management System (MMS) for tracking and performing maintenance activities. The MMS is also used to identify and inventory statewide transportation assets and resources. In performing these functions the MMS helps maintenance managers make more informed decisions regarding the use equipment and materials, helping to improve efficiency of operations and lowering the annual cost of performing maintenance.

The MMS is connected with a GIS platform and the State's HAS.

Commercial Vehicle Information Exchange Window

The Commercial Vehicle Information Exchange Window (CVIEW) provides a central data warehouse and exchange service for all Alaska commercial vehicle functions. It exchanges credential and safety data with various data sources, such as SAFER, ALVIN, SEPP, IROC (electronic screening), and roadside query systems. Commercial vehicle officers use CVIEW to check credentials in real-time using the internet. CVIEW data are also available to select public entities such as motor carriers, for personal review of their own data. CVIEW is a key component of Alaska's CVISN Program.

ALVIN-Registration

The ALVIN registration system is used to collect registration fees, and maintains current registration information about commercial vehicles, trailers, and passenger cars. The system is operated by the Alaska DMV.

ASPEN

ASPEN is a software package used at the roadside to record and report commercial vehicle safety inspections. The Software package provides safety performance information, CDL information and status, and past safety problems. The software package can be installed on pen computers, mobile data terminals, and lap top computer to assist in roadside inspections. Reports are uploaded to CVIEW and SAFER.

Alaska Public Safety Information Network

The Alaska Public Safety Information Network (APSIN) system is a data repository for Alaska's federal, state and local law enforcement agencies. Besides serving a number of other functions, the APSIN system provides access to Department of Motor Vehicle records including; driving records and license and registration information. Additionally, the system is used to collect registration fees, and maintains current information about commercial vehicles, trailers, and passenger cars. The system is available to the law enforcement community through MDTs.

HazMat System

The system provides for the management and maintenance of HazMat data. Data from this system will be disseminated to other systems for use in enforcement and inspections. The HazMat system will send permit data to CVIEW. A centralized state HazMat system, which can be accessed by all local jurisdictions, is currently under consideration. Sharing of HazMat information with other state and federal jurisdictions is under review.

Highway Analysis System

The HAS is ADOT&PF's interactive, menu-driven transportation database. The HAS integrates highway-related information such as road inventory features, motor vehicle crash data, and traffic data. This information relates closely to the 3 main components that comprise the HAS:

- ROADLOG – defines the road network structure and is the basic building block of the HAS.
- ACCIDENTS – contains detailed information about motor vehicle crashes. The HAS database includes only those accident reports that are sent by the DMV, however the HAS is the most complete statewide database of vehicle crash data in the state.
- TRAFFIC – contains information about traffic volume, speed, classification, and turning movements.

The HAS feeds the Highway Data Port. The Data Port not only provides access to the HAS, but also the ADOT&PF's legacy transportation data database and the WIM program. The data port generates data extracts and reports based on user defined queries and is only available to authorized ADOT&PF personnel with a user ID and password.

The HAS resides on the Enterprise Technology Services (ETS) mainframe. ADOT&PF's Highway Database Section programmers maintain the HAS.

SAFER

SAFER provides safety and credentials data for motor carriers and vehicles. Many different state and federal transportation agencies use SAFER for data collection and retrieval. SAFER has interfaces with the Motor Carrier Management Information System (MCMIS), SAFETYNET, and state CVIEW systems.

SAFETYNET

SAFETYNET is a data management system for driver/vehicle inspections, commercial vehicle crashes, compliance reviews, assignments, complaints, enforcement cases, etc. It supports links to SAFER, MCMIS, and Compliance Analysis Performance Review Information (CAPRI). SAFETYNET is an Oracle-based client/server system.

Single and Extended Permit Process System

The Single and Extended Permit Process (SEPP) System is a web application integrated with various data systems that supports the automated issuance of Alaska permits. Payments are accepted via a third-party credit card acceptance system called Paymentech. Currently, the system in not capable of providing permits for all vehicles; however the MSCVE, which owns and maintains the system, is working to expand system capabilities to include all permits over the course of the next two years.

EMS Data System

The Department of Health & Social Services is developing an EMS Data System to capture EMS data such as nature of call, response times, multiple transports and courses of treatment from EMS service providers. This comprehensive collection system will automatically collect data from urban EMS service providers and allow smaller, rural EMS providers to enter information via a web interface. The EMS Data System will also permit integration of data with partner agencies such as ADOT&PF and the Alaska Injury Prevention Center, and will create linkages with the Alaska Trauma Registry (ATR), the Fatal Accident Reporting System (FARS), and the HAS traffic crash data.

Tunnel Control System and Train Signal System

The Anton Anderson Memorial Tunnel is controlled by two systems: the Tunnel Control System (TCS) and the Train Signal System (TSS). These two computer-based systems make it possible for cars and trains to safely take turns traveling through the tunnel.

The TCS is responsible for all vehicle movement within the tunnel. One of the system's primary functions is to monitor the direction of vehicle movement and, by controlling traffic signals and gates, to allow vehicles to travel in only one direction at a time. The TCS also monitors tunnel operations via live video covering the length of the tunnel, and continually monitors and adjusts the lighting and ventilation systems.

Similarly, the TSS is responsible for train movement through the tunnel. This system controls train switches and signals, and ensures that trains move through the tunnel in one direction at a time and only when there are no vehicles in the tunnel.

Remote Video Monitoring System

The Remote Video Monitoring System (RVMS) monitors commercial vehicle activity at the Port of Anchorage (Ocean Dock Road) and Minnesota Bypass, which are existing WIM sites. Through this technology, ADOT&PF is able to expand its commercial vehicle activities without hiring additional commercial vehicle enforcement (CVE) personnel. The systems help monitor commercial vehicle traffic and identifies high-risk and illegal carriers. Data collected by the system is shared with AST and the MOA for use by law enforcement, traffic control, and the Anchorage Area Metropolitan Transportation Study (AMATS). The commercial vehicle industry will also use summary information.

4.3.3 Vehicle-based Elements

Transit Vehicle On-board Equipment

Transit vehicles represent the various modes of transportation used to transport people within the State. This includes buses, ferries, and trains that are equipped with communications and sensory systems (e.g. wireless communications and GPS sensors) that allow either the vehicle or vehicle operator to communicate with other systems located either at the roadway or center. Transit vehicles may be equipped with automated vehicle location capability so they can be monitored and tracked in real-time, which in turn helps dispatch operators to update schedules, reassign vehicles to limit delays, or simply inform patrons to make their trip more convenient. Vehicles may also be equipped with traffic signal priority emitters that communicate with a receiver installed on a traffic signal to give transit vehicles priority when approaching or stopped at a traffic signal. In some cases, vehicles may not be equipped with either of these technologies, but rather instead rely on two way communications to obtain/transmit information to and from dispatch. Additionally, transit vehicles may be equipped with passenger counters and/or automatic fare collection systems to ease driver workload and streamline the collection of data for analysis in improving operations.

In Alaska, transit vehicle on-board equipment is currently limited to PeopleMover and Capital Transit. However, with that said, it is likely that within the next ten years that other transit providers will begin to deploy these technologies.

Emergency Response Vehicle On-board Equipment

Emergency response vehicles represent the various vehicles owned by statewide emergency response agencies (e.g., police, fire, and EMS) that are equipped with communications and sensory systems that allow either the vehicle or vehicle operator to communicate with other systems

located either at the roadway or at a center. Emergency response vehicles may be equipped with automated vehicle location capability so they can be monitored and tracked in real-time, which in turn helps dispatch operators to effectively and safely route vehicles. Vehicles may also be equipped with traffic signal preemption emitters that support signal preemption through communications with a receiver installed on a traffic signal. In some cases, vehicles may not be equipped with either of these technologies, but rather instead rely on two way communications to obtain/transmit information to and from dispatch.

Commercial Vehicle On-board Equipment

Commercial vehicles that use Alaska's roadways are equipped with technologies that can be used to improve mobility of goods, improve safety, and generally improve the efficiency of commercial vehicle operations. For this reason the systems installed on commercial vehicles will likely be used to improve:

- Electronic Screening & Registration
- Border Security
- Safety Assurance
- Fleet Management

Automated Vehicle Location Systems

In May 2007, ADOT&PF, Highways and Aviation Division issued a request for proposals to vendors to assist in the development of an AVL system for its fleet of vehicles. The primary purpose of the system is to help the Division "run their fleet more effectively and efficiently on a daily basis."[xx] The system is expected to track the location and monitor the status of equipment. The system will have and mapping and reports interface. Additionally, data form the AVL system will be pulled into the ADOT&PF's MMS.

Vessel Tracking System

The Alaska Marine Highway's Vessel Tracking System incorporates GPS sensor and low orbit satellite communications to provide near-real time vessel location information. Vessel location data will eventually integrate with the State's 511 system to provide real time arrival and departure information. The AMHS Vessel tracking system also transmits weather data collected by on-board weather instrumentation to the National Weather Service for use in their operations[xxi].

Smart M&O Vehicles

ADOT&PF, Maintenance and Operations, in coordination with the University of Minnesota, has equipped a snow plow and snow blower with advance technologies and communications (e.g., GPS sensors, radar, collision avoidance systems) as part of the over all effort to develop a smart snowplow and smart snow blower for Thompson Pass on the Richardson Highway. They have also outfitted a snow grader in Prudhoe Bay for the same purposes and plan to outfit an airport fire rescue vehicle in 2008. The systems and communications installed on these vehicles collect needed data to guide operators and keep the vehicle on the road during periods of severe snow fall and inclement weather. Data collected by the systems are used to plot the vehicle location with respect to the roadway. Information is plotted using GIS software and displayed using a monitor within the vehicle cab.[xxii]

ARRC Collision Avoidance System

ARRC is implementing a Collision Avoidance System to enforce train speed limits and prevent train-to-train collisions. The system relies on GPS sensors installed on trains and VHF radio data communications to continuously monitor train positions and to verify that trains are within authorized sections of track. The system is currently deployed on all 58 locomotives. Although the system can be automated, it includes a map display that allows dispatchers the ability to actively monitor train movements in real time, and based on observations to make corrective actions when trains exceed speed limits.

4.3.4 Personal Information Access

Personal information access includes the various systems and technologies the public owns and operates to report or request information. This includes:

- Cell phones
- Computers
- Personal Digital Assistants

Personal information access is facilitated in large part through the use of the internet to report and retrieve information. Therefore, websites that are implemented and operated by public agencies, which provide the public with travel or traveler services information are described below.

511 Travel Information System

ADOT&PF owns, operates and maintains a statewide 511 traveler information service, called 511 Travel-in-the-Know, that provides real-time traveler information to travelers via an interactive website (511.alaska.gov) and through any phone (5-1-1 or 866-282-7577). The types of information available include:

- Urgent Reports (e.g., road closures, hazardous driving conditions, major accidents, natural disasters affecting travel, etc.)
- Winter driving conditions
- Highway construction and maintenance activities
- Route & regional reports
- National Weather Service weather and forecasts

The CARS feeds the states 511 system (website and phone service). CARS allows quick entry of events and information to disseminate travel related information on a near real-time basis. The CARS program partners in Alaska include:

- ADOT&PF M&O, construction, and bridge design
- Alaska State Trooper
- Palmer Police Department
- Measurement Standards and Commercial Vehicle Enforcement
- National Weather Service
- Alaska Marine Highway
- U.S. Customs and Border Protection
- Municipality of Anchorage - Anchorage Police Department, Water & Waste Utilities, street maintenance, and construction
- Denali National Park
- Yukon Roads Departments

Authorized CARS agencies can enter and update information as needed. This information is then plotted within a geographic information system for spatial understanding. Information entered into CARS is also achieved for analyzing past events and patterns.

CARS automatically ingests NWS weather and forecasts to display on the 511 Travel in the Know.

Transit Information Websites

Transit management agencies throughout the state own, operate and maintain websites that provide transit users with information they need to plan a transit-based trip. Transit agencies include:

- City and Borough of Juneau Capital Transit – http://www.juneau.org/capitaltransit/index.php
- Municipality of Anchorage PeopleMover - *http://www.peoplemover.org/*
- Fairbanks North Star Borough - http://co.fairbanks.ak.us/Transportation/default.htm
- Matsu Community Transit - http://www.matsutransit.com/
- Kenai Central Area Rural Transit System - http://www.ridesalaska.org/#
- Ketchikan Gateway Borough Transit System - http://borough.ketchikan.ak.us/works/bus_info.htm
- Kodiak Area Transit System - http://home.gci.net/%7Ekodiakseniorcenter/kats.html
- Sitka Center for Community - http://www.ptialaska.net/~cfcsitka/

These websites generally provide the following types of information; however, the exact information provided vary between provider's websites.

- Origin and destination
- Departure time
- Arrival time requirements
- Ability to transfer
- Travel time table generator
- System maps
- Detailed route information, including:
  - Major transfer points
  - Major points of interest

Several websites also provide dynamic route generators, that provide users with the ability to determine the optimal route based on designated requirements.

Alaska Marine Highway System Website

AMHS operates a website that enables travelers to access ferry service information, including:

- Schedule, reservations, and fares
- Schedule search
- On-line reservations
- Schedule changes
- Links to port cities' websites
- Tour services

The AMHS website is located at *http://www.dot.state.ak.us/external/amhs/home.html*.

The Alaska Marine highway system includes an online real-time reservation system.

4.4 Communication Systems Analysis

This section summarizes the communication systems deployed in the State of Alaska. Although these systems do not currently support ITS functions, they could potentially support the future ITS functions identified in the ITS Long-Range Vision. This section also provides an analysis of the communications infrastructure that is needed to realize the ITS Long-Range Vision.

4.4.1 Existing Communication Systems

The existing telecommunication infrastructure that could potentially support ITS functions in the future is described below.

Basic Telephone Service (Local)

The Department of Administration (DOA) provides local telephone services. Each telephone line is billed at a fixed annual fee that covers the equipment, facilities, contracted services, and personnel services required to provide a dial tone to the DOA demarcation point. Basic telephone service rates include direct lines connecting DOA owned/managed telephone switches and remote peripheral equipment.

Enhanced telephone features are available for an additional service fee. Voice Mail, Automated Call Distribution (ACD), Auto Attendant, and Recorded Announcements are a few of the available features. DOA supplies phone sets for basic telephone customers at an additional charge.

DOA also provides materials, consulting, training, repairs, and wiring for the basic telephone service described above, and for phones not connected to the DOA owned/managed switches. Services are performed on an as-needed basis and billed at an additional fee. DOA also provides a number of teleconference-related services.[xxiii]

Measured Telephone Services (SATS Long Distance)

This service refers to interstate and intrastate long distance phone calls made on both state and leased private carrier lines. Access is provided to those customers subscribing to ETS's basic telephone service. Measured service is available between Juneau, Anchorage and Fairbanks. This service is provided via leased lines from a common carrier between Juneau to Anchorage and state-owned microwave(SATS) between Anchorage and Fairbanks. Charges are based on the number of minutes per call and are billed monthly. Rates are based on anticipated ETS costs and statewide volume for the fiscal year. ETS costs consist of a prorated portion of the microwave facilities between Anchorage and Fairbanks, leased line service between Anchorage and Juneau, and personnel services.

Measured service is also referred to as "On Net" (using state managed and billed facilities). Long distance communications provided and billed directly by private carriers is referred to as "Off Net".[xxiv]

Dedicated Lines (SATS)

Dedicated or private lines are leased to state agencies for either data or voice traffic. These lines are leased from a common carrier and/or are provided via the state's microwave system. ETS costs include leased service from common carriers, facilities and equipment costs, and personnel services. Rates for leased lines are calculated by multiplying the number of miles between terminating

locations by a per-mile fee. The per-mile fee varies between 9.6KB and T-1 line capacities. Billing for leased lines occurs on an annual basis at the beginning of the fiscal year.[xxiv]

Statewide Paging (SATS)

Paging service is provided in Juneau, Anchorage, Fairbanks, Palmer, Kodiak, Wasilla, Soldotna, Glennallen, Cordova, Homer, Seward, Valdez, Tok and Delta, Talkeetna, and Cantwell. Customers purchase their own paging devices through ETS and are provided local pager access numbers. The purchase price includes benchwork, programming and requisition fee.

Pagers can be accessed through any touch tone telephone. Customers are billed on an annual basis at the beginning of each fiscal year. Customers are charged an annual fee based on the cost of providing shared equipment, long distance communication when needed, maintenance, and operational support to administer the paging system. Additionally, customers requesting changes to pagers are charged an administrative fee.[xxiv]

Two-Way and Other Radio (SATS)

Two-way radios are extensively used throughout the State to support public safety, law enforcement, correctional industries, natural resource management, operating public facilities and delivering emergency medical service. Costs include mobile, portable, base and repeater stations. Rates are based on circuits, space and power. A fee is charged for a dedicated circuit (9.6kb) used exclusively by an agency to carry two-way radio traffic between communication facilities. Space and power rates are the lease cost for the space and power needed to provide facilities for customer-owned equipment. Purchase prices for customer equipment include benchwork, programming and requisition fees. Dedicated circuits are used to carry radio traffic across broad geographic areas. FCC licensing includes frequency coordination for marine, land, and auxiliary television broadcast stations. Customers request radio maintenance and are billed on a monthly basis for the time and materials necessary to complete the request. Billing for travel, meals and incidental expenses are based on current administration and personnel costs.[xxiv]

WAN Connectivity

There is a state-owned Wide-Area Network (WAN) in Alaska. WAN connectivity encompasses all personal services, equipment, software, telecommunication lines, and other contractual services needed to operate and manage a fully functional multi-protocol network. These services include:

- Network load management
- Maintenance
- Configuration of agency routers
- Equipment purchases
- Installation of all DSU/CSU, data path and data lines used for data communication between agency LANs and the WAN
- Products such as the enterprise-wide email system
- Internet connectivity links in Anchorage and Juneau

The State WAN supports IP, SNA, IPX, FTP, SMTP, HTTP, and other protocols. DOA offers assistance in configuring network connections and selecting equipment (terminals, printers, etc.) that have been tested and found to function properly on the WAN. DOA performs network troubleshooting and DOA software offers network analysis including netbios, IPR and TCP/IP protocol to assist agencies with higher level diagnostics and LAN performance analysis.[xxiii]

Land Mobile Radio System

The Land Mobile Radio System (LMRS) is a project that is converting state radio systems to enable the interoperability and efficiency of two-way radio resources at the state, local and federal levels. This will prove very useful in coordinating operational procedures and responding to natural disasters and other major catastrophes. The land mobile radio system is used today by emergency responders and public safety officials for secure communications in daily operations. However, the system is not restricted to normal operations, but rather is a flexible and secure solution for communicating in real-time during emergencies. With the land mobile radio system, emergency responders and public safety officials can effectively communicate with each other in the environment in which they work, reducing delay and enabling more prompt response to emergencies.

Emergency Medical Service Communications

In addition to the systems described above, other communication systems have been implemented to support EMS operations. These systems include:

VHF-HB/UHF Radio Networks

The state-maintained portion of the Department of Health and Social Services (DHSS)/EMS radio system consists of two components:

- The VHF-HB base station /repeater network consisting of the State's two-way radio sites
- The Kenai Peninsula-Turnagain Pass Call Box System

The VHF-HB two-way radio network uses one simplex and four repeater frequencies throughout Alaska's two-way radio sites. Base stations and repeaters provide radio communications for regional hospitals, clinics, and dispatch centers, to be used by EMS personnel for coordinating medical emergencies.[xxv]

Other Mobile Radio Resources

Throughout the State, EMS has formal and informal arrangements to use other agencies' radio systems when needed during emergencies. These radio systems include those owned by the AST, ADOT&PF, and other State and Federal agencies.

The U.S. Coast Guard currently has eleven VHF-HB sites. Some of these sites have been upgraded with towers, power plants, and base stations to improve coverage. The USCG has a program called "PARTNERING" which allows sharing a radio site with public-safety agencies if the facilities can support the additional equipment.[xxv]

Microwave System

Alaska has a well-established microwave system, consisting of 120 sites that generally parallel the most used portions of Alaska's highway system. The microwave system is the state's main communication backbone. The microwave system typically has served the AST and ADOT&PF, it is available to all state agencies.

Enterprise Technology Services (ETS) has upgraded this system to digital transmission and increased its capacity. It has been upgraded to digital (with DS-3 capacity) from Anchorage to Soldotna, and from Anchorage to Glennallen. It was converted to digital from Glennallen to Fairbanks along the Richardson and Alaska Highways this year, and from Anchorage to Fairbanks via the George Parks Highway.[xxv]

Optical Fiber Cable Systems

An 800-mile fiber link has been installed between Valdez and Prudhoe Bay. This fiber link connects 21 communities and is used by the Division of Emergency Services (DES) of the Department of Military and Veteran Affairs to save on leased landline costs.[xxv]

Highway Call Boxes

Call boxes have been deployed at strategic locations along Alaska's highways to enhance travel safety in Alaska. Call boxes allow motorists to report emergencies to 911 dispatchers at locations where there is a lack of communications. Each call box has a unique ID number which dispatchers use to determine the location where the call is made. Depending on their location, call boxes make use of both wireline and wireless communications. Due to their cost and the inability to determine accurate usage, call boxes are not attractive options for reporting emergencies on a large geographic scale. Call boxes are more attractive at locations with known problems (e.g., high crash rates) and lack of communications. The location of call boxes are detailed below:[xxvi,xxvii]

- George Parks Highway MP 57.4 (located in the Houston Volunteer Fire Department)
- George Park Highway MP 97 (sunshine station)
- Chena Hot Springs Road MP 23.5 (Valley Center)
- Glenn Highway (MP 30.8 - MP 120)
- Seward Highway (MP 68.3 – Turnagain Pass)
- Seward Highway (MP 56 – Hope Road Junction)
- Seward Highway (MP 45.5 – Summit Lake Lodge)
- Sterling Highway (MP 40)
- Whittier Tunnel (every 300 feet)

Call boxes are funded by Injury Prevention and Emergency Medical Services and maintained by the Regional Maintenance and Operations Divisions.

Aircraft Radio Communications

Given Alaska's rural and isolated environment, the use of fixed-wing aircraft and helicopters to evacuate patients is critical. To support this need, most communities in Alaska have an airport.

A total of 17 air-medical service providers are certified by the state. These providers include private air carriers, the 283rd Medical Detachment at Ft. Wainwright, the United States Coast Guard, and the Air National Guard. Generally speaking, airborne units are not equipped with radios that can be programmed to EMS frequencies. Consequently, airborne units cannot communicate with ground units.[xxv]

It is common to use land mobile radio channels in aircraft to communicate with the ground during air medical transports. However, there are serious limitations to the use of land-mobile equipment for air-ground communications.

4.4.2 Future Improvements

In 2007 the City of Wasilla received a federal grant in the amount of $4,250,000 ($4,670,320 with State DOT match) to implement a broadband wireless communications network for the Palmer, Wasilla, Houston core area. This network will increase the efficiency and security of public safety communications, and will be used primarily by law enforcement and homeland security agencies, although the network will also be available for ADOT&PF to use, for such applications as installing video cameras at critical intersections. The network will pave way to easily and securely transmit

video, audio, and data communication among the various agencies that have access to the network.

The network will use an entirely different communications frequency than is currently used. The network will use the 4.9 GHz band or simply 4.9. This band allows users to transmit data through a high-speed broadband connection similar to a normal Internet connection. Unlike the Internet however, the 4.9 band is a secure frequency and it's mobile, allowing emergency responders to access the network remotely from Mobile Data Terminals installed within their vehicle. With this new communications network, emergency officials will be able to view streaming video, which will offer greater insights into the events and conditions occurring in the field which in turn can provided for improved emergency response. From ADOT&PF's perspective, the network can also be used to enhance traveler information, giving motorists the ability to make effective decisions using real-time observations from the field.

4.4.3 Communication Systems Needs

Support of the functions identified in the ITS Long-Range Vision will require a reliable communication system. Several different operating entities in the State of Alaska have deployed a variety of communication systems that can be used to support these functions. However, additional communication infrastructure will be required to fully realize the ITS Long-Range Vision. This section provides a summary of the communication infrastructure that will be required. Communications systems discussed below are characterized as:

- Center to Center - Communication systems that link two centers or stationary locations (e.g., traffic operations to field maintenance facility).
- Center to Vehicle - Communications systems that link an operations center to a vehicle in the field (e.g., field maintenance facility to snow plow).
- Vehicle to Vehicle - Communications systems that link two vehicles in the field (e.g., maintenance vehicle to maintenance vehicle).
- Vehicle to Roadside – Communications systems that link systems installed on a vehicle with systems deployed in the field (e.g., systems that support Vehicle Infrastructure Integration).
- Center to Roadside - Communications systems that link an operations center to a field device (e.g., traffic operations center controlling a VMS).

Center-to-Center

The center-to-center communication required to achieve the ITS Long-Range Vision will essentially link different operational entities within ADOT&PF and their stakeholders. This communication requirement will be met in large part by the existing WAN that has been implemented by the Department of Administration. Commercial telecommunication service providers will meet additional communication requirements. By using commercial telecommunications service providers to achieve the ITS Long-Range Vision, the ADOT&PF will essentially only be required to secure adequate bandwidth to support required functions.

Center-to-Vehicle

Center-to-vehicle communications will mainly support ADOT&PF's normal maintenance operations and emergency operations. Center-to-vehicle communications will require both voice and data transmission. The Land Mobile Radio System (LMRS) will support voice communications. Data communications could potentially be supported by a combination of the LMRS, cellular, and satellite.

Vehicle-to-Vehicle

The project team envisions that the vehicle-to-vehicle communications identified in the ITS Long-Range Vision will only require voice transmission. LMRS and cellular will support this communication requirement.

Vehicle-to-Roadside

Although not a critical need at the moment, vehicle-to-roadside communications will be needed in the future (beyond 2009) to support vehicle infrastructure integration (VII). Vehicle-to-roadside communication will likely occur primarily though wireless communications (e.g., the Land Mobile Radio System).

Center-to-Roadside

Center-to-roadside communication will require the transmission of both data and video images from the field. Video images will include still images and motion video. This communication requirement could potentially be supported by the existing microwave system, or possibly by deployment of Low Earth Orbit Satellite (LEOS).

4.5 Operational Challenges

The Operational Concept provides the opportunity to identify current functions and future functions that the ADOT&PF and other Alaska stakeholders desire. Additionally, the Operational Concept identifies the ITS and communications systems that are needed to support the desired functionality.

In this section, the Operational Concept provides an opportunity to identify issues that must be considered and addressed in planning, developing, and deploying ITS. The issues associated with deployment, as identified by ADOT&PF and other stakeholders in Alaska, are documented below.

4.5.1 Funding

The potential costs associated with deploying and operating ITS technology could be significant. This presents a significant challenge, given that budgets are becoming increasingly constrained and also due to the fact that ITS projects compete with other traditional transportation projects for funding. The specific costs that must be considered when developing and implementing ITS include:

- Planning (i.e., needs analysis, requirements list, concept of operations, etc.)
- Design
- Deployment of infrastructure
- Routine and emergency maintenance
- Organizational adaptation (i.e., does the organization have the needed resources or ability to obtain them).
- Hiring or retaining staff with the knowledge, skills, and abilities to deploy, operate and maintain ITS elements.
- Training

ADOT&PF and their stakeholders recognize many of the challenges they will face in deploying, operating and maintaining an ITS infrastructure. As such, they have identified the need to:

- Identify innovative financing techniques.
- Form partnerships (including both public/public and public/private).
- Develop projects using a systems engineering analysis.
- Involve stakeholders early in the planning phase and keep them abreast of project developments.
- Attend ITS workshops and conferences to stay abreast of issues and learn from others.
- Gain upper management support for ITS.
- Adopt the regional and statewide architectures as formal planning documents.
- Update and maintain regional architectures.

In order to justify the capital and operating expenses required, ITS initiatives must offer greater benefits than their costs. Alaska is mainly a rural state with urgent basic transportation concerns. In order for these new costs to warrant state investment ITS must compete in practical terms with projects that provide basic transportation.

4.5.2 Organizational Support for ITS Deployments

For ITS to be well supported, there is a need for organizational maturing. The full benefits of deploying these systems will not be recognized if they cannot be supported within the existing organizational structures of ADOT&PF and their stakeholders in the State of Alaska. Therefore, the following issues should be considered when developing and deploying ITS in Alaska:

- Emphasize the benefits of ITS, i.e. cost savings, improved operational efficiency, and minimal disruption to existing functions.
- Plan for future ITS deployments, i.e. formally adopt the regional and statewide ITS architectures and maintain them regularly.
- Develop ITS Alaska, ITS State Chapter
- Provide regular ITS training and workshops
- Emphasize existing and potential funding, i.e. STIP, grants, earmarks, etc.
- Gain upper level management support
- Promote ITS through workshops, conferences and meetings
- Involve and coordinate with potential stakeholders

4.5.3 Public Awareness

Successful ITS deployment involves public awareness. Informing the traveling public that ITS is making their travel more safe, efficient and convenient helps gain public support for an agencies ITS program. In turn, public support helps maintain a strong and lasting ITS program for the State of Alaska.

4.5.4 Inter-Jurisdictional Coordination

ADOT&PF and their stakeholders recognize the need to coordinate ITS project planning, design, implementation, and operations across jurisdictional boundaries. Inter-jurisdictional coordination may be achieved through:

- The implementation of a regional traffic operations center. This center could potentially serve as focal point for information dissemination that fosters coordination and cooperation across jurisdictional boundaries. A Regional TOC is in the long-term plans with the MOA.
- Memorandum of Agreements (MOA). MOA's can address responsibilities of each jurisdiction and formalize a partnership.
- Conference or workshops that can bring all parties to the table and address the needs and issues.
- Participation in the development and review of statewide and regional plans.

4.5.5 Deployment of Standards Compliant Systems

ITS standards define how ITS systems, products, and components can interconnect, exchange information and interact to deliver services within a transportation network. ITS standards are open-interface standards that establish communication rules for how ITS devices can perform, how they can connect, and how they can exchange data in order to interoperate.

ITS standards can help maximize ITS investments because they allow data sharing:

- Between devices manufactured by different ITS vendors at different times
- Across different ITS applications
- Among transportation agencies located in different jurisdictions

Some challenges related to using and conforming to ITS standards include:

- Reluctance in deploying ITS that is on the "bleeding edge" of technology where standards have not been clearly defined yet
- Lack of understanding what ITS standards are and how they apply

4.6 Operational Concepts

The following section identifies and describes at a high-level the operational concepts that are applicable for fulfilling ITS functions in Alaska. Operational concepts are derived using National ITS Architecture market packages. Market Packages simply represent the physical infrastructure that corresponds, and is needed to implement a particular transportation service. By using Market Packages, it is not only easier for stakeholders to understand where they fit in terms of the context of ITS activity, but also links Alaska's architecture development effort to the National ITS Architecture – a common, consistent, and required (if Federal Funds are being used) approach for planning and implementing ITS.

User services are addressed in Chapter 2 and identify what ITS should do from the user's perspective. They are included within each operational concept and are based on the needs addressed in Chapter 1.

4.6.1 Traffic Management Concepts

Network Surveillance

This operational concept relies on the use of traffic detectors, other surveillance equipment, and the supporting field equipment, including fixed point communications to collect and transmit data for use in making traffic management decisions. In Alaska, this concept would involve use of traffic

detectors, cameras, and weather instrumentation and sensors. Collected data can be analyzed for accuracy and sensitive information and made available to users of Alaska's transportation network.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Traffic Control
- Incident Management

Agencies roles and responsibilities for performing this concept is are shown in Table 4-2.

Surface Street Control

This operational concept relies on the use of equipment and communications that allow central monitoring and control of traffic signals. In Alaska, this concept would apply to the network of traffic signals (primarily within the municipalities of Anchorage and Fairbanks) that can be remotely controlled and monitored. In other words, not isolated traffic signals that are not interconnected. Besides the aforementioned equipment, the concept also relies on the use of traffic detectors, cameras and other surveillance equipment to support urban traffic signal control, local surface street control and/or arterial traffic management. Although existing roadway cameras are currently limited to non-arterial RWIS sites, cameras will likely be installed on traffic signal masts or other arterial locations and can be used to remotely monitor traffic conditions along the arterial.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Highway Rail Intersection
- Traffic Control
- Incident Management

Agencies roles and responsibilities for performing this concept is are shown in Table 4-3.

Traffic Information Dissemination

This operational concept relies on the use of equipment and systems located along the roadway that provide information to driver's en-route so they can make informed decisions and adjust their driving behavior. A wide range of information can be disseminated including traffic and road conditions, closure and detour information, incident information, and emergency alerts and driver advisories. The equipment and systems that typically support this concept include dynamic message signs and highway advisory radio. Only 4 DMS exist in Alaska. HAR is not currently used; however it may be certainly possible that this technology be applied at specific locations in Alaska. Although the state does not have a traffic management center, this concept would cover the equipment and interfaces that provide traffic information from an agency responsible for traffic management functions to the media (for instance via a direct tie-in between a traffic management center and radio or television station computer systems).

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- En-route Driver Information
- Traffic Control
- Incident Management

Agencies roles and responsibilities for performing this concept is are shown in Table 4-4.

Regional Traffic Control

This operational concept relies on roadside ITS elements used in the Network Surveillance and Surface Street Control concepts and adds the communications and software needed to allow multiple agencies to share information from and/or control an agency's ITS elements. For this concept to work inter-agency agreements should be developed to prevent conflicts in terms of use of equipment and to prevent sensitive information from being released to the public. In Alaska, this concept applies to an agency's internal traffic signal operations. However, it does allow agencies the potential to operate each other's signals if agencies enter into an agreement to do so.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Traffic Control

Agencies roles and responsibilities for performing this concept is are shown in Table 4-5.

Traffic Incident Management

This operational concept relies on the use of center-to-center communications, cameras, and traffic detectors, to detect, verify, and manage both unexpected incidents and planned events so that the impact to the transportation network and traveler safety is minimized. Traffic management agencies will be primarily responsible for detecting, verifying, managing the incident as the response to the incident evolves, however; the following other agencies might also be involved in this concept, to either coordinate activities and/or resources or to adjust activities and plans in an effort to improve response and manage traffic:

- Maintenance and construction management
- Emergency service providers
- Emergency management
- Rail operations
- Event promoters
- Roadside cleanup companies

It is likely that this operational concept will be undertaken in parallel with the Traffic Information and Dissemination operational concept to deliver information to travelers en-route so they are not adversely impacted by the incident, but more importantly, to divert vehicles away from the incident so as to provide more timely response to, and clearance of, the incident.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Incident Management
- Emergency Vehicle Management
- Disaster Response and Evacuation

Agencies roles and responsibilities for performing this concept is are shown in Table 4-6.

Table 4-2:
Key Stakeholder Roles and Responsibilities for Network Surveillance

Stakeholder	ITS Elements	Roles and Responsibilities
ADOT&PF, Program Development	RWIS cameras	• Operate and expand network of cameras both at RWIS sites and at other roadway locations. • Monitor the operational status of cameras. • Collect and store camera images. • Oversee operation of the internal RWIS website (the RWIS contractor currently manages this site).
ADOT&PF, Highway Data Section (Headquarters)	Automatic traffic data recorders	• Install, operate, and maintain statewide network of Automatic Traffic Data Recorders (ATRs). • Monitor the operational status of ATRs.
ADOT&PF, Program Development	Automatic traffic data recorders	• Collect, monitor, and store ATR data.
Alaska Marine Highway System	AMHS security cameras	• Monitor the AMHS terminal facilities, surrounding waters, and vehicle and passenger traffic via the internet.
MOA, Traffic Department, Division of Traffic Engineering, Data Section	Traffic detectors	• Install and operate traffic detectors within the MOA. • Monitor the operational status of traffic detectors. • Collect and store traffic detector data. • Share detector data with MOA, Traffic Department, Transportation Planning.

Table 4-3:
Key Stakeholder Roles and Responsibilities for Surface Street Control

Stakeholder	ITS Elements	Roles and Responsibilities
ADOT&PF, Regional Traffic Divisions	Traffic signals (State owned)	• Install and operate traffic signals (state highways). • Control state-owned traffic signal system. • Monitor operational status of state owned traffic signals. • Maintain state owned traffic signal equipment. • Coordinate traffic signal activities with MOA, Traffic Department, Division of Traffic Engineering, Signal Section. • Exchange traffic signal information with MOA, Traffic Department, Division of Traffic Engineering, Signal Section (e.g., status, timing plans, etc.).
MOA, Traffic Department, Division of Traffic Engineering, Signal Section	Traffic signals (MOA)	• Monitor operational status of municipal traffic signals. • Control municipal traffic signal system. • Maintain municipal traffic signal equipment including priority systems. • Coordinate traffic signal activities with ADOT&PF Regional Traffic and Safety Offices (predominantly ADOT&PF Central Region). • Exchange traffic signal information with ADOT&PF, Regional Traffic and Safety Offices.
	Cameras (future arterial locations)	• Implement, operate and maintain cameras. • Verify traffic signal timing plans and operation. • Monitor cameras to assess traffic conditions along arterials.
MOA, Traffic Department, Division of Traffic Engineering, Data Section	Traffic detectors	• Install and operate traffic detectors within the MOA. • Monitor the operational status of traffic detectors. • Collect and store traffic detector data. • Share detector data with MOA, Traffic Department, Signal Section.

Table 4-4:
Key Stakeholder Roles and Responsibilities for Traffic Information Dissemination

Stakeholder	ITS Elements	Roles and Responsibilities
ADOT&PF, Division of Measurement Standards and Commercial Vehicle Enforcement	Permanent Dynamic Message Sign (located at Port of Anchorage)	• Operate and post messages to DMS. • Monitor operational status of DMS.
ADOT&PF, Regional Maintenance and Operations Divisions	Portable Dynamic Message Signs	• Deploy and program portable DMS.
MOA, Police Department	Permanent Dynamic Message Signs (2 located outside of Anchorage on Glenn and Seward Highways)	• Operate and post messages to DMS. • Monitor operational status of DMS.
ADOT&PF, Regional Maintenance & Operations, MS&CVE	Permanent Dynamic Message Sign (1 Fox, Alaska weigh station)	• Operate and post messages to DMS. • Monitor operational status of DMS.
MOA	Integrated traffic management center (Future)	• Provide road network condition information to emergency management, transit management, and other traffic management agencies and the media.

Table 4-5:
Key Stakeholder Roles and Responsibilities for Regional Traffic Control

Stakeholder	ITS Elements	Roles and Responsibilities
ADOT&PF, Regional Traffic Divisions	Traffic signals (state roads)	• Monitor operational status of state owned traffic signals. • Control state-owned traffic signal system. • Maintain state owned traffic signal equipment. • Coordinate traffic signal activities with MOA, Traffic Department, Division of Traffic Engineering, Signal Section. • Exchange traffic signal information with MOA, Traffic Department, Division of Traffic Engineering, Signal Section (e.g., status, timing plans, etc.).
ADOT&PF, Regional Highway Data Sections	Automatic traffic data recorders (State)	• Install and operate network of Automatic Traffic Data Recorders (ATRs). • Monitor the operational status of ATRs. • Collect and archive ATR data.
MOA, Traffic Department, Division of Traffic Engineering, Signal Section	Traffic signals (MOA)	• Monitor operational status of municipal traffic signals. • Control municipal traffic signal system. • Maintain municipal traffic signal equipment including priority systems. • Coordinate traffic signal activities with ADOT&PF Regional Traffic and Safety Offices (predominantly ADOT&PF Central Region). • Exchange traffic signal information with ADOT&PF, Regional Traffic and Safety Offices.
MOA, Traffic Department, Division of Traffic Engineering, Data Section	Traffic detectors (MOA)	• Install traffic detectors. • Monitor operational status of traffic detectors. • Collect and archive traffic detector data. • Share detector data with MOA, Traffic Department, Transportation Planning.

Table 4-6:
Key Stakeholder Roles and Responsibilities for Traffic Incident Management

Stakeholder	ITS Elements	Roles and Responsibilities
ADOT&PF, Regional Maintenance and Operations Divisions	RWIS	• Monitor the operational status of RWIS cameras. • Observe weather and roadway conditions using RWIS cameras. • Notify Emergency Management Agencies of potential environmental threats (e.g., avalanches). • Assist Emergency Management in responding to environmental threats. • Provide emergency response agencies with camera images (via CCTV website).
	RWIS cameras	• Disseminate collected traffic images to traffic and emergency management agencies for use in preparing a response to incidents.
MOA, Traffic Department, Division of Traffic Engineering, Signal Section	Cameras (future arterial locations)	• Disseminate collected traffic images to traffic and emergency management agencies for use in preparing a response to incidents.
MOA, Office of Emergency Management, Emergency Operations Center	Phone, internet and e-mail communications	• Develop and implement emergency response plans for major environmental and man-caused disasters. • Manage response to major disasters. • Coordinate emergency response with police, state troopers, and emergency medial service providers (major incidents only). • Operate emergency alert system and disseminate emergency alert information.

Local Police Departments	Mobile data terminals	• Provide emergency personnel in the field with road and weather information. • Provide emergency personnel in the field with incident status and decision making information.
	Phone, internet and e-mail communications	• Provide incident notification and status information to; People Mover Transit and MOA, Maintenance and Operations Department, Division of Park and Street Maintenance
Department of Public Safety, Division of State Troopers	Mobile Data Terminals	• Provide emergency personnel in the field with road and weather information. • Provide emergency personnel in the field with incident status and decision making information.
	Phone, internet and e-mail communications	• Coordinate emergency response with emergency management and communications centers (major incidents only). • Provide incident notification and status to transit management agencies.
City of Fairbanks, Emergency Communications Center	Phone, internet and e-mail communications	• Coordinate emergency response with police, state troopers, and emergency medial service providers (major incidents only).
Anchorage Fire Department, Communications Center	Phone, internet and e-mail communications	• Coordinate emergency response with police, state troopers, and emergency medial service providers (major incidents only).
Alaska Railroad Corporation	Avalanche detection system	• Detect incidents. • Notify emergency response and management agencies of incidents affecting surface transportation.

4.6.2 Traveler Information Concepts

Interactive Traveler Information

This concept relies on the use of internet based technologies (personal computers and personal digital assistants (PDAs), phone communications, and kiosks) to push a tailored stream of traveler information to travelers en-route and pre-trip. In Alaska, this concept primarily pertains to the 511 website and phone system to provide real-time transportation information and alerts.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Pre-Trip Traveler Information
- En-Route Traveler Information
- Traveler Services Information
- Incident Management
- Electronic Payment Services

Agencies roles and responsibilities for performing this concept is are shown in Table 4-7.

Transportation Operations Data Sharing

This concept relies on the collection and use of real-time transportation operations data to facilitate the exchange of information between agencies. Information will be stored on a central server so agencies can make operational decisions based on a wide view of the entire transportation network. In Alaska, this concept will rely on the CARS/511 system, which is already in place, to store and disseminate near-real time conditions and events effecting transportation. Agencies with access to the CARS/511 system can quickly acquire event and condition information to improve their operations.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Traffic Control
- Incident Management
- Public Transportation Management
- Electronic Payment Services
- Disaster Response and Evacuation
- Maintenance and Construction Operations

Agencies roles and responsibilities for performing this concept is are shown in Table 4-8.

Table 4-7:
Key Stakeholder Roles and Responsibilities for Interactive Traveler Information

Stakeholder	ITS Elements	Roles and Responsibilities
ADOT&PF, 511 Management Center	511 Travel in the Know Website	• Monitor status and maintain the 511 website • Provide tailored information based on user requests for information (via web). • Input conditions and events affecting transportation
	511 Phone System	• Operate & maintain 511 phone system. • Provide tailored information based on user requests for information (via phone).
ADOT&PF, Program Development	511 Web and Phone System	• Market 511 Program
Alaska Marine Highway System	AMHS Website	• Disseminate ferry traveler information.
	CARS/511	• Provide near real-time arrival departure information
Transit Management Agencies	Transit Agencies Websites	• Disseminate transit traveler information.
Alaska State Troopers	CARS/511	• Input conditions and events affecting transportation
Local Police Departments	CARS/511	• Input conditions and events affecting transportation
ADOT&PF, Measurement Standards and Commercial Vehicle Enforcement	CARS/511	• Input conditions and events affecting transportation
National Weather Service	CARS/511	• Provide link to weather and forecast data
Denali National Park	CARS/511	• Input conditions and events affecting transportation

MOA, Maintenance and Operations , Water & Waste Water Utility, Project Management & Engineering	CARS/511	• Input conditions and events affecting transportation
ADOT&PF, Regional Maintenance and Operations Divisions, Regional Construction, Headquarters Bridge Design & Engineering	CARS/511	• Input conditions and events affecting transportation
Regional Transit Agencies	CARS/511	• Input schedule information

Table 4-8:
Key Stakeholder Roles and Responsibilities for Transportation Operations Data Sharing

Stakeholder	ITS Elements	Roles and Responsibilities
ADOT&PF, 511 Management Center	CARS/511	• Monitor operational status of the CARS system.
Alaska State Troopers	CARS/511	• Input conditions and events affecting transportation
Local Police Departments	CARS/511	• Input conditions and events affecting transportation
ADOT&PF, Measurement Standards and Commercial Vehicle Enforcement	CARS/511	• Input conditions and events affecting transportation
National Weather Service	CARS/511	• Input conditions and events affecting transportation
Alaska Marine Highway	CARS/511	• Input conditions and events affecting transportation
Denali National Park	CARS/511	• Input conditions and events affecting transportation
MOA, Maintenance and Operations , Water & Waste Water Utility, Project Management & Engineering	CARS/511	• Input conditions and events affecting transportation
ADOT&PF, Regional Maintenance and Operations Divisions	CARS/511	• Input conditions and events affecting transportation

4.6.3 Maintenance and Construction Management Concepts

Maintenance and Construction Vehicle and Equipment Tracking

This operational concept relies on the use of AVL systems (e.g., GPS units) to locate and track maintenance and construction vehicles. In Alaska, this concept would be used to improve effectiveness and efficiency of existing maintenance and construction operations. Through this concept, maintenance personnel would be able to track maintenance vehicle movements to determine which roads have not been plowed and direct plows to these locations. In doing so not only do roads get plowed more quickly, but also the materials laid down (salt, sand and chemical) to fight snow and ice will be used more efficiently, reducing the duplicative use of material on roads that were recently treated. Although not currently planned, GPS units may also be installed on construction vehicles and used to ascertain the location of construction vehicles and determine if construction vehicles and equipment are being used at desired locations. This information can be used to improve how construction vehicles and equipment are assigned, maximizing the use of equipment, and reducing the cost of purchasing additional equipment that is not needed.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Maintenance and Construction Operations

Agencies roles and responsibilities for performing this concept is are shown in Table 4-9.

Road Weather Data Collection

This operational concept relies on the use of environmental sensors, like those associated RWIS to collect road (i.e., pavement) and weather (i.e., atmospheric) conditions (i.e., icy roads, high-winds, dense fog). It is also within this concept where the various road and weather data are consolidated to improve forecasts and to operational decision making. In Alaska, this operational concept will consolidate road and weather data from the various agencies that collect this information, so it can be shared and used more effectively.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Maintenance and Construction Operations

Agencies roles and responsibilities for performing this concept is are shown in Table 4-10.

Weather Information and Processing and Distribution

This operational concept relies on the processing systems and center-to-center communications that will be used to process and disseminate road and weather information collected by the Road Weather Data Collection Concept. Processed weather information can be passed to other agencies to develop responses to the types of data collected and to initiate alerts and warnings to drivers using the Traffic Information Dissemination Concept. In Alaska, ADOT&PF's Program Development Division would be the primary party responsible for this concept. In terms of maintenance operations, processed road and weather information provided by this concept would improve the assignment of maintenance equipment, conserve snow and ice fighting resources (salt, sand and chemical), and assist in avalanche forecasting.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Maintenance and Construction Operations

Agencies roles and responsibilities for performing this concept are shown in Table 4-11.

Roadway Automated Treatment

This operational concept relies on the use of environmental sensors, dynamic message signs to warn drivers of severe conditions and/or systems to treat the roadways. In Alaska, this concept would primarily relate to alerting drivers en-route to the presence of ice on the roadway or even the presence of fog. In the latter, automated treatment does not apply however, in both cases environmental sensors can be used in conjunction with dynamic message signs to alert drivers before the conditions are present. This in turn will allow drivers to alter driving behavior in advance, reduce the effects of weather on travel.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Maintenance and Construction Operations

Agencies roles and responsibilities for performing this concept is are shown in Table 4-12.

Maintenance and Construction Activity Coordination

This concept coordinates maintenance activities with operations of other agencies and information service providers that will likely use maintenance activity information to improve their operations. Coordination supported by this operational concept may include but is not limited to the provision of maintenance work plans, maintenance schedules and current or planned asset restrictions. In Alaska, coordination of maintenance activities will likely improve operations of the following types of agencies:

- Traffic management agencies (currently none, but possibly in the future the ADOT&PF, integrated transportation management center).
- Transit management agencies,
- Emergency response agencies,
- The Alaska Rail Road Corporation,
- Commercial vehicle administrative offices,

In Alaska, maintenance activity information will be generally communicated indirectly to the aforementioned agencies through the State's 511 system (phone and web). Additionally, maintenance activity information will also be available to numerous other agencies and individuals, most notably the media and the traveling public. Only maintenance activities that affect travel will be posted and available to these agencies.

In addition to posting information to the CARS/511 system, regional and municipal maintenance departments will be responsible for responding to specific requests for maintenance activity information.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Maintenance and Construction Operations

Agencies roles and responsibilities for performing this concept is are shown Table 4-13.

Table 4-9:
Key Stakeholder Roles and Responsibilities for Maintenance and Construction Vehicle and Equipment Tracking

Stakeholder	ITS Elements	Roles and Responsibilities
ADOT&PF, Regional Maintenance and Operations Divisions, Regional Construction	Maintenance Vehicle Automatic Vehicle Location Sensors	• Monitor and maintain AVL units deployed on State owned maintenance/construction vehicles and equipment. • Collect maintenance/construction vehicle location.
MOA, Maintenance and Operations , Water & Waste Water Utility, Project Management & Engineering	Maintenance Vehicle Automatic Vehicle Location Sensors	• Monitor and maintain AVL units deployed on MOA owned maintenance/construction vehicles and equipment. • Collect maintenance/construction vehicle location.

Table 4-10:
Key Stakeholder Roles and Responsibilities for Road Weather Data Collection

Stakeholder	ITS Elements	Roles and Responsibilities
ADOT&PF, Program Development	RWIS	• Monitor and maintain RWIS. • Expand RWIS to new locations. • Collect environmental condition information.
	RWIS website	• Broadly disseminate environmental condition information.
	RWIS FTP Website (Access controlled)	• Disseminate environmental condition information to NWS and Elmendorf Air Force Base.
ADOT&PF, Traffic Section (Central Region)	Temperature Data Probes	• Install and maintain TDPs. • Retrieve TDP data and post to FTP sites.

National Weather Service	NWS Weather Monitoring Equipment	• Collect environmental condition information. • Disseminate environmental condition information to ADOT&PF, Regional Maintenance and Operations Offices.

Table 4-11:
Key Stakeholder Roles and Responsibilities for Weather Information and Processing and Distribution

Stakeholder	ITS Elements	Roles and Responsibilities
ADOT&PF, Program Development	Phone, internet and e-mail communications	• Respond to requests for weather information from media and regional/state agencies.
	RWIS website & FTP	• Broadly disseminate current road weather information for public and agency use and consumption.
	Alaska-Canada Highway Road Weather Portal	• Integrate environmental sensor station data and widely disseminate.
ADOT&PF, Program Development	RWIS website & FTP	• Integrate ADOT&PF, Regional Maintenance and Operations weather data with other state and regional weather data. • Broadly disseminate current and forecast weather information for public and agency use and consumption.
MOA, Traffic Department, Division of Traffic Engineering, Signal Section	Phone, internet and e-mail communications	• Collect weather information from ADOT&PF, and ADOT&PF, Regional Maintenance and Operations Offices. • Disseminate weather information to maintenance personnel.
National Weather Service	NWS Weather Monitoring Equipment	• Collect environmental condition information. • Disseminate environmental condition information.

Table 4-12:
Key Stakeholder Roles and Responsibilities for Roadway Automated Treatment

Stakeholder	ITS Elements	Roles and Responsibilities
ADOT&PF, Regional Maintenance and Operations	Automated Anti-icing System	• Monitor operational status of Automated Anti-icing system. • Override and manually control automated anti-icing system (if needed and based on conditions). • Monitor communications between automated anti-icing system and supporting ITS infrastructure (i.e., dynamic message signs).
	RWIS	• Monitor the operational status of RWIS cameras.
ADOT&PF, Program Development	RWIS	• Coordinate RWIS with DMS and fog warning systems for the purpose of issuing real-time warnings to motorists.

Table 4-13:
Key Stakeholder Roles and Responsibilities for Maintenance and Construction Activity Coordination

Stakeholder	ITS Elements	Roles and Responsibilities
ADOT&PF, Regional Maintenance and Operations Divisions, Regional Construction, Bridge Design & Engineering.	Maintenance Management System	• Log information on current and planned asset restrictions.
	Phone, internet and e-mail communications	• Coordinate maintenance plans and activities with MOA, Maintenance and Operations, Water & Waste Water Utility, Project Management & Engineering. • Respond to requests for maintenance/construction activity information from the media and partner agencies.
	CAR/511	• Input construction/maintenance activities.
MOA, Maintenance and Operations Department, Water & Waste Water Utility, Project Management & Engineering	Maintenance Management System	• Log information on current and planned asset restrictions.
	Phone, internet and e-mail communications	• Coordinate maintenance/construction plans and activities with ADOT&PF, Regional Maintenance and Operations. • Respond to requests for maintenance/construction activity information from the media and partner agencies.
	MOA website	• Disseminate maintenance/construction activities and schedules.

4.6.4 Public Transportation Concepts

Transit Vehicle Tracking

This operational concept, similar to Maintenance and Construction Vehicle and Equipment Tracking, relies on the use of AVL systems (e.g., GPS units) and communications to locate and track vehicles. This concept, however, applies to transit vehicles. In Alaska automated vehicle location systems, which are widely implemented on transit vehicles today will be used to determine real time schedule adherence and update the transit system's schedule in real-time. Currently, tracking vehicle location information is only used internally, however in the future it is expected that real-time transit vehicle location information will be passed along to the public so they can make transit related decisions in real-time. For instance, accurate schedules provided in real-time will allow users to seek shelter during adverse weather when transit vehicles are delayed. This will improve public perception, and ultimately use, of transit.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Public Transportation Management
- Public Travel Security

Agencies roles and responsibilities for performing this concept is are shown in Table 4-14.

4.6.5 Commercial Vehicle Concepts

In March 2005, the ADOT&PF division of MSCVE, through a private contractor updated the State's Commercial Vehicle Information Systems and Networks (CVISN) Architecture. CVISN is an ITS program that focuses on State commercial vehicle interests and activities. The 2005 CVISN architecture provides an overview of commercial vehicle concepts for the State of Alaska, as well as the various system-to-system interconnects and information flows related to them. To summarize, the commercial vehicle concepts that pertain to the State of Alaska and reflected in the CVISN architecture are bulleted below. For continuity, and since Alaska's CVISN program is a component of the *Iways* program, the CVISN architecture was incorporated into Alaska's *Iways* Architecture. The corresponding system-to-system interconnects and information flows are shown in the updated Turbo Architecture file and well as the Architecture Chapter (See chapter 5).

- Fleet Administration
- Freight Administration
- Electronic Clearance
- CV Administrative Processes
- International Border Clearance
- Weigh-in-Motion
- Roadside CVO Safety
- On-board CVO and Freight Safety and Security
- HazMat Management
- Roadside HazMat Security Detection and Mitigation
- Commercial Vehicle Driver Security Authentication

Table 4-14:
Key Stakeholder Roles and Responsibilities for Transit Vehicle Tracking

Stakeholder	ITS Elements	Roles and Responsibilities
Transit Management Agencies	Transit Vehicle Automatic Vehicle Location System	• Collect transit vehicle location information.
	Transit Management Agency Website	• Disseminate transit vehicle location information.
Alaska Marine Highway	Ferry Vessel Automatic Vessel Location System	• Collect ferry vessel location information. • Provide near real-time arrival/departure information to CARS/511.
	AMHS Website	• Disseminate ferry location information.

4.6.6 Emergency Management Concepts

Emergency Call Taking and Dispatch

This operational concept relies on technologies installed on emergency vehicles (e.g., AVL and mobile data terminals), call answering and dispatching equipment, and communications to safely and effectively dispatch emergency vehicles. Additionally, this concept provides information to emergency personnel in the field to speed response. This concept provides all the communications linkages with 9-1-1 emergency services and traffic management agencies to obtain the information needed to assign and route the required equipment needed at the scene of the emergency.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Hazardous Material Security and Incident Response
- Emergency Vehicle Management

Agencies roles and responsibilities for performing this concept is are shown in Table 4-15.

Emergency Routing

This concept routes emergency vehicles based on real-time conditions (e.g., traffic information and road conditions) and relies on priority systems installed on traffic signals and communications to improve the safety and time-efficiency of responding to emergencies. This concept also provides for information exchange between care facilities and both the Emergency Management Subsystem and emergency vehicles.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Route Guidance
- Traffic Control
- Emergency Vehicle Management

Agencies roles and responsibilities for performing this concept is are shown in Table 4-16.

MayDay and Alarms Support

This concept relies on in-vehicle equipment and satellite communications to enable a driver or passenger to manually initiate a request for assistance from within their vehicle. In Alaska, this concept would depend on car manufactures or other private sector agency installing systems and sensors on-board the vehicle, and vehicle owners subscribing to services like those offer by General Motor's On-Star. Assuming these actions occur, the driver would be able to talk with an operator who then could contact the appropriate response agency when assistance is needed. Depending on the services provided and equipment (e.g., sensors) installed on the vehicle, operator notification may occur automatically when situations occur, such as collisions, where the driver and other occupants may be rendered incapacitated. In these cases, AVL sensors installed on the vehicle would automatically transmit the location of the vehicle to operators so appropriate response agencies can be dispatched to the vehicle location.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Emergency Notification and Personnel Security

Agencies roles and responsibilities for performing this concept is are shown in Table 4-17.

Transportation Infrastructure Protection

This concept relies on sensors (e.g., motion and acoustic sensors) and video surveillance equipment located in the field and on infrastructure (e.g., bridges and tunnels) to monitor and prevent natural and man-cause threats for damaging infrastructure. Due to the rural nature and geographic vastness of the state, it is often difficult to determine if natural events like avalanches or earthquakes have happened, but more so the impacts these events have on infrastructure. Typically, events like these and their impacts are not reported in a timely manner, resulting in long-periods of time elapsing before infrastructure can be opened for travel. The ability to monitor infrastructure remotely, will not only improve overall mobility, but will also reduce the cumulative costs of having trained personnel travel out to remote areas of the state to assess the extent of damage. In the case of man-made events, this concept can also provide evidence or clues of the actions that taken place immediately before the event occurred.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Emergency Notification and Personal Security
- Disaster Evacuation and Response

Agencies roles and responsibilities for performing this concept is are shown in Table 4-18.

Wide Area Alert

This concept relies on dynamic message signs, highway advisory radio, emergency and transit vehicle mobile data terminals, the statewide 511 traveler information system, and websites to widely disseminate alerts and instructions when emergency situations occur. Such situations may include but be not limited to child abductions, severe weather events, civil emergencies, and other situations that pose a threat to life and property. The intent of this concept is not only to provide information to the public and transportation operators, but also to seek the public's help in some cases (e.g., child abductions).

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- En-Route Transit Information
- Emergency Notification and Personal Security

Agencies roles and responsibilities for performing this concept is are shown in Table 4-19.

Early Warning System

This concept monitors and detects potential, looming, and actual disasters including natural disasters (hurricanes, earthquakes, floods, winter storms, tsunamis, etc.) and technological and man-made disasters (hazardous materials incidents and acts of terrorism including nuclear, chemical, biological, and radiological weapons attacks). The market package monitors alerting and advisory systems, ITS sensors and surveillance systems, field reports, and emergency call-taking systems to identify emergencies and notifies all responding agencies of detected emergencies.

This Operational Concept works to address the following User Services. Only the User Services that map to Alaska's stated needs, as previously identified in Chapter 2, are shown.

- Disaster Response and Evacuation

Agencies roles and responsibilities for performing this concept is are shown in Table 4-20.

Table 4-15:
Key Stakeholder Roles and Responsibilities for Emergency Call Taking and Dispatch

Stakeholder	ITS Elements	Roles and Responsibilities
ADOT&PF, Regional Maintenance and Operations Divisions	Cameras (RWIS and non-RWIS)	• Disseminate collected traffic images to emergency response agencies for use in preparing a response to incidents.
	Phone, internet and e-mail communications (includes LMRS)	• Coordinate response and clean up activities with AST and local police departments.
ADOT&PF, Regional Traffic Divisions	Cameras (non-RWIS)	• Disseminate collected traffic images to emergency response agencies for use in preparing a response to incidents.
Transit Management Agencies	Phone, internet and e-mail communications	• Transit emergency alerts and information.
Emergency Response Agencies	Emergency vehicles equipped with AVL	• Monitor and track emergency vehicle location.
	Computer Aided Dispatch	• Receive and respond to public calls for emergency assistance.
	Phone, internet and e-mail communications	• Coordinate emergency response with other emergency response agencies, including telematics providers.
	Mobile Data Terminals	• Send/receive emergency dispatch requests and information.

Table 4-16:
Key Stakeholder Roles and Responsibilities for Emergency Routing

Stakeholder	ITS Elements	Roles and Responsibilities
Local Response Agencies	Emergency Response Vehicles (equipped with AVL)	• Collect emergency response vehicle location information. • Monitor and track equipped emergency response vehicles. • Expand AVL implementation to include entire fleet of vehicles (if not are ready completed).
	Computer aided Dispatch	• Assign routes/dispatch vehicles based on real time vehicle location information.
	Emergency Vehicle onboard equipment and communications.	• Send hospitals/care facilities patient status and treatment information.
Alaska State Troopers	Emergency Response Vehicles (equipped with AVL)	• Collect emergency response vehicle location information. • Monitor and track equipped emergency response vehicles. • Expand AVL implementation to include entire fleet of vehicles (if not are ready completed).
	Computer Aided Dispatch	• Assign routes/dispatch vehicles based on real time vehicle location information.
MOA, Traffic Department, Division of Traffic Engineering, Signal Section	Traffic Signals (within MOA boundary)	• Monitor, maintain and expand signal pre-emption equipment. • Provide road network condition information to emergency response agencies. • Provide status and notification of signal priority activation to emergency response agencies.
ADOT&PF, Regional Maintenance and Operations	Phone, internet and e-mail communications	• Provide construction activity information to emergency response agencies. • Provide status of on-going roadway maintenance activities.

MOA, Maintenance and Operations Department, Water & Waster Water Utility, Project Management & Engineering	Phone, internet and e-mail communications	• Provide construction activity information to emergency response agencies. • Provide status of on-going roadway maintenance activities.

Table 4-17:
Key Stakeholder Roles and Responsibilities for MayDay and Alarms Support

Stakeholder	ITS Elements	Roles and Responsibilities
Emergency Response Agencies	911 phone system/emergency telecommunication system	• Respond to calls from in-vehicle mayday systems, or indirectly through 3rd party telematics service providers (e.g., OnStar).
Third Party Telematics Providers	Vehicle onboard sensors and communications	• Communicate with motorists via in vehicle telematics. • Provide notification and details of incidents to emergency response agencies.

Table 4-18:
Key Stakeholder Roles and Responsibilities for Transportation Infrastructure Protection

Stakeholder	ITS Elements	Roles and Responsibilities
U.S. Geological Survey Alaska Science Center	Bridge Scour System	• Operate, maintain and expand bridge scour system. • Monitor the operational status of sensors.
ADOT&PF, Bridge Design & Engineering	Bridge Scour System	• Monitor bridge scour system data.
ADOT&PF, Regional Maintenance and Operations	Cameras	• Operate, maintain and monitor existing cameras. • Expand network of cameras to include critical infrastructure (bridges, tunnels, etc). • Temporary archive collected video for use in investigating the cause of disasters and impacts to infrastructure. • Notify law enforcement agencies of suspicious activities occurring at bridges and other key infrastructure (either manually or automatically depending on technology). • Notify Emergency Management of detected natural or man made emergencies or disasters.
Alaska Marine Highway	Cameras (at ferry terminals)	• Operate, maintain and monitor existing cameras. • Notify law enforcement agencies of suspicious activities occurring at ferry terminals.
Department of Military and Veterans Affairs, Division of Homeland Security and Emergency Management	State Emergency Communications Center (SECC)	• Coordinate with local and state emergency response and management agencies. • Provide incident status reports to; local and state emergency response and management agencies, and the media. • Respond to resource requests from local emergency management and response agencies.

	Emergency Alert System	• Issues alerts and threat information to affected jurisdictions.
Alaska Railroad Corporation	Avalanche Detection System	• Operate, maintain and expand avalanche detection system. • Notify Transportation and Emergency Management of avalanches that have either occurred or might occur. • Notify ADOT&PF maintenance and operations divisions when detected incidents affect surface transportation.

Table 4-19:
Key Stakeholder Roles and Responsibilities for Wide Area Alert

Stakeholder	ITS Elements	Roles and Responsibilities
MOA, Office of Emergency Management, Emergency Operations Center	Phone, internet and e-mail communications	• Disseminate emergency alert and advisory information to: o Integrated Traffic Management Center. o Transit Management Agencies. o Private ISPs and the Media. • Coordinate emergency evacuation and reentry with: o MOA, Police Department. o MOA, Fire Department. o Transit Management Agencies (for moving large numbers of injured).
Local Response Agencies	ADOT&PF Permanent Dynamic Message Signs	• Operate and post messages to DMS. • Monitor operational status of DMS. • Post Amber Alert Messages.
	CARS/511	• Report emergency events and status information.

	Phone, internet and e-mail communications	• Coordinate emergency response with Emergency Management Agencies.
Department of Public Safety, Division of State Troopers	CARS/511	• Report emergency events and status information.
	Phone, internet and e-mail communications	• Coordinate emergency response with Emergency Management Agencies.
ADOT&PF, Integrated Traffic Management Center	CARS/511	• Report emergency events and status information.
Transit Management Agencies	Transit Management Agency websites	• Report travel alerts and advisory information for trip planning (to support general public decision making).
ADOT&PF, 511 Management Center, Regional Maintenance and Operations	CARS/511	• Report emergency events and status information.
MOA, Maintenance and Operations, Water & Waste Water Utility, Project Management & Engineering.	CARS/511	• Report emergency events and status information.

Table 4-20:
Key Stakeholder Roles and Responsibilities for Early Warning System

Stakeholder	ITS Elements	Roles and Responsibilities
MOA, Office of Emergency Management, Emergency Operations Center	State of Alaska Emergency Alert System	• Activate Emergency Alert System and Disseminate Emergency Information and Alerts for Anchorage Region.
	Phone, internet and e-mail communications	• Coordinate emergency response with regional/local emergency response agencies.
National Weather Service, Anchorage Forecast Office	State of Alaska Emergency Alert System	• Activate Emergency Alert System and Disseminate statements, advisories, watches, warnings, and other weather-related notices for Anchorage Region (only applies for severe weather warnings).
Alaska Railroad Corporation	Avalanche Detection and Prevention System[xxviii]	• Implement, operate and maintain weather stations and software associated with the Avalanche Detection and Prevention System • Provide access to weather and avalanche data collected by the Avalanche detection and prevention system (per inter-agency agreement).
National Weather Service	Phone, internet and e-mail communications	• Direct (e.g., phone) and indirect (e.g., website) dissemination of weather related disaster information.
ADOT&PF, Regional Maintenance and Operation	Phone, internet and e-mail communications	• Share natural or man-caused disaster information with MOA, Office of Emergency Management, Emergency Operations Center. • Share natural or man-caused disaster information with ADOT&PF, Integrated Traffic Management Center.
ADOT&PF, Regional Maintenance and Operations	Phone, internet and e-mail communications	• Share major incident and HazMat incident information with Emergency Management.
ADOT&PF, MSCVE	Phone, internet and e-mail communications	• Share major incident and HazMat incident information with Emergency Management.

National Weather Service, Juneau Forecast Office	State of Alaska Emergency Alert System	• Activate Emergency Alert System and Disseminate statements, advisories, watches, warnings, and other weather-related notices for Juneau Region.
National Weather Service Fairbanks Forecast Office	State of Alaska Emergency Alert System	• Activate Emergency Alert System and Disseminate statements, advisories, watches, warnings, and other weather-related notices for Fairbanks Region.
State of Alaska Department of Military Affairs, Division of Emergency Services	State of Alaska Emergency Alert System	• Activate Emergency Alert System and Disseminate Emergency Information and Alerts for the entire state.
ADOT&PF, Bridge Design & Engineering	Phone, internet and e-mail communications	• Following an emergency share emergency bridge inspection status with Emergency Management overload restrictions with MS&CVE.
	Land Mobile Radios	• Following an emergency share emergency bridge inspection status with Emergency Management overload restrictions with MS&CVE.

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