Alaska Iways Architecture Update

Task 5:
ITS Project Implementation Plan for the Glenn Highway Commuter Corridor

FINAL

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Alaska Department of Transportation and Public Facilities

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LIST OF ACRONYMS

AADT	Average Annual Daily Traffic
ADOT&PF	Alaska Department of Transportation and Public Facilities
AFD	Anchorage Fire Department
AHSO	Alaska Highway Safety Office
ALVIN	Alaska License Vehicle Information Network
AMATS	Anchorage Metropolitan Area Transportation Solutions
APD	Anchorage Police Department
ARRC	Alaska Railroad Corporation
APSIN	Alaska Public Safety Information Network
ARTMIS	Advanced Regional Traffic Interactive Management & Information System
AST	Alaska State Troopers
ATR	Alaska Trauma Registry or Automatic Traffic Recorder
AVI	Automatic Vehicle Identification
AVL	Automatic Vehicle Location
CAD	Computer Aided Dispatch
CAPRI	Compliance Analysis Performance Review Information
CARS	Computer Acquisition and Reporting System
CBERRRSA	Chugiak, Birchwood, Eagle River, Rural Road Service Area
CCTV	Closed Circuit Television
CDL	Commercial Drivers License
CMAQ	Congestion Mitigation and Air Quality
CMMS	Computerized Materials and Maintenance Management System
CVIEW	Commercial Vehicle Information Exchange Window
CVISN	Commercial Vehicle Information Systems and Networks
CVO	Commercial Vehicle Operations
DMS	Dynamic Message Sign
DMV	Division of Motor Vehicles
DOA	Department of Administration
DOT	Department of Transportation
DPS	Department of Public Safety
EDC	Emergency dispatch Center
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EAS	Emergency Alert System
ESS	Environmental Sensor Station
ETS	Enterprise Technology Services
FAA	Federal Aviation Administration
FARS	Fatal Accident Reporting System
FBI	Federal Bureau of Investigation
FHWA	Federal Highway Administration
FIS	Flight Information Services
FMCSA	Federal Motor Carrier Safety Administration
FTA	Federal Transit Administration
FTP	File Transfer Protocol
GPS	Global Positioning System

H&SS	Health and Social Services
HAS	Highway Analysis System
HDP	Highway Data Port
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
HPMS	Highway Pavement Management System
HSIP	Highway Safety Improvement Program
IPEMS	Injury Prevention and EMS
IR	Infrared Illuminators
IRIS	Infra-red Inspection System
IROC	Integrated Roadside Operations Computer
ITOCC	Integrated Traffic Operations and Communication Center
ITS	Intelligent Transportation System
LOS	Level of Service
M&O	Maintenance and Operations
MCMIS	Motor Carrier Management Information System
MDT	Mobile Data Terminal
MMS	Maintenance Management System
MOA	Municipality of Anchorage
MST	Mobile Status Terminal
NHS	National Highway System
NWS	National Weather Service
OEM	Office of Emergency Management
OTMC	Operational Testing to Mitigate Congestion
PDA	Personal Digital Assistant
RAWS	Remote Automated Weather Stations
RWIS	Roadway Weather Information System
SAFER	Safety and Fitness Electronic Records System
SECC	State Emergency Coordination Center
SEPP	Single and Extended Permit Process
SIB	State Infrastructure Banks
STIP	State Transportation Improvement Program
STP	Surface Transportation Program
TDM	Transportation Demand Management
TDP	Temperature Data Probes
TEA-21	Transportation Equity Act for the 21st Century
TIFIA	Transportation Infrastructure and Finance Act
TIP	Transportation Improvement Program
TMC	Traffic Management Center
TRACS	Traffic and Criminal Software
TSM	Transportation System Management
TOC	Traffic Operations Center
US	United States
USDOT	United States Department of Transportation
VII	Vehicle Infrastructure Integration
VPPP	Value Pricing Pilot Program
WIM	Weigh in Motion

DOCUMENT CONTROL

File Name	Date	Version	Author	Company	Change
Glenn Highway Corridor ITS Plan v.1.0_110708	11/7/2008	1.0	Jason Stribiak Les Jacobson	Telvent Farradyne	First release

1 INTRODUCTION

In 2005, the Alaska Department of Transportation and Public Facilities (ADOT&PF) initiated the effort to update the Alaska Iways or Intelligent Transportation System (ITS) Architecture. The Iways Architecture provides a framework to implement ITS within Alaska and was initially completed in December 2003. The update to the Alaska Iways Architecture included a task to develop area-specific ITS Implementation Plans as needed, based on on-going ITS activities within the state. The Glenn Highway ITS Implementation Plan is one such plan. This plan and the Seward Highway ITS Implementation Plan were developed concurrently with the update to Alaska's Iways Architecture.

Over the last several years many ITS elements have either been deployed or have been planned for the Glenn Highway Commuter Corridor (Hereafter referred to as the Glenn Highway). Due to these developments and growing interest in ITS along the corridor, the ADOT&PF decided to develop this Plan so ITS implementation can be better planned and occur in a more controlled, integrated, and cost effective manner. Such an approach maximizes the potential benefit of ITS investments and ensures that they can be integrated with additional ITS elements as they are deployed in the future.

Besides ensuring that ITS elements can be integrated with one another, the Glenn Highway ITS Implementation Plan also accomplishes the following objectives:

- Identifies how ITS can improve or enhance operations and user sentiment along the corridor.
- Fosters inter-agency cooperation and consensus of ITS activities within the State of Alaska and, specifically, the Glenn Highway.
- Recommends high-level ITS project initiatives that can be implemented over the next 10 years or as funding becomes available to meet the regional transportation goals and desires.
- Avoids implementing ITS in a disconnected, isolated manner.

The Glenn Highway ITS Implementation Plan is reflective of stakeholder input and on-going local, regional and statewide ITS activity.

1.1 Overview of ITS

In order to develop an ITS plan that is broad-based and reflective of the needs and desires of all stakeholders it is important to provide a basic understanding of ITS. This understanding is intended to provide stakeholders with a shared understanding of what ITS is and what is being accomplished, so they know how to respond in an appropriate manner. The term ITS is still not well understood, especially by the agencies that lie on the periphery of ITS activity. Although these agencies do not represent core ITS stakeholders, they often have input that benefits regional ITS activities. Without a common understanding of ITS, this input may be missed.

1.1.1 What is ITS?

An ITS represents the collection of technologies or systems (e.g., advanced sensors, computers, communication systems) that enable multiple agencies to work together to deliver various transportation services (e.g., regional traffic control, incident management, emergency response, traveler information, etc.). This includes all facets of surface transportation including highways, commercial vehicle operations, transit services, emergency service providers, as well as other transportation entities that interface with the surface transportation system (e.g., airports, marine ports and rail). The transportation services that ITS helps to deliver include:

- Collect and transmit information on traffic conditions and transit schedules for travelers before and during their trips. When alerted to hazards and delays, travelers can change their plans to minimize inconvenience and additional strain on the system.
- Decrease congestion by reducing the number of traffic incidents, clearing them more quickly when they occur, and rerouting traffic flow around them.
- Improve the productivity of commercial, transit, and public safety fleets by using automated tracking, dispatch and weigh-in-motion (WIM) systems that speed vehicles through much of the red tape associated with commerce.
- Assist drivers in reaching a desired destination with navigation systems enhanced by pathfinding (route guidance), or through real-time updates available through touch button telephone systems.

1.1.2 What are the Benefits of ITS?

Regions all over the U.S. have experienced the benefits of ITS. The benefits are many as illustrated by the real world examples bulleted below:

- In San Antonio, Texas, the region deployed incident management systems and achieved reductions in emergency service provider response time by 20%. Crashes were reduced by 35% and cost savings of over $1.6 million per year were achieved.
- In the Cincinnati metropolitan area, 99% of the travelers surveyed reported that their travel experience improved by having real-time traveler information provided by the region's Advanced Regional Traffic Interactive Management and Information System (ARTIMIS). ARTIMIS provided information that allowed travelers to avoid congested areas, which saved time, reduced frustration and made getting around more reliable.
- In Palm Beach County, Florida, a traffic signal preemption system for its emergency service vehicles achieved up to a 20% reduction in response time to emergencies. This helped save more lives and reduced the severity of injuries and property damage.

1.1.3 Overview of ITS Activities within the Corridor

ITS is not new to Alaska or for that matter the Glenn Highway. Agencies in Alaska have been deploying ITS for over a decade now, and is evident by looking at existing ITS elements along the Glenn Highway Corridor. ITS elements deployed along the corridor include:

- Dynamic message signs (DMS)
- Automatic vehicle location (AVL) systems
- Cameras
- Bridge scour systems
- Road weather information systems
- Vehicle height detection systems (Eklutna)
- Bridge deicing (Knick River Bridge)
- CVISN NorPass

In addition to this list are ITS elements deployed at weigh stations and technologies installed in private vehicles (e.g., commercial vehicles). These devices, however, only represent the beginning of ITS deployment. Additional ITS devices have either been planned or are desired for the corridor.

1.2 Plan Purpose

The Glenn Highway ITS Implementation Plan has been prepared to foster institutional coordination and technical integration of ITS along the Glenn Highway. This improves transportation system safety and efficiency, and ensures that ITS projects will be developed with the consensus of agencies that have a stake in ITS activities along the corridor. This in turn helps to maximize the value of ITS within the corridor.

1.3 Timeframe

This plan is effective the 10 year period beginning the date of this plan (2008-2018). Due to the rapid evolution of technology, planning beyond a 10 year horizon yields little benefit as technologies considered attractive today will hold little value 10 years in the future. In fact, it is likely that technologies will evolve well in advance of the 10 year horizon, requiring that this plan be updated periodically so it remains an up-to-date, valid document. Encompassing such an approach not only ensures that the plan remains up-to-date, it also preserves the initial investment used to develop it and minimizes both level of effort to develop an entirely new plan, and loss of knowledge that occurs when a new plan is developed. Therefore, it is recommended that stakeholders update this plan whenever there is a change in needs or desired technologies. At a minimum this plan should be updated whenever the Alaska Iways Architecture is updated. For more information on updating and maintaining this plan, stakeholders can reference the Alaska Iways Architecture maintenance plan. This plan provides a more comprehensive approach for maintaining architectures and offers insights into when plans should be updated.

1.4 Approach

The Glenn Highway ITS Implementation Plan was developed to be consistent with local, state and National policies and is reflective of stakeholder input. Steps taken to develop this plan are outlined below.

1.4.1 Stakeholder Outreach and Participation

Engaging the agencies that are either responsible for or affected by ITS activity is a critical step in the development of ITS Implementation Plans. Such plans should be based on either needs or desired enhancements and should strive to provide benefits to a broad stakeholder base. Without stakeholder input, plans would likely not reflect the true sentiment of the region and desired improvements to the corridor, and would not provide sufficient value in guiding ITS deployment. Therefore, stakeholders were invited to participate throughout the development of this report.

Stakeholder outreach consisted of workshops, interviews, questionnaires, and review of outreach activities conducted as part of past projects. ADOT&PF spearheaded the effort to identify stakeholders and was responsible for inviting these agencies to participate in the development of this ITS Implementation Plan. The following agencies participated in the identification of transportation issues pertinent to the Glenn Highway.

- ADOT&PF, Northern Region Research and Technology Transfer
- ADOT&PF, Central Region Design
- ADOT&PF, Program Development
- ADOT&PF, Measurement Standards & Commercial Vehicle Enforcement
- ADOT&PF, Administrative Services
- ADOT&PF, Central Region Construction
- ADOT&PF, Central Region Traffic
- ADOT&PF, Central Region Planning
- Alaska Dept. of Public Safety
- Anchorage Police Department (APD)
- Alaska Injury Prevention Center
- Alaska Trucking Association
- City of Wasilla
- Federal Highway Administration (FHWA)
- US DOT
- Matanuska-Susitna Borough
- Mat-Su Community Transit
- Municipality of Anchorage
- University of Anchorage

1.4.2 Coordination with Local and Statewide Plans and Activities

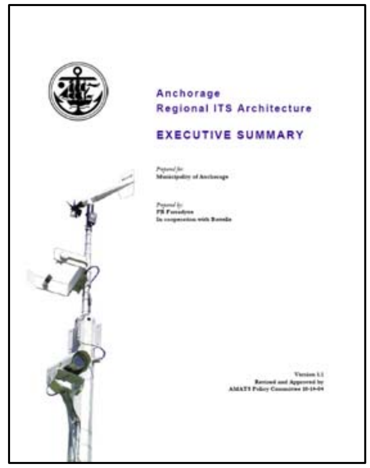
This effort to develop the Glenn Highway ITS Plan was coordinated with a similar effort undertaken to develop an ITS Implementation for the Seward Highway. The need to develop both the Glenn and Seward Highway ITS Plans stemmed from the Alaska Iways Architecture update project and the relative interest in deploying ITS along these corridors. Over the last several years many ITS elements have either been deployed or have been planned for the Glenn and Seward Highways. Due to this interest in ITS along these corridors, the ADOT&PF decided to develop these corridor-specific ITS Plans so ITS implementation can be better planned and occur in a controlled, effective manner.

The Glenn Highway ITS Plan, in addition to the Seward Highway ITS Plan was developed in parallel with the update to Alaska's Iways Architecture. Therefore, this ITS Implementation Plan takes into consideration the ITS projects identified in the update to the Statewide Iways Architecture, and expands upon this discussion to effectively guide local agencies in their efforts to effectively deploy ITS along the corridor. Due to their relative location to Anchorage, and the relative importance of Anchorage to the State, many projects from the Statewide Iways Plan are carried over to this plan.

Besides the Alaska Iways Architecture, several other regional plans and documents were reviewed, and information from them used to develop this plan. In December 2003, at the same time the State of Alaska completed its Alaska Iways (ITS) Architecture, the Municipality of Anchorage (MOA) completed its Regional ITS Architecture. These two plans provide significant background into the ITS activities occurring within the state and the region which includes the Glenn Highway.

Alaska Iways Architecture and Update

The Glenn Highway ITS Implementation Plan is a component of the Alaska Iways (ITS) Architecture Update. The Alaska Iways Architecture serves the State's surface transportation network and includes the Glenn Highway ITS Implementation Plan. The initial development of the Alaska Iways Architecture already identified ITS elements used to manage traffic along the Glenn Highway. To this extent, the initial Alaska Iways Architecture served as the foundation for developing the Glenn Highway ITS Implementation Plan.



Municipality of Anchorage ITS Architecture

Since the southwest terminus of the Glenn Highway is located within the MOA, the Municipality's ITS Architecture offers significant insight into the transportation issues affecting the Glenn Highway. The Municipality's ITS Architecture was developed in parallel with the State's Iways Architecture. In addition, the Municipality's ITS Architecture included stakeholder organizations along the Glenn Highway Corridor, such as Elmendorf Air Force Base and Fort Richardson. The Municipality is currently in the process of updating this plan.

1.4.3 Coordination with National Policies

In early 2001, the United States Department of Transportation (USDOT) announced the release of FHWA's final rule and FTA's policy for applying the National ITS Architecture at the regional level. The Rule/Policy requires regions that are funding ITS projects through the National Highway Trust Fund, to develop a Regional ITS Architecture that conforms with the National ITS Architecture (ITS projects that are funded through other programs are exempt from the final Rule/Policy). Section 940.9D of the final Rule/Policy states that a regional ITS architecture include at a minimum the following:

- A description of the region,
- Identification of participating agencies and other stakeholders,
- An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders in the operation and implementation of the systems included in the regional ITS architecture,
- Any agreements (existing or new) required for operations including, at a minimum, those affecting ITS project interoperability, utilization of ITS related standards, and the operation of the projects identified in the regional ITS architecture,
- System functional requirements,
- Interface requirements and information exchanges with planned and existing systems and subsystems (for example, subsystems and architecture flows as defined in the National ITS Architecture),
- Identification of ITS standards supporting regional and national interoperability, and
- The sequence of projects required for implementation.

For the purpose of this plan the Glenn Highway Corridor represents the "region" for which the above requirements apply. This plan will address each of these requirements, in separate Chapters delivered over six phases.

1.4.4 Plan Development

The approach used to develop this ITS Implementation Plan is illustrated in Figure 1-1. The approach is comprised of 6 main phases, culminating with the recommendation of ITS project initiatives in the last phase – the ITS Implementation Plan. Each phase corresponds to a chapter in this plan and is based on stakeholder input and review. Each phase/chapter is briefly described below.

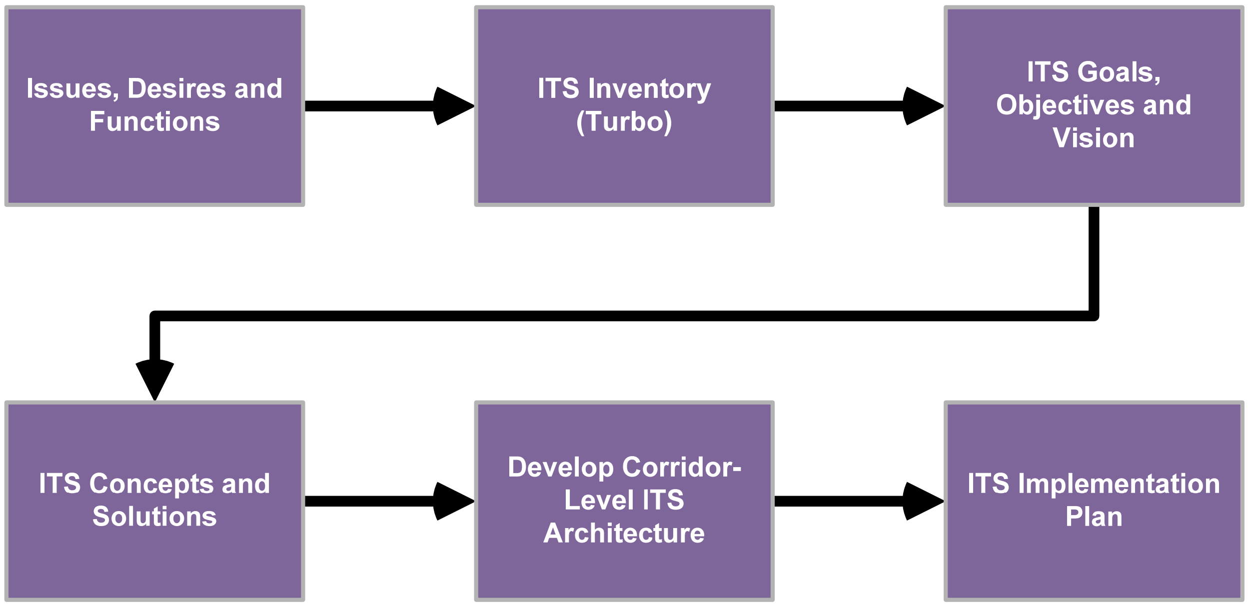


Figure 1-1:
Glenn Highway ITS Implementation Plan Approach

Phase 1: ITS Enhancement and Desired Functions

This phase identified the various transportation issues and desires pertinent to the Glenn Highway. The project team obtained these issues and desires from stakeholder discussion and summarized them in Chapter 2. Issues and desires form the foundation from which the question "How can ITS improve transportation along the Glenn Highway?" can be answered. In Chapter 2, the team mapped pertinent elements to corresponding ITS functions from the National ITS Architecture to begin the process of developing ITS projects. The National ITS Architecture is a commonly used and accepted framework for implementing ITS.

Phase 2: ITS Inventory

This phase identified the existing and planned ITS elements applicable to the Glenn Highway and was conducted roughly at the same time as Phase 1. The ITS inventory helped to identify the ITS pieces or elements that work together to deliver transportation services. As such, the inventory not only captures the applicable ITS systems, but also includes their respective stakeholders, and information flows and standards. Existing ITS elements form the baseline from which future or planned ITS elements must be integrated to share information and data. In understanding these connections, gaps in technology are identified and priorities for implementing ITS are established. The project team inventoried existing and planned ITS elements using the Turbo Architecture Software tool. This tool helps to map ITS elements to the National ITS Architecture and ultimately results in a customizable list of system-to-system interconnects and information flows.

Phase 3: ITS Goals, Objectives and Vision

This phase formulated ITS goals for the Glenn Highway using the input obtained and results produced in the previous 2 phases. Based on these goals, the project team developed an ITS Vision to guide growth of ITS within the corridor. The ITS Vision along with the ITS goals will set the direction for recommending ITS project initiatives.

Phase 4: ITS Concepts and Solutions

This phase identified stakeholder roles and responsibilities for delivering key transportation services referred to as Operational Concepts. Operational Concepts essentially align with Market Packages in the National ITS Architecture. The project team identified roles and responsibilities for key agencies that have a role in designing, deploying, operating, and/or maintaining ITS.

Phase 5: Develop Corridor Level ITS Architecture

This phase will identify the components of the Alaska Iways Architecture that are applicable for the Glenn Highway. The project team will provide a mapping to the State's Architecture.

Phase 6: ITS Implementation Plan

This phase recommends high-level project initiatives that meet goals and satisfy the ITS Vision of the Glenn Highway Corridor. Project initiatives are not specific projects per se, but rather generic descriptions of the types of projects that can be implemented with further discussion. In addition to providing project initiatives, the Implementation Plan Chapter also addresses concepts that affect project implementation, including funding opportunities and ITS standards that promote ITS interoperability.

1.5 Geographic Scope

The Glenn Highway is a heavily traveled high-speed facility that begins in the MOA and extends 135 miles North and East to the Town of Glenallen. In the summer months, the Highway carries a large number of tourists traveling to destinations like, Denali National Park, Matanuska Glacier, or other state recreation areas. Perhaps more importantly though, the corridor is predominantly used by commuters traveling to and from Anchorage. Congestion along the Glenn Highway is growing worse on an annual basis as more and more people move to communities on the outskirts of Anchorage. At certain times of day and at various points along the corridor, demand is already exceeding capacity. ITS deployment is one approach seen as a way to make better use of existing capacity without the expense associated with creating new lanes.

This ITS Implementation Plan covers the very southwest segment of the Glenn Highway from Downtown Anchorage (Mile Post 0) to the Town of Palmer 42 miles to the Northeast. This segment is referred to as the commuter corridor segment. As this name implies, this segment largely carries Anchorage commuter traffic to and from the towns of Palmer, Wasilla, and Eagle River. The City Palmer and Eagle River are located along the Glenn Highway; however the City of Wasilla lies approximately 7 miles to the west of the corridor and is connected to the Glenn Highway via the Parks Highway. Because of the commuter traffic that occurs between the Municipality of Anchorage and the City of Wasilla, the 7 mile segment of the Parks highway was included in this Plan. The segments of the Glenn Highway and Parks Highway included in this Plan are highlighted in Figure 1-2.

In 2005 the Average Annual Daily Traffic of this Glenn Highway segment from Eagle River to Anchorage was 23,386, while the traffic between the MatSu Valley and Anchorage was approximately 27,028. Due to the rather large volume of traffic carried on the Glenn, congestion often occurs resulting in such problems as increased delay, crashes, and higher emissions.

Congestion is particularly bad at the northern entrance to the MOA where six lanes of traffic funnel into four. Problems also occur outside the MOA near the town of Eagle River. For instance, the Chugiak – Eagle River 2003 Long Range Transportation Plan indicates that several segments of the Glenn Highway will operate at Level of Service D by year 2023. One such segment is currently operating at LOS D. Due to heavy traffic along the Glenn Highway, motorists often leave the highway and travel along nearby arterials and local roads to avoid congestion. This of course spreads problems onto these facilities resulting in deceased level of service.

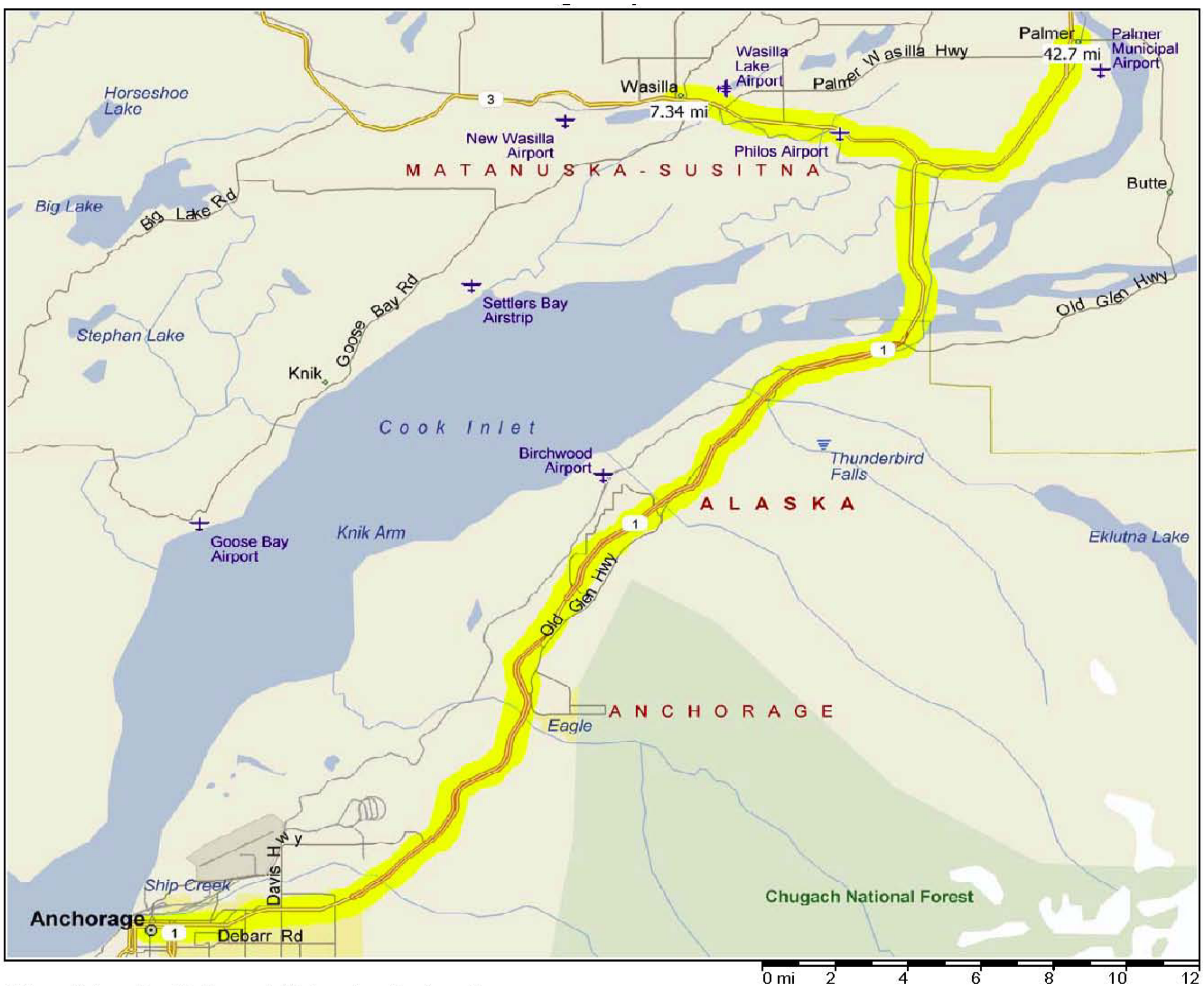


Figure 1-2:
Map of the Glenn Highway Commuter Corridor

1.6 Timeframe

The Glenn Highway ITS Implementation Plan covers the ten year period following the completion of the Plan. This timeframe is long enough to guide ITS deployment well into the future, but short-enough to be realistic in terms of the rapid advances in technology and the likely changes that will occur along the corridor.

Project initiatives are recommended over 3 distinct timeframes; short-term (0-3 years), mid-term (3-5 years) and long-term (5-10 years). These three timeframes allow projects to be implemented in a layered, sequential fashion, taking full advantage of, and building off previously deployed ITS elements. Additionally, prioritizing projects allows them to be implemented as funding becomes available.

Even though this plan has a 10 year planning horizon, it should be considered a living document and should be revisited often to determine if any changes have occurred that affect the validity of stakeholder input and direction of growth for ITS within the corridor. This preserves the initial investment used to develop this plan, and ensures that the plan remains a useful planning tool. Changes that may necessitate updating the ITS Implementation Plan include: changes to transportation goals, existing or planned ITS elements, and local, state or national policies.

A Maintenance Plan was developed as part of this project, and provides guidance on how to update this plan. Maintaining the Glenn Highway ITS Implementation ensures that the Plan does not become outdated and remains valid for its entire 10 year timeframe.

2 ISSUES, DESIRES AND FUNCTIONS

This chapter summarizes the existing and anticipated issues affecting transportation along the Glenn Highway. These issues were identified from discussions with stakeholders, review of existing documentation, and stakeholder questionnaires. Discussions and questions directed at stakeholders focused on how ITS is used today and should be used to meet the transportation-related issues of the corridor. Therefore, the results of this process (i.e., the issues identified), do not reflect just the planned or programmed projects for the corridor, but rather reflect a desired view of ITS along the corridor. This "view" is broader in scope than what can be typically accomplished with tight transportation budgets, but provides the flexibility to deploy projects in-line with National requirements, as funding becomes available. The issues and desires mentioned in this chapter will form the basis for more detailed discussion of potential projects and recommendations for project phasing.

2.1 Purpose and Approach

Transportation-related issues and desired improvements provide the foundation from which specific ITS operational strategies and projects can be recommended to fulfill corridor specific goals and objectives. Identified issues and desires are compared to the inventory of ITS elements (See Chapter 3) to determine how ITS can be used to benefit the corridor. In some cases, ITS may already be addressing some of the identified issues, but perhaps not at a sufficient level, and in other cases ITS may not be used at all. This process also helps determine areas where ITS can be used and is useful in setting priorities. Therefore, the first step in developing the Glenn Highway ITS Implementation Plan was to undergo a stakeholder driven process of identifying transportation-related issues affecting the corridor and gaining a sense of what improvements are desired.

2.1.1 Review of Existing Documentation

The first step taken to identify the transportation issues of the Glenn Highway was a thorough review of existing documentation. As mentioned previously, in Chapter 1, the State of Alaska and the MOA have previously completed similar ITS plans. These plans provide the basic level of understanding of the issues affecting transportation in the state and within the MOA. Depending on whether it's the State or the MOA, all or portions of the Glenn Highway are represented in these plans. However, the focus of the plans was not directly on the Glenn Highway per se. Some investigation was needed to identify the specific issues associated with this corridor and to determine if these issues had changed since the time these plans were developed.

In addition to the State of Alaska Iways Architecture and the MOA's Regional ITS Architecture, several other documents/sources provided insight into the types of issues that are or might soon impact the corridor. These documents/sources of information were:

- ADOT&PF Website
- Local and State Planning Documents (STIP)
- Alaska Commercial Vehicle Information Systems and Networks (CVISN) Architecture Update

2.1.2 Kick Off Meeting/User Needs Workshop

In October 2006, a project kickoff meeting was held in Anchorage to introduce the project to stakeholders and to obtain input needed to begin developing the Glenn Highway ITS Implementation Plan, and more specifically this User Needs document. At the workshop stakeholders were asked to express any transportation issues they thought needed to be addressed, including any improvements they thought would benefit current operations. They were also asked to identify any existing or planned ITS elements within the corridor. A stakeholder group was identified and was invited to participate in this half day meeting. The types of groups invited included; traffic, emergency and transit management agencies, emergency management agencies, and others thought to have a stake in ITS activities along the corridor. At the workshop, agencies were led through hypothetical scenarios involving applications involving ITS and asked a series of questions that led to the identification of needs and issues affecting travel along the Glenn Highway.

2.2 Transportation Issues and Desired Improvements

This section summarizes the identified transportation issues and desired improvements pertaining to the Glenn Highway as identified from stakeholder outreach. These issues and needs are categorized into high-level functional areas to begin the process of mapping them to the National ITS Architecture. Mapping issues and desired improvements to the National ITS Architecture ensures that the Glenn Highway Architecture is developed using a nationally accepted and proven approach.

2.2.1 Traffic Management

Traffic management needs for the Glenn Highway stem from the need to provide information to the public as quickly and as accurately as possible to provide travelers the ability to adjust their travel plans accordingly, whether pre-trip or en-route. Specific needs stated by stakeholders include:

Regional Traffic Management Center

A regional traffic management center (TMC) was identified as a potential project in the MOA's Regional ITS Architecture (2004). Stakeholders again re-stated this need and emphasized that a TOC would benefit traffic management activities on both the Glenn and Seward Highways and could also be used to coordinate information and response among various regional agencies (traffic, transit, and emergency management).

A regional TMC may be either a fixed facility or a mobile center. In either case, it is likely that the regional TMC will be owned and operated by the Municipality; however other agencies may assign representatives to the center to improve communication among regional agencies. Its likely that a TMC will start off as a small facility or office within a facility, and grow from there as additional coordination with other agencies is desired and the network of ITS elements grows.

Variable Speed Limit System

Due to the adverse and dynamic weather conditions in Alaska and along the Glenn Highway, traveling at posted speeds is often too dangerous and not recommended. To reduce the effects of weather along the Glenn Highway stakeholders proposed that a system be implemented that adjusts speed limits based on current roadway conditions. Such a system should be tied to weather and pavement sensors and should use real-time weather measurements to adjust travel speeds accordingly.

HOV Lane Management

The Anchorage Bowl 2025 Long Range Transportation Plan recommends the phased implementation of HOV lanes to help ease the Glenn Highway commute to and from the Municipality. The recommended HOV project is divided into two phases, both slated for the long-term (2016-2025). The first phase includes 1 HOV lane for 11.3 miles between the Municipality and Eagle River. The second phase includes 1 HOV lane for 8.1 miles between Eagle River and Peter's Creek Interchange.[i] As part of this project ITS is needed to coordinate signals, detectors and lane control systems.

Since this project is at the far end of the planning horizon for this plan it is included here for primarily so that this project is not forgotten in future planning activities. When this plan is updated in the future this project can be revisited and a determination can be made as to whether or not this project is still viable. If viable this project should be brought forward and included in the Operational Concept and to that extent the Physical ITS Architecture. Despite the fact that this is a long-term project, ITS implementation that supports HOV lanes can occur well in advance of HOV going operational. Dynamic message signs, cameras, and other supporting infrastructure can be deployed over the next 10 years.

Dynamic Message Signs

There is a DMS currently deployed and operational on the Glenn Highway. However, this sign is only for Northbound traffic and is aging. Additional signs are desired for both directions and should be located at sites where travelers can use the information to make better travel related decisions. Stakeholders suggested that either new signs be deployed or the existing sign be moved to a location where posted information is needed and more valuable.

2.2.2 Emergency Management

The primary emergency management issue stated for the Glenn Highway relates to improving response to, and awareness of natural and man-made disasters (e.g., HazMat spills, winter storms and earthquakes). Due to the rather large volumes of traffic carried by the Glenn Highway these events as well as more typical blocking incidents and full closures will likely have significant impact on regional mobility and safety of travelers. Alerting travelers to potential dangers, especially tourists, helps these travelers make other plans, avoiding potential danger zones.

Disaster Information and Alerting

Information pertaining to natural and man-made disasters is critical to provide timely response to injured persons and to prevent additional injuries from occurring. Disaster information also helps in determining the amount and type of supplies needed before a response is initiated, ensuring that the correct supplies are brought to the scene as quickly as possible. Technologies that detect potential disasters are desired to alert travelers of these dangers. Similarly, technologies that assist in the evacuation of persons likely to be impacted by potential disasters are desired, but only after more basic plans and procedures have been implemented.

2.2.3 Public Transportation

Public transportation needs for the Glenn Highway are associated with making a traveler's public transportation experience more convenient and effective. Information is desired to assist the public transportation user in making decisions quickly, putting to ease concerns the user may have about using public transportation. Additionally, it is desired that this information be more widely disseminated to offer riders the ability to make decisions from locations where their trip originates. Specific public transportation needs are explained below.

Transit Traveler Information

The Public Transportation Agencies in Anchorage (i.e., People Mover) and Mat-Su Valley (e.g., Mat-Su Transit) operate commuter routes on the Glenn Highway. To promote transit and improve the quality of transit services along the corridor, stakeholder agencies believe that ITS should consolidate and make more widely available transit-related traveler information. Such information includes:

- Transit schedules
- Fares
- Transfer policies
- Current status (On-time or Delayed)
- Transit agency phone numbers

Park & Ride Location and Space Availability

Information on Park & Ride location and space availability is desired to promote the use of public transportation. This information makes it easier and more convenient for users to use these services, and can be included as an enhancement to the State's 511 system. Traditionally, commuters find out that a lot is full only after they arrive at the lot. Access to this information before or during a trip will allow the commuter to proceed to other transportation options before arriving at the Park & Ride lot saving them the time to travel to the park & ride lot.

2.2.4 Traveler Information

There are several issues related to enhancing and expanding the types of traveler information that are provided to the public. Generally speaking, it is the desire of the region to disseminate a broader set of information to travelers (pre-trip and en-route) to allow travelers to make better decisions before or during their trip. Additionally, this information should be provided to the public as quickly as possible and in a method that is concise. Such a method may involve the use of geographic information systems or other map-type display where information can be pulled by the user quickly. If such a system is implemented, it should contain the ability to allow users to select different types of display formats to allow the user to pull information using a display that is most easily understood. The types of information needed, as identified by stakeholders include:

- Current and forecast weather conditions.
- Existing incidents and delays.
- Traffic flow rates.
- Historical travel times, including peak periods.
- Locations where cell coverage is present.
- Tourists related info (fish runs, campground capacity, etc.).
- Alternate routes.

Traveler information should be consistent and accurate to gain and keep traveler's confidence in traveler information. In some cases, the traveler information issues and desires stated below may also be used by traffic management agencies to determine operational characteristics of the transportation network.

Real-time Vehicle Speeds

There is a desire to collect real-time vehicle speed data as a means to determine the operational service level of the Glenn Highway (i.e., traffic stoppages and slow downs). If detected vehicle speeds are well below than those posted, it may be indicative of congestion or other problem. This information, when passed along to travelers pre-trip and presented in a manner that can be easily interpreted may prompt travelers to delay or alter their trips. For instance, vehicles speed information can be used to generate trip times to and from certain points. Such information helps travelers make decisions, and as a result the extent and length of congestion is reduced and overall mobility is improved.

Real-time speed and/or travel time information can also be passed along to motorists en-route and will help these drivers make more informed decisions while they travel.

Real-time vehicle speeds also enables traffic managers to detect incidents as they occur, resulting in less delay in clearing the roadway. It also enables emergency agencies to respond to incidents and treat the injured more quickly.

Available Modes of Transportation

The Glenn Highway is the only highway leading to points North and West of Anchorage. Therefore, when crashes, or natural events like earthquakes close the highway for long periods of time, travelers must use alternative modes of transportation to reach their intended destinations. Therefore, there is a desire to provide travelers with information on alternative modes of transportation they may use to reach their destinations.

Personalized Traveler Information

Stakeholders desire to provide traveler information tailored to the unique needs of individual travelers. Such a system would require that the user input a set of criteria they wish to obtain information for and manner/frequency of receiving this information. For instance, a traveler who lives in Eagle River may request to receive only information for the Glenn Highway, since this is the primary Highway the traveler uses. Also since the traveler only travels during the peak periods, he/she may request that updates be only provided during peak periods. Personalized information reduces the time a traveler must spend seeking out traveler information manually.

Special and Seasonal Event Information

Special events like the State Fair in Palmer and seasonal events like fishing runs often draw large crowds and therefore increases the likelihood that incidents will occur and affect travel on the Glenn Highway. In response to these events, stakeholders seek to provide the public with special event information so they can better plan their travel.

2.2.5 Maintenance and Construction Management

Stakeholders indicated a desire to provide information and alerts to the public and to implement systems that collect information/data to assist day-to-day maintenance operations.

Real-time & Forecast Weather Condition Information

There are 4 environmental sensor stations (ESS) strategically located along or near the Glenn Highway (between Anchorage and Palmer). The ESS are part of the State's road weather information system (RWIS) which is a statewide network of ESS that provide road weather data and images every 15-30 minutes. (see http://roadweather.alaska.gov) Additional ESS stations would strengthen data collection along the corridor, and help to establish historical weather patterns that may be used to better predict conditions in the field when certain measurements are detected. Additionally, there is a desire to integrate ESS data into the 5-1-1 system to ease access to ESS data. By integrating this data into a 5-1-1 display, users can view information from each ESS on a single web page making it easier to access information and reducing the time and effort to access desired information.

Construction Information

Stakeholders desired information on construction related activities to inform the public so they can better plan their trips. Information on construction activities will also benefit the operations of public transportation providers and emergency response agencies.

Weather and Pavement Sensors

The ESS use air and pavement sensors to determine weather conditions occurring at points along the Glenn Highway. More ESS are desired to give a more thorough and comprehensive profile of weather conditions occurring in the field. In addition, some RWIS should be relocated to improve the accuracy of the data collected. For instance, stakeholders noted that the RWIS at the KNIK River is poorly situated to detect peak winds on the Palmer Hay Flats.

Fog Detection and Warning

The Glenn Highway is often affected by dense fog and freezing fog, which limits visibility and reduces overall roadway safety. Data from the ESS can be used as input to fog warning systems to alert motorists of the presence of fog so they can reduce speed before reaching the affected areas. The Knik River Bridge is a location that frequently experiences fog and one that stakeholders indicate is a potential site for detection and warning.

Snowplow Tracking

Stakeholders seek to track snowplows to determine snowplow progress in clearing roadways. By doing so operators are able to determine the roadways that have been treated and can route vehicles to locations that need treatment. By tracking snowplows with on-board sensors (e.g., Global positioning system), agencies can operate snowplows more effectively and efficiently thereby reducing overall material and operating costs of clearing roadways.

2.2.6 Commercial Vehicle Operations and Safety

Issues affecting commercial vehicle operations and safety have been documented in Alaska's CVISN Architecture and summarized in Alaska's Iways Architecture. Described below are the commercial vehicle issues pertinent to the Glenn Highway.

Permitting Information

Commercial vehicle operators wish to have electronic access to permitting information to expedite the movement of goods within Alaska, including the Glenn Highway. The Alaska CVISN Architecture identifies several systems that are currently operational that provide web-based access to permitting information. This service exists to increase access to web-based reporting systems like the Condition Acquisition and Reporting System (CARS) and 511 at the roadside, to allow operators without on-board systems to access this information. CARS is used by ADOT&PF and partnering agencies to enter travel information which is then publicly displayed at 511.Alaska.gov and on the 5-1-1 telephone.

Commercial Vehicle Safety Checks

Commercial vehicles traveling along the Glenn Highway are subject to safety checks which include weighing of vehicles and roadside vehicle inspections.

Hazardous Materials Tracking

Hazardous materials, carried by commercial vehicles, need to be tracked to ensure safety, initiate a speedy response when incidents occur, and detect suspicious activity.

2.2.7 Other Issues and Desires

There are several other issues and desires stated by stakeholders that do not fall within one of the categories already presented. Unlike the issues and desires already presented, these needs do not map to National ITS User Services. In other words there are not standardized ITS elements that are commonly used to address these needs. In fact, several issues/desires mentioned in this section do not contain or can be addressed with ITS, however in the future ITS applications may be developed and may be used to accommodate some if not all these issues. For this reason, future updates to this plan should revisit these issues/desires to determine if ITS applications exist that work toward resolving these issues. In the future, the National ITS Architecture may be updated, and include new or modified user services that address the issues discussed below.

Over Height Vehicle Detection

The ability to identify over height vehicles was mentioned as an area where ITS systems may be applied to improve traveler safety and roadway infrastructure security. Detecting over height vehicles may allow a warning to be issued to a vehicle driver in advance of bridges or other lower clearance infrastructure. This may prevent collisions with, and damage to infrastructure.

Lane Marking Visibility

Improving the visibility of lane markings was mentioned as a means to improve crashes resulting from vehicles leaving the roadway. Improved lane marking visibility was considered especially beneficial due to the large volume of traffic supported by this segment of roadway and also to the fact that the dark winter months necessitate improved visibility. Such systems that support lane marking visibility, like flashing/lighted lane making, will likely be stand alone (not ITS per se), but the potential exists that these systems will be integrated with other roadway instrumentation, like fog sensors or traffic signals (in the case of crosswalks).

Roadway Lighting

Stemming from the discussion to improve lane marking visibility, stakeholders stated the general need to improve roadway lighting. Improvements to and/or additional roadway lighting will improve the visibility of existing lane markings, roadway signs, and potentially dangerous objects alongside or near the roadway.

If implemented at or near locations where cameras are deployed, roadway lighting may improve camera imagery. However, this is not always possible or beneficial. At locations where lighting is not desired or available, low or no light cameras can be used to improve the quality of images.

Animal Detection and Notification

In Alaska, wildlife is abundant and is a cause for concern for the traveling public. Large animals like moose frequently cross roadways like the Glenn Highway and are often a cause of collisions. Mechanisms are needed to alert drivers of the presence of animals near the roadway or prevent animals from crossing the roadway altogether via underpasses or fences. This is especially important at locations where animals are known to migrate or frequently cross. The traditional approach would be to install fences to prevent animals from crossing over the roadway. This is a cost effective approach, but does not alert drivers to the presence of animals when fences are blow down or damaged ITS applications, although not widely used, may involve the use of global positioning systems (GPS) tags or invisible fences that sense the presence of animals.

Public Feedback Collection and Reporting

Several stakeholders indicated a desire to obtain more public feedback on projects and improvements, as well as general concerns with the transportation system as a whole. Based on public feedback, transportation agencies can focus their efforts on public concerns and issues and be more responsive to needs. Systems like 511 and websites should be updated to provide users with the ability to provide feedback. This will promote greater public acceptance of projects and improve public perception of the agencies implementing these projects.

Partnerships with Media

Although not an ITS need per se, partnerships with the media (e.g., radio, television, pint media and web sites) can be an effective approach to providing traveler information to motorists, both pre-trip and en-route. Partnerships, may take various forms. One form often used is where traffic management agencies offer limited control of their cameras or simply camera images in exchange for media agencies broadly disseminating this traveler information and alerts. These win-win partnerships are a low cost, effective approach for disseminating traffic information; however inter-agency agreements must be first established to dictate policies and expectations.

2.3 Mapping Issues/Desires to High-Level Services

The transportation issues and desires identified in the previous sections are mapped to the high-level transportation services or functions supported by the National ITS Architecture. In doing so, the transportation services/functions identified state what ITS should do from the user's perspective and help identify the individual ITS elements needed to resolve the issue. Using nationally accepted and defined services and functions works toward developing the Glenn Highway ITS Implementation Plan in a manner that follows a nationally accepted approach and is consistent with the MOA ITS Architecture and the Alaska Iways Architecture. This not only promotes system integration and interoperability within the corridor, but also between adjacent corridors and from region-to-region.

In every region, or corridor, there are likely to be unique issues and desires that do not fall into a nationally accepted framework like the National ITS Architecture. Although valid, these issues and desires are not supported by approved national standards. In cases where these issues and desires do not map to the National ITS Architecture they may be added to the MOA ITS Architecture, the Alaska Iways Architecture or preserved so they can be revisited in the future. It is likely that the National ITS Architecture framework will change over time, and may in the future include new services that support previously identified and preserved issues or needs.

National ITS Services that are applicable to the issues and desires of Glenn Highway stakeholders are summarized in Table 2-1.

2.4 Next Steps

The transportation-related issues and desires documented in this chapter represent the first step in the larger process of developing the Glenn Highway ITS Implementation Plan. The information reported in the chapter will serve as the required input needed to develop the ITS goals and vision for the corridor, the operational concepts for delivering transportation services and ultimately recommending a phased approach for deploying ITS project initiatives. The next chapter (Chapter 3 - ITS Inventory) will summarize the existing ITS elements currently at work along the Glenn Highway and those desired to meet transportation issues.

Table 2-1:
Mapping of Stakeholder Needs and Desires to National ITS Architecture Services

Transportation Need	National ITS Architecture Service
Regional Traffic Management Center (Coordination, Control and Monitoring)	• Traffic Control • Incident Management
Variable Speed Limit System	• Traffic Control
Dynamic Message Signs	• Traffic Control
Disaster Information and Alerting	• Disaster Response and Evacuation
Transit Traveler Information	• Pre-trip Traveler Information
Park & Ride Location and Space Availability	• Broadcast Traveler Information
Real-time Vehicle Speeds	• Traffic Control
Available Modes of Transportation	• Pre-trip Traveler Information
Personalized Traveler Information	• Pre-trip Traveler Information • En-route Traveler Information
Special and Seasonal Event Information	• Pre-trip Traveler Information • En-route Traveler Information
Real-time & Forecast Weather Condition Information	• Pre-trip Traveler Information • En-route Traveler Information
Construction Information	• Pre-trip Traveler Information
Weather and Pavement Sensors	• Pre-trip Traveler Information • En-route Traveler Information
Fog Detection and Warning	• En-route Traveler Information
Snowplow Tracking	• Maintenance and Construction Operations
Permitting Information	• Commercial Vehicle Administrative Processes
Hazardous Materials Tracking	• Hazardous Materials Security and Incident Response • On-board Safety and Security Monitoring
Commercial Vehicle Weight Enforcement	• Commercial Vehicle Electronic Clearance

3 ITS GOALS, OBJECTIVES AND VISION

Understanding what ITS is, let alone what ITS should be like is often difficult when undertaken in a single step. Developing this understanding is best completed in a series of small, manageable steps. The first of these steps was documented in the previous chapter, where transportation issues and desires for the Glenn Highway were captured and documented. This chapter builds upon that work and begins to define how existing ITS elements can be leveraged, and new ITS elements integrated to satisfy issues and fulfill the desires of the Glenn Highway.

Although the Vision for ITS along the Glenn Highway is predominantly based on the issues and desires specific to the Glenn Highway, it must also embrace the outcomes of existing local and statewide planning. In other words, this plan should not stand alone from other existing plans, but rather be developed in a manner that supports, and ultimately feeds into these previous efforts. Such an approach - which aligns the ITS vision of the Glenn Highway with other regional and statewide plans - not only ensures that ITS projects proposed for the Highway help satisfy regional and statewide transportation goals, but also makes it easier to secure funding for ITS projects. This is attributed to the fact that the Glenn Highway must compete for funding with other projects in the region, and will be viewed more favorably if multiple goals and objectives are satisfied.

Therefore, state and regional transportation goals and objectives were considered alongside the transportation related issues in the Glenn Highway corridor and the desires of the Glenn Highway stakeholders, when defining goals and objectives for ITS in the corridor. These ITS goals and objectives were then used to develop a Vision for growing and developing ITS within the corridor.

3.1 Existing State and Regional Guidance

As mentioned above and in previous chapters, there are several existing transportation plans and documents that provide insight into defining how ITS should evolve and what it should ultimately look like within the Glenn Highway Corridor. One such document - the Vision 2020 Statewide Transportation Policy Plan (adopted November 2002) - provides a statewide perspective for how the state's surface transportation system should be developed in the first part of the 21st century. Specifically, this plan states that transportation improvement should be made in line with ADOT&PF's mission, which is to…

> *"Provide for the safe movement of people and goods and the delivery of state services."*

The policies and objectives contained in the Vision 2020 plan generally set the direction for transportation system development; with some being more relevant than others for ITS development and deployment. The policies stated in the Vision 2020 plan that apply directly to ITS are listed below with their applicable objectives listed as sub-bullets.

- Develop multi-modal facilities and connections to ensure that Alaska's transportation system is safe, integrated, coordinated, cost-effective, and energy-efficient to effectively move people and freight (Policy #1).
- Develop and improve the transportation system in a way that preserves and enhances Alaska's unique character and takes advantage of Alaska's unique global position (Policy #5).
    - Incorporate national defense considerations into the planning and development of Alaska's transportation infrastructure, specifically corridors linking key military facilities, the Port of Anchorage, Ted Stevens Anchorage International Airport and other facilities deemed significant to the nation's security.
- Effectively provide timely and accurate public information about department responsibilities, accomplishments, available resources, and constraints (Policy #7).
    - Use innovative methods to effectively inform and communicate with the public, potential contractors, and other transportation stakeholders (objective a).
    - Take advantage of electronic technology to better inform and communicate with the public, potential contractors, and other transportation stakeholders (objective c).
    - Expand use of the internet as a public involvement mechanism. Strive to make the department's website user friendly and informative – for example, include information about road conditions and ferry arrivals and departures for travelers (objective d).
- Strive to preserve the natural beauty of the state, limit the negative impacts and enhance the positive attributes –environmental, social, economic, and human health – of transportation projects (Policy #9).
    - Favor transportation projects that improve fuel-efficiency, reduce accidents and congestion, and minimize air and noise pollution (objective e).
- Ensure that the benefits of transportation improvements are gained by all Alaska citizens (Policy #10).
    - Make transportation investment decisions equitably across Alaska according to need (objective c).
    - Employ new approaches and technologies to address transportation needs in remote Alaska as appropriate (objective e).
- Reduce long-term maintenance and operational costs through incorporation of new technologies, improvement of sub-standard roads, and other strategies (Policy #15).
    - Evaluate new technologies and approaches in maintenance and operations and implement as appropriate (objective a).
    - Utilize ITS for Commercial Vehicle Operations (ITS/CVO) technologies as well as fixed and roadside commercial vehicle enforcement sites to improve the safety and productivity of commercial vehicle operations (objective b).
- Provide a safe and secure transportation system to ensure freedom of movement for people and commerce (Policy #18).
    - Improve safety for motorized and non-motorized users of new and existing highways through improved design and maintenance (objective a).
    - Support development and enforcement of appropriate transportation safety laws and regulations to reduce injury and property damage (objective f).
    - Use current technology, training programs, and equipment to improve aviation, transit, railroad, pipeline, port and harbor security (objective h).

In addition to the Vision 2020 Plan, there are several regional plans that set a direction for how transportation improvements are to be made within the Municipality of Anchorage and greater Anchorage region which includes the towns of Chugiak and Eagle River. Since a significant portion of the Glenn Highway lies within the Municipality's geographic boundaries, and connects the municipality with the Chugiak-Eagle River area, the approach for deploying ITS along the corridor should be developed so that it is in-line with these regional plans, which include:

- Anchorage Bowl 2025 Long-Range Transportation Plan
- Anchorage Regional ITS Architecture
- Chugiak-Anchorage 2027 Regional Long Range Transportation Plan

The Anchorage Bowl 2025 Long-Range Transportation Plan summarizes goals and objectives which were previously documented in the Municipality's 2020 Comprehensive Plan. These goals and objectives reflect the public's vision for the future. The goals and objectives that relate specifically to ITS, are listed below.

- Safety and Health (Goal #1).
    - Improve the safety and security of people on all modes and in all areas.
    - Reduce vehicular and pedestrian crashes.
    - Decrease emergency response time and reduce risk to the community from natural hazards and disasters.
    - Minimize exposure to transportation-related air pollutants, including carbon monoxide, particulate matter, and volatile organic compounds such as benzene.
- Improve Mobility and Access in Anchorage and the Region (Goal #5).
    - Improve the existing transportation system efficiency through the implementation of effective and innovative transportation system management (TSM), transportation demand management (TDM), and ITS strategies.
- Transportation Choices (Goal #6).
    - Improve the year-round reliability and travel time of transit without increasing automobile travel time and while assessing whether the increased costs are offset by increased ridership.
    - Optimize the year-round accessibility to, and the convenience of, travel choices.

Perhaps the source of information most pertinent to setting a direction for ITS along the Glenn Highway is the Municipality's Regional ITS Architecture – Long Range Vision. This document states the specific goals for ITS within the Municipality and surrounding areas (i.e., Chugiak-Eagle River), and is based largely upon the Municipality's Community Vision as stated in the 2020 Comprehensive Plan. Because the MOA Regional Architecture was developed based on outreach to individuals within the greater MOA region, much of the information in this plan is relevant to the Glenn Highway Corridor.

- Ensuring Public Safety.
    - Reducing the presence of snow and ice on the roadway,
    - Informing the public of hazards so they may avoid them, and
    - Clearing crashes from the roadway as quickly as possible to reduce the potential for secondary crashes.

- Supporting Public Security.
  - Monitoring, managing, and mitigating potential and actual major incidents and emergencies, and
  - Eliminate all man-made security hazards, and reduce the impact of any natural disaster.
- Delivering Public Services More Efficiently.

The Chugiak-Eagle River Comprehensive Plan Update (2006) and the 2027 Chugiak-Eagle River Long Range Transportation Plan (LRTP), which was recently completed in 2007, also include goals, objectives and policies that can be satisfied in part through application of ITS. Both plans identify congestion as being a significant problem on the Glenn Highway. Although ITS can reduce congestion and its associated impacts, several of the recommended approaches for addressing the problem in each of these plans focus on capacity or design improvements. This may indicate that ITS alone cannot completely address existing problems, but rather may be used to improve conditions until traditional capacity projects can be implemented.

Goals and objectives from the Chugiak-Eagle River Comprehensive Plan that can be addressed in part through ITS include:

- Natural Environment, Air Quality, Goal D: Promote car pooling, van pooling and public transit as an alternative to the single-occupancy vehicle, especially for commute trips between Anchorage and Chugiak-Eagle River.
- Natural Environment, Natural Hazards, Goal B: Make information on natural hazards available to the public.
- Land Use, Growth, Goal C: Optimize the provision, use and efficiency of public facilities and services.
- Public Facilities and Services, Transportation, Goal A: Ensure development of a transportation network that provides an acceptable level of service, maximizes safety, minimizes environmental impacts, provides alternate transportation types and is compatible with planned land use patterns.
  - Objective A: Increase transportation system efficiency during peak-hour periods.

Similarly, the LRTP included the following objective:

- Decrease travel time through an increase in the transportation efficiency during peak hour periods (objective #1).

3.2 Looking Ahead – National ITS Initiatives

Besides existing statewide and regional transportation plans and documents, which offer guidance on how ITS should be deployed today, there are several national ITS initiatives that should be considered when setting the direction for ITS growth and development along the Glenn Highway. Aligning the Glenn Highway ITS goals and objectives with National ITS Initiatives may make it easier to secure funding for ITS, as it is likely that additional funding opportunities will be made available to support these national efforts. Of the nine major ITS initiatives developed by the USDOT for improving transportation safety, relieving congestion and enhancing productivity, the following 5 most pertain to the Glenn Highway.

3.2.1 Clarus Initiative

The *Clarus* Initiative was launched in 2004, to develop and demonstrate an integrated surface transportation weather observing, forecasting and data management system. The goal of the system is to provide transportation operators and users with comprehensive profile of weather data, in real-time to reduce the effects of adverse weather on the transportation system.

The *Clarus* initiative is similar to that of the national 5-1-1, program where the outcomes of the initiative are geared toward providing users with a stable, reliable source of information – in this case weather and pavement information. The initiative will provide access to RWIS sensor data and will fill in gaps in RWIS coverage using on-board vehicle equipment as well as other remote sources (e.g., satellite). Since there are RWIS located on the Glenn Highway as well as along other highways in Alaska, the *Clarus* Initiative may affect how operators and users of Alaska's highways obtain and benefit from weather information.

The *Clarus* Initiative is planned to be in development until 2009. As part of the demonstration, Alaska is currently the lead agency in a multi-agency effort to develop a concept of operations for the *Clarus* System Regional Demonstration, the "*Alaska – Canada Highway Road Weather Portal.*"

3.2.2 Cooperative Intersection Collision Avoidance Systems

This initiative will apply systems installed on vehicles and along the roadside to increase driver awareness of conditions occurring at an intersection as they approach it. The systems on board the vehicle will warn drivers as well as potential victims (other nearby drivers, pedestrians, and bicyclists) that a violation of a traffic control device might occur, based on real-time measurements. Based on these warnings, drivers can change their driving behavior and victims can take precautionary measures, preventing incidents and improving safety. Although much of the Glenn highway is unsignalized, there are a few signalized intersections on the facility (primarily within the MOA), where this initiative will apply. Therefore, it is only practical to consider this initiative when making future improvements to signalized intersections. Additionally, this initiative works toward realizing the Municipality's goal of improved safety across all modes, as specified earlier in this chapter.

3.2.3 Electronic Freight Management

This initiative will work toward streamlining technologies to implement a common electronic manifest for managing freight. This would improve speed, accuracy and visibility of information transfer between various modes of transportation. As a by product of this exchange, tracking freight will become easier helping to better secure transportation infrastructure, as well as the safety of all citizens.

Considering that the Glenn Highway is one of the two primary highways leading to and from Anchorage and the Port of Anchorage, this initiative may be particularly of interest for two reasons. First, this initiative speeds the movement of goods to market, helping to improve Alaska's economic vitality. Second, the ability to better manage and track freight will benefit the security of residents along the corridor, as well as the integrity of transportation infrastructure.

3.2.4 Integrated Corridor Management Systems

This initiative will analyze how proven and emerging ITS technologies can be collectively used to improve congestion on "critical corridors". The Glenn Highway, could be considered a critical corridor, in that it supports large volumes of traffic and is a primary link between the MOA and outlying residential areas. With that said, and due to the fact that the Glenn Highway is frequently subject to periods of congestion, makes it a likely beneficiary of an initiative like this. One of the results of this initiative will be a "tool box" outlining various applications of technology that make better use of existing capacity, in an effort to reduce congestion levels. Therefore, in the future, this initiative should be monitored to determine what impact, if any, the results of this initiative have on the highway's ITS Vision.

3.2.5 Vehicle Infrastructure Integration (VII)

Currently, the USDOT, several state DOTs and various car manufactures are working together to develop a national vehicle-to-vehicle and vehicle-to-roadside communication network so data can be communicated to drivers, in real-time and at any point along the highway. Various crash avoidance applications are being developed as part of the VII program. Such a system would also open doors for various types of traveler information. Overall, the VII program will help make vehicle trips more safe, efficient, and convenient.

Under this initiative cars would be equipped with a GPS unit and on-board, short-range communications. With this equipment, one vehicle could "talk" with another vehicle or with equipment installed along the roadside. Such communication can alert drivers to avoid areas affected by an incident. Alternatively, the systems on the vehicle could also be used to collect data that would ultimately be used to assist others in making travel decisions. Of particular interest in the Glenn Highway corridor is the possibility of a vehicle that experiences slippery road conditions, as determined by on-board vehicle traction sensors, communicating with a roadside device or other vehicles about the roadway condition. Drivers could be alerted to slowdown when approaching the specific area where the problem exists.

The growing national interest in the VII initiative may affect how information might be best disseminated to travelers, or data collected along the Glenn Highway. A joint decision, as to whether or not to begin deploying the VII network, will be made by the USDOT and car manufacturers in 2009. Glenn Highway decision makers need to remain cognizant of the impacts that VII poses and be able to adjust their Vision for ITS along the corridor accordingly.

3.3 ITS Vision

With an understanding of existing statewide and regional transportation goals and objectives, and influencing national ITS activities, the future of ITS along the Glenn Highway now becomes more clear. With that said, the ITS Vision sets forth a clear, concise statement that defines what ITS should become or in other words what it should ultimately look like from the perspective of the user. The Vision is critical to the development of ITS within the corridor, because it represents a consensus based view of what role ITS should have in the corridor. In other words it's a forward looking statement agreed to by stakeholders to effectively guide ITS deployment over a specified number of years. Due to the rapid evolution of ITS-related technology, this period is typically capped at 10 years.

Because technologies are constantly changing and new methods are consistently being introduced to improve travel, the Vision will likely never be completely fulfilled; however this should be expected and does not negate its purpose. In the future, as technology changes and desires evolve, this plan including the ITS vision should be updated to reflect current issues and priorities of the Glenn Highway.

The ITS Vision for the Glenn Highway is articulated below.

> *"The Glenn Highway intelligent transportation system should strive to become an integrated "system of systems" that improves safety and mobility, enhances efficiency and convenience of travel for all residents, visitors and commerce, and supports where practical local, regional, state, and national transportation objectives.*

3.4 ITS Goals and Objectives

ITS goals and objectives represent the steps that need to be taken to satisfy the ITS Vision. These "steps" bridge the gap between stated issues and desires and the Vision for what ITS should look like. In doing so, goals and objectives are derived from the stated issues and desires of the Glenn Highway (see Chapter 2), as well as applicable statewide and regional transportation goals and objectives.

Each goal and corresponding objective presented in this section was prepared with the goal of promoting inter-agency discussion and fostering region wide consensus. To this regard, the goals and objectives were written to be clear and easily understood to ensure common understanding of the action ITS needs to perform to successfully satisfy the ITS vision.

The goals and objectives for ITS along the Glenn Highway are articulated in Table 3-1. A total of 5 goals and 17 objectives were identified. A mapping of these goals and objectives to issues and desires stated for the Glenn Highway is shown in Table 3-2.

Table 3-1:
Glenn Highway ITS Goals and Objectives

Goals	Objectives
1. Provide safe transportation for residents, visitors and commerce.	1) Minimize the occurrence of traffic incidents. 2) Minimize the duration of incidents. 3) Minimize the time needed to identify/respond to incidents. 4) Improve inter-agency communication and coordination. 5) Expand the collection of real-time weather and traffic data.
2. Improve efficiency and convenience of travel and quality of life.	1) Improve the content, delivery and presentation of traveler information. 2) Make traveler information more widely available. 3) Improve the predictability of travel times.
3. Provide timely and accurate information and alerts.	1) Enhance and expand traveler information. 2) Reduce the time needed to share information between agencies. 3) Minimize the time needed to detect natural or man-caused disasters. 4) Provide traveler information at specific points to improve decision making.
4. Improve the efficiency and appeal of public transportation.	1) Increase access to and expand content of transit-related traveler information. 2) Improve travel time reliability when traveling to transit facilities. 3) Increase visibility of travel choices and availability.
5. Improve the efficiency and safety of commercial vehicle operations.	1) Reduce commercial vehicle delay. 2) Reduce the number of commercial vehicle related incidents and crashes.

Table 3-2:
Mapping of Glenn Highway Goals and Objectives to Issues and Needs

Goals and Objectives	Glenn Highway Issues and Needs: Regional Traffic Management Center	Variable Speed Limit System	Dynamic Message Sign	Disaster Information and Alerting	Transit Traveler Information	Park & Ride Lot Location and Space Availability	Real-time Vehicle Speed Data	Available Modes of Transportation	Personalized Traveler Information	Special and Seasonal Event Information	Real Time and Forecast Weather Information	Construction Information	Weather and Pavement Sensors	Fog Detection and Warning	Snow Plow Tracking	Permitting Information	Commercial Vehicle Safety Checks	Hazardous Materials Tracking
Goal #1: Provide safe transportation for residents, visitors and commerce.	●	●	○	●			●			○	○	○	●	●	○		●	●
Minimize the occurrence of traffic incidents.	○	●	○							○	○	○	○	●	○		●	
Minimize the duration of incidents.	●		○															
Minimize the time needed to identify/respond to incidents.	●			●			●											●
Improve inter-agency communication and coordination.	●																	
Expand the collection of weather and traffic data.													●	○				
Goal #2: Improve efficiency and convenience of travel and quality of life.	○		●	○	○	○	●	○	●	○	○	○	○	○	○			
Improve the content, delivery and presentation of traveler information.	○	○	●	○	○	○	○	○	●	○	○	○	○	○	○			
Make traveler information more widely available.	○		●	○	○	○	○	○	●	○	○	○	○	○	○			
Improve the predictability of travel times.	○						●											
Goal #3: Provide needed and timely information and alerts.	●	○	●	●	●	●	●		●	●	●	●	○	●				●
Enhance and expand traveler information.				●	●	●	●	●	●	●	●	●	○	○				

	Glenn Highway Issues and Needs																	
Goals and Objectives	Regional Traffic Management Center	Variable Speed Limit System	Dynamic Message Sign	Disaster Information and Alerting	Transit Traveler Information	Park & Ride Lot Location and Space Availability	Real-time Vehicle Speed Data	Available Modes of Transportation	Personalized Traveler Information	Special and Seasonal Event Information	Real Time and Forecast Weather Information	Construction Information	Weather and Pavement Sensors	Fog Detection and Warning	Snow Plow Tracking	Permitting Information	Commercial Vehicle Safety Checks	Hazardous Materials Tracking
Reduce the time needed to share information between agencies.	●																	
Minimize the time needed to detect/respond to natural or man-caused disasters.	●			●							○		○					●
Provide traveler information at specific points to improve decision making.	○	○	●			●								●				
Goal #4: Improve the efficiency and appeal of public transportation.	○				●	●	○	●	●	○	○	○						
Increase access to and expand content of transit-related traveler information.					●	○		●	●									
Improve travel time reliability when traveling to transit facilities.	○					●	○		○	○	○	○						
Increase visibility of travel choices and availability.					●			●	●									
Goal #5: Improve the efficiency, security and safety of commercial vehicle operations.	○	●	●				○		○	○	●	●		●	○	●	●	●
Reduce commercial vehicle delay.	○		●				○		○	○	●	●			○	●		
Reduce the number of commercial vehicle related incidents and crashes.		●	○				○				●			●			●	●

● Goal directly applies to issue/need.

○ Goal indirectly applies to issue/need.

3.5 Next Steps

As mentioned earlier, the ITS Vision, and supporting goals and objectives, set a course of action for developing and deploying ITS along the Glenn Highway. Using this course as a foundation, ITS solutions can begin to be developed that meet goals and objectives. In the next chapter, these solutions will be presented at a high-level to further encourage stakeholder engagement and to define responsibilities for developing, operating and maintaining ITS solutions. In Chapter 4, identified solutions will be grouped by the specific functions or transportation services that can be delivered through application of ITS-related systems. These functions/services are known better by members of the ITS community as Operational Concepts. In later chapters, these operational concepts will be used to develop a "blue-print" that shows how ITS components come together to operate a single system comprised of smaller, individual agency owned subsystems. This will eventually lead to a recommendation of ITS-related project initiatives phased over the short- (0-3 years), mid- (3-5 years), and long-term (5-10 years).

4 OPERATIONAL CONCEPTS AND SOLUTIONS

4.1 Introduction

With ITS goals, objectives and Vision now in place (see Chapter 3), it is now possible to begin the process of recommending specific ITS applications that can be implemented or expanded to better address transportation issues and needs along the Glenn Highway. Before ITS applications can be implemented, however, agency operations as they relate to ITS activity should be reviewed to determine where within an agency's current operations ITS applications fit. This requires that agency roles and responsibilities for implementing, operating and maintaining ITS be defined.

This Operational Concept defines at a high-level the roles and responsibilities ITS stakeholders have in day-to-day operation of ITS. These responsibilities not only include operations, but also planning, construction, and maintenance of existing and planned ITS elements. In defining these activities the ITS Operational Concept begins to answer the who, what, where, why, and how questions that surround existing and planned ITS elements, in essence taking the first step to develop individual subsystems that fulfill the Corridor ITS Vision. However, the ITS Operational Concept is only the beginning step in the larger process, and isn't intended to capture all the details needed to design/deploy individual systems or subsystems. To this regard, the ITS Operational Concept is written in a non-technical voice that is easy to understand and allows stakeholders to achieve consensus and buy-in.

4.2 Overview of Agency ITS Operations

This section provides an overview of current agency operations, as they are relate to and impact ITS operations on the Glenn Highway. 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 4.5. The following discussion of agency operations was derived in large part from the discussion of agency roles and responsibilities documented in the Alaska Iways Architecture, which is being updated concurrently with the development of the Glenn and Seward Highway ITS Plans.

The roles and responsibilities that these agencies will have in terms of designing, implementing, and maintaining ITS will vary substantially. Some departments like the Department of Transportation, through its various divisions, will obviously play a more significant role. Whereas, other departments like the Division of Tourism, and the Division of Motor Vehicles (DMV) tend to operate on the periphery of ITS activity, and play a much less significant role.

4.2.1 State of Alaska

These following State agencies are key ITS stakeholders along the corridor.

- ADOT&PF
- Alaska Department of Public Safety
- Department of Military and Veterans Affairs, Division of Homeland Security and Emergency Management
- Alaska Railroad Corporation (ARRC)
- Alaska Department of Administration, Division of Motor Vehicles
- Alaska Department of Tourism
- Department of Health & Social Services, Injury Prevention & EMS

Alaska Department of Transportation and Public Facilities

Statewide and Regional Traffic and Safety Sections

The ADOT&PF, Traffic and Safety Office focuses on improving highway safety and operation. Staff are grouped into statewide and regional sections.

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

- Planning,
- Preliminary design,
- Design,
- Construction, and
- Maintenance.

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.

Central Region Traffic has the largest share of both traffic and crashes in the state. Central Region Traffic provides timing for traffic signals in Central Region outside of the MOA but does not operate them. They are not responsible for traffic data collection for the HPMS.

Maintenance and Operations (Central Region)

ADOT&PF's Central Region Maintenance and Operations (M&O) is headquartered in Anchorage, with maintenance stations and offices located in outlying locations, including the MatSu office in Palmer. Central Region M&O is one of three statewide Maintenance and Operations Divisions, with the other 2 headquartered in Fairbanks and Juneau. Regional M&O divisions are responsible for maintaining roadways, bridges, and airports within their respective region. This includes routine and emergency maintenance. Other activities include:

- Deploying and programming portable 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

Central Region M&O is responsible for maintenance and construction on major roadways in Anchorage including the Glenn and Seward Highways. In the event of major incidents, the Maintenance and Operations Division assists the Alaska State Troopers (AST) upon request. This division also provides and uses weather information to schedule maintenance personnel and equipment. Maintenance sections have agreements with cities that enable them to share each others' equipment.

Statewide Design and Engineering Services

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

Bridge Design Section - This section carries out two primary functions:

- Provision of design services and consultant oversight for new bridge and/or bridge rehabilitation construction projects.
- Provision of a broad range of services associated with the existing inventory of the State's 980 public highway bridges.

From an operational perspective, this section is responsible for collecting and monitoring data from bridge scour detection systems. Although programming varies between sites, scour data are typically collected every thirty minutes and transmitted four times daily. Readings are typically taken every thirty minutes during floods.

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

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

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

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

Regional Highway Construction Section

This section oversees construction events, manages contractors, and provides information to the traveling public. They input construction information into the CARS program to advertise on the 511. Central Region advertises construction on their Navigator website, in addition to the 511. The construction section maintains the following website where current construction activities are posted (http://www.dot.state.ak.us/creg/const_nav/index.shtml).

Program Development Division

Statewide GIA Mapping Section - This section provides the base maps and other spatial data necessary to support many ITS projects. They have collected road centerline data statewide in order to provide better quality maps for ADOT&PF. They are also involved in the HAS/GIS interface project so that data are synchronized. This section is also using digital imaging to collect the data needed to establish an asset management inventory within the HAS/GIS Interface.

Highway Data, Highway Database Section - The Highway Data Section is responsible for developing and maintaining transportation data and management 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 section collects and processes the following types of data:

- Road network data (road character data, video log)
- Traffic data (annual average daily traffic (AADT), vehicle classification, speed, turning movements)
- Accident data

These types of data are stored in a transportation database known as the Highway Analysis System (HAS).

ADOT&PF is currently developing its WIM Program, which will coordinate statewide data collection and analyses of vehicle weight, length, classification, counts, and speed.

Accident staff in the Highway Database Section 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, DMV, Alaska Department of Administration. The DMV forwards a copy of each accident report to ADOT&PF's Division of Program Development, Highway Database Section. Once at the Highway Database Section, accident staff process each vehicle crash report, verify the information on 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 Section, in conjunction with the GIS/Mapping groups, is also responsible for developing AADT maps that are published. These data are provided to developers, local public sector agencies, the ADOT&PF Design Group, and local residents. These 2 groups are also responsible for migrating the HAS database with the GIS Database, to establish a more robust database that provides quick access to transportation data.

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 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 CVISN;
- Operating the Commercial Vehicle Information Exchange Window (CVIEW) database;
- Operating weigh stations and associated equipment;
- Operating WIM devices;
- Operating portable scales; and
- Operating the Infra-red Inspection System (IRIS).

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

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 Network. 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 the state's Condition Acquisition & Reporting System (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."[ii] The Center 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 Emergency Alert System, 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 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 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:

- 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 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 (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 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 RWIS sites. In return, the ADOT&PF provides an FTP site for NWS to access real-time RWIS data. ADOT&PF provides a link to NWS observation and forecast information from the following website:

www.roadweather.alaska.gov

4.2.3 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 real-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.

4.2.4 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. Current operations of these sections 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 APD 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.[iii] 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's 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 operations 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 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.[iv]

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:[v]

- Automated Vehicle Location
- Signal Priority
- Mobile Data Terminals (MDT)
- 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 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 (AFD). 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 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 AFD is responsible for 911 dispatch of fire, rescue and emergency medical services 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. During major emergencies the EOC will be staffed by other 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.

4.2.5 Other Local/Regional Agencies

City of Wasilla Police Department

The City of Wasilla Police Department operates the MatCom Dispatch Center located in Wasilla and provides dispatch services for City Police and AST. The Department is responsible for patrolling the section of the Parks Highway located within the City of Wasilla. The Department has a written contract with AST for dispatch services. Besides daily communication with the AST, the Department also communicates with ADOT&PF during inclement weather and with APD on an as needed basis.

The Wasilla Police Department has previously applied for grant funding to install a DMS on the Parks Highway, between the Parks and Glenn Highway intersection. The DMS in this location can be used to direct motorists away from areas of congestion or that are impacted by an incident.

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 Regional ITS Asset 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 impact corridor operations. 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 along the Glenn Highway are described below.

Dynamic Message Signs

The ADOT&PF owns and maintains one permanent DMS on the Glenn Highway. This DMS is located just south of the Fort Rich gate and is used primarily to improve safety and decision making during adverse weather. Besides this sign, there are 2 other DMS located within the Anchorage region, which can be used to warn motorists of incidents and weather on the Glenn Highway. One of the 2 signs is located on the Seward Highway, south of Anchorage, while the other is a permanent DMS located at the Port of Anchorage. The Port of Anchorage sign is used primarily for commercial vehicle purposes, while the sign on the Seward is again used primarily for safety and decision making during adverse weather.

In addition to permanent DMS mentioned above, the ADOT&PF Maintenance and Operations own and operate 15 portable DMS in and around the Anchorage and Fairbanks regions. These signs are used on a temporary basis in and around construction and work zones within these regions.

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.

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

The ADOT&PF owns and operates a statewide RWIS that consists of a total of 49 ESS and one cooperative site strategically located along major transportation corridors across the state. Of this total, 4 ESS are located along the Glenn Highway. ESS are located along the Glenn Highway at the following locations.

- S curves (MP 9.9)
- Eagle River Bridge (MP 12.8)
- Glenn Highway @ Thunderbird Falls (MP 24.0)
- Kink River Bridge (MP 31.1)

Data collected by the ESS and consequently 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:

- Air temperature
- Pavement temperature
- Sub surface temperature at 17 inches
- Precipitation occurrence and amount
- Snow depth
- 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 share 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 ESS, there have been specific add on equipment donated by the University of Alaska Fairbanks and the NWS at several ESS.

ADOT&PF plans to install 2-3 ESS per year statewide as M&O or partners request them.[vi] It is expected that additional ESS will be installed along the Glenn Highway and the need for additional data increases.

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

http://roadweather.alaska.gov

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, with 4 of these residing within the Glenn Highway Corridor. Besides these 4, there are several more TDP sites located near the corridor, residing within the Anchorage as well as nearby communities. Many TDP's are collocated with the automatic traffic recorder (ATR) installation, while others are stand-alone or collocated with RWIS. TDP locations along the Glenn Highway are listed below.

- Glenn Highway @ Bragaw
- Glenn Highway @ NB Scale House
- Glenn Highway @ Thunderbird Falls (co-located with RWIS)
- Glenn Highway @ 2nd Knik River Bridge (co-located with RWIS)

Maintenance and operations personnel use the subsurface temperature data from TDPs to determine seasonal weight restrictions. TDPs are maintained by ADOT&PF's Traffic Section (Central Region). Data from the TDPs are collected by ADOT&PF's Highway Data Section. 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

The FAA has deployed closed circuit television (CCTV) cameras at 71 locations within the state, each offering real-time directional views of the location. Of these 71 cameras, 2 are located along the Glenn Highway, at the following locations:

- Glenn Highway @ Sheep Mountain
- Glenn Highway @ Tahneta Pass

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, they also are valuable for surface transportation, and supplement the RWIS camera images. 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 complete 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.

Lastly, there is a camera located approximately eight miles from Anchorage at the Glenn Highway Weigh Station. This camera is pointed west, toward Anchorage and provides view of the Glenn Highway and the entrance to the weigh station.

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.

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.[viii]

Traffic Signal Systems

The MOA owns and operates a closed-loop traffic signal system. Most traffic signals within the municipality are connected to a centralized computer that allows staff to remotely monitor traffic signal operation, and make adjustments. The Municipality's Traffic Engineering Division, Traffic Signal Section is responsible for operating and maintaining all traffic signals within the Municipality. There are currently over 250 signalized intersections in Anchorage.

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.[ix] 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.[ix,x] 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 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. With their participation in the pooled fund study, ADOT&PF may in the future elect to deploy an animal detection system.

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.[xi]

Automatic Traffic Data Recorders

An 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. 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, the network contains 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

Signal Preemption Systems

The MOA and ADOT&PF have installed signal pre-emption receivers at 27 intersections within the MOA.[xii] Similar systems are also deployed within the City of Fairbanks.[xiii] 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.[xiv]

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, 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.[xv]

Electronic Screening

ADOT&PF's Division of Measurement Standards and Commercial Vehicle Enforcement (MSCVE), in conjunction with the Federal Motor Carrier Safety Administration (FMCSA) are 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 Automatic 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.[xvi]

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. [xvii,xviii]

4.3.2 Center and Center-based Elements

Palmer Police and Emergency Dispatch Center

The Palmer Emergency Dispatch Center (EDC) provided dispatch services for the Palmer Police Department, 11 Fire Departments, and 12 emergency medical service providers. The EDC is tied into the Alaska Public Safety Information Network (APSIN) and has enhanced 911 capabilities. The Center currently transmits on 10 radio frequencies. The center recently deployed a mobile command van, which can assume all responsibilities of the center, in case operations at the center become interrupted.

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 (CVIEW)

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, the Alaska License Vehicle Information Network (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, MDTs, and laptop computers to assist in roadside inspections. Reports are uploaded to CVIEW and SAFER.

Alaska Public Information System Network (APISN) System

The APISN system is a data repository for Alaska's federal, state and local law enforcement agencies. Besides serving a number of other functions, the APISN 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 HazMat 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 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 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 (SEPP) 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 division is working to expand system capabilities to include all permits over the course of the next two years. The Division of Measurement Standards and Commercial Vehicle Enforcement owns and maintains the system.

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.

4.3.3 Vehicle 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 the 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 helps dispatch operators 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 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 People Mover. However, it is likely that other transit providers will begin to deploy these technologies with the next ten years.

Emergency Response Vehicle On-board Equipment

Emergency response vehicles represent the various vehicles owned by statewide emergency response agencies (e.g., police, fire, and emergency medical services) that are equipped with communications and sensory systems that allow 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 helps dispatch operators route vehicles effectively and safely. 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 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 proposal 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."[xix] 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.

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 advanced 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.[xx]

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.

Palmer Emergency Dispatch Center Mobile Command Van

In 2007, the Palmer Emergency Dispatch Center received a Federal Grant to purchase a mobile command van. The van, which is a multi-use, multi-agency vehicle is equipped with a video camera, telephone, computers, and has access to the internet. The van is able to perform all the activities of the Emergency Dispatch Center, so as to be able to maintain communications in case operations at the EDC must be halted, due to circumstances outside the control of center staff. The van became operational in summer 2007.

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. The service 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 state’s 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 website.

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:

- Municipality of Anchorage People Mover - *http://www.peoplemover.org/*
- Matsu Community Transit - http://www.matsutransit.com/

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.

4.4 Operational Concepts

The benefits of ITS are maximized when multiple agencies and multiple systems are integrated, or at least closely linked. This, in combination with the earlier fact that developing an ITS Operational Concept for a corridor located within a region as large as Anchorage would be complex, suggests that it is best that the Glenn Highway ITS Operational Concept be focused on only the transportation services that require significant integration and are considered most important for satisfying the Regional ITS Vision. These "bite-sized" pieces are referred to as ITS Operational Concepts. These concepts are roughly aligned with ITS functions derived from the National ITS

Architecture. This alignment ensures consistency with a nationally accepted and proven approach, helping to ensure that public investment is used in the most effective manner. This approach also eases the process of developing the more detailed Regional ITS Architecture that provides the information flows that do or will occur between all agencies thought to have a role in ITS activities within the region.

The intent of this operational concept is to demonstrate region-wide, multi-agency integration of ITS elements that impact operations on the Glenn Highway. Therefore, transportation services that pertain to the operations of one or a few agencies that require little to no integration are not discussed (for example an isolated traffic signal operated by a city). However, a more comprehensive listing of the transportation services (Market Packages) applicable to the Glenn Highway can be found in the Physical ITS Architecture Chapter.

4.4.1 Traffic Management Concepts

Network Surveillance

This operational concept relies on the use of traffic detectors, cameras, other surveillance equipment, the supporting field equipment, including fixed point communications to collect and transmit data for use in making traffic management decisions for the Glenn Highway. The concept represents the foundation or source of information from which real-time information is collected, processed and distributed to motorists. This enables many of the core ITS services currently being performed, or are desired for the Glenn Highway. For instance, it is this concept that provides many of the functions that a regional TMC would use.

This Operational concept produces the following benefits for the Glenn Highway:

- Increase efficiency and capacity
- Improve mobility
- Reduce energy consumption and impacts to environment

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

- Traffic Control
- Incident Management

Agencies roles and responsibilities for performing this concept 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. This concept would apply primarily to the network of traffic signals located in and around the MOA 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, stakeholders stated a desire to install cameras on traffic signal masts or other arterial locations. These cameras can be used to remotely monitor traffic conditions along the arterial, and identify and verify incidents that occur at equipped signalized intersections.

This operational concept produces the following benefits for the Glenn Highway:

- Increase efficiency and capacity
- Improve mobility
- Improve safety
- Reduce emergency consumption and impacts to environment

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 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 DMS and highway advisory radio. Since there is 1 DMS on the Glenn Highway, and a couple others near the Highway, the region is already active in the concept. HAR on the other hand, is not currently, used but is being considered at specific locations in Alaska. This concept covers the equipment and interfaces needed in a TMC that provide traffic information to the media (for instance via a direct tie-in between a TMC and radio or television station computer systems).

This Operational concept produces the following benefits for the Glenn Highway:

- Increase efficiency and capacity
- Improve mobility
- Improve safety
- Reduce emergency consumption and impacts to environment

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 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 and/or control an agency's ITS elements. This concept attempts to establish a regional control strategy for the Glenn Highway where multiple agency systems are integrated and working cooperatively. 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 the near-term this concept will pertain primary to the internal operations of agencies, however, in the long-term this concept provides the opportunity for agencies to work together from a centralized location, such as a regional TMC. 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 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 along the Glenn Highway. In doing so, this concept will reduce the impact of incidents on the transportation network and improve traveler safety. 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 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	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.
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 (Central Region)	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, Maintenance and Operations Divisions (Central Region)	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 (Central Region)	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 (Central Region)	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.
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.

4.4.2 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 while en-route or before leaving on a trip. Alaska's existing 511 website and phone system is one example of a technology that is part of this concept. Another potential example are kiosks at Ted Steven's International Airport, that might provide travelers with needed travel information before leaving the airport and taking a trip on the Glenn Highway. This concept essentially provides user friendly access to traveler information, helping motorists make informed decisions and providing them the ability to seek alternate routes or modes when congestion or incidents impede mobility.

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 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. This concept will rely on the existing CARS/511 system 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 stated needs of the Glenn Highway, 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 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
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
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
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 (Central Region)	CARS/511	• Input conditions and events affecting transportation

4.4.3 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. 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 if the Glenn Highway was plowed and direct plows to locations of the highway that need to be plowed or re-plowed. In doing so, not only does the highway remain open and safe for motorists to drive, but additionally maintenance personnel can make better use of snow and ice fighting materials (salt, sand and chemical), by specifically treating only the segments of roadway that need treatment, reducing duplicative use of materials on segments of roadway that have recently been treated. Segments that need treatment are easily identified by tracking vehicle movements. 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 are shown in Table 4-9.

Road Weather Data Collection

This operational concept relies on the use of environmental sensors, like those associated with 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. This concept is well underway along the Glenn Highway, with ADOT&PF's RWIS deployment, and its associated ESS installations. RWIS data is currently being shared with other agencies including the NWS and Military bases, as well as publicly shared through websites. This operational concept will expand the coverage of environmental sensors and further 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 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. 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, DMS, and/or automated treatment systems to improve roadway conditions, inform travelers of these conditions and to allow maintenance personnel to monitor the operational status of the system. The underling premise of this concept is to improve safety by alerting en-route travelers to the presence of ice on the roadway, status of automated treatment systems, or even the presence of fog. Additionally, the concept allows for remote monitoring of systems, in the effort to reduce the time systems are inactive. The anti-icing system installed on the Knik River Bridge is an example of a system included in this concept. Automated treatment systems like the anti-icing system at the Knik Bridge will interconnect with DMS signs to warn drivers of conditions before traveling through them. This in turn will allow drivers to alter driving behavior in advance, reducing the impact of adverse weather and pavement conditions 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 are shown in Table 4-12.

Maintenance and Construction Activity Coordination

This concept coordinates maintenance activities both internally within an agency as well as with operations activities of other agencies and information service providers that 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. This concept also seeks to make the operations of maintenance agencies more efficient through a coordinated effort in plowing regional roadways, of which the Glenn Highway is included. Agencies responsible for maintenance of regional roadways include the ADOT&PF maintenance department as well as the MOA's Street Maintenance Division. ADOT&PF maintenance is responsible for clearing the Glenn Highway as well as other major roadways in Anchorage and nearby towns, while the Anchorage Street Maintenance Division is responsible for clearing the remainder of minor roadways and side streets in Anchorage and the Chugiak, Birchwood, Eagle River, Rural Road Service Area (CBERRRSA). This includes over 1,300 lane miles, and is performed in part with the help of Anchorage's snow removal contractor. 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 ARRC
- Commercial vehicle administrative offices

Maintenance activity information along the Glenn Highway will be generally communicated indirectly to the aforementioned agencies through CARS and 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 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 (Central Region)	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 (Central Region)	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 (Central Region)	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.

4.4.4 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. Automated vehicle location systems, which exist on People Mover Buses and are desired for Matsu Buses will be used to determine real-time schedule adherence and update the transit system's schedule in real-time[xxi]. Currently, tracking vehicle location information is only used internally, however in the future it is possible that real-time transit vehicle location information will be passed along to the public so they can make timely transit related decisions. For instance, accurate schedules provided in real-time will allow users to seek shelter during adverse weather and/or 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 are shown in Table 4-14.

4.4.5 Commercial Vehicle Concepts

In March 2005, the ADOT&PF division of MSCVE, through a private contractor updated the State's 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 database file as 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.

4.4.6 Emergency Management Concepts

Emergency Call Taking and Dispatch

This operational concept relies on technologies installed on emergency vehicles (e.g., AVL and MDTs), call answering and dispatching equipment, and communications to safely and effectively dispatch emergency vehicles. This concept works to improve regional transportation mobility following emergencies, as well as the safety of those involved and impacted by the emergency through an efficient, coordinated response. This includes providing 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 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. For instance, this concept would allow emergency technicians in the field to communicate directly with hospitals and other care facilities en-route to determine which care facility has the resources available to treat the injured persons being transported. This will eliminate the need for injured persons to be moved between care facilities, reducing the overall time needed to acquire proper medical treatment.

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 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. 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 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 take 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 are shown in Table 4-18.

Wide Area Alert

This concept relies on DMS, highway advisory radio, emergency and transit vehicle MDTs, 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 (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 are shown in Table 4-19.

Early Warning System

This concept monitors and detects potential, looming, and actual disasters including natural disasters (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 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 (Central Region)	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 (Central Region)	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 (Central Region)	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.
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[xxii]	• 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. • 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.
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.

5 PHYSICAL ITS ARCHITECTURE

5.1 Introduction

The Physical ITS Architecture is a high-level representation or framework that describes how existing and planned ITS elements along the Glenn Highway interconnect with other elements to exchange information and data. Up to this point, ITS elements pertinent to the Glenn Highway have been identified and defined in the terms of the transportation services that they help perform. These services or Operational Concepts as they were called in Chapter 4 require ITS elements that are interconnected so that benefits are realized among a wide stakeholder base. The Physical ITS Architecture defines the interconnections between ITS elements, and how these elements build upon each other to fill in gaps so as to build a complete "system of systems" that adequately and effectively addresses transportation related needs and issues.

5.2 Physical Architecture Overview and Terminology

In order to develop an Architecture that is truly broad-based and reflective of the needs and activities of all stakeholders it is important to provide a basic understanding of ITS. This information is intended to provide stakeholders with a shared understanding of what ITS is and what is being accomplished so they know how to respond in an appropriate manner. The term ITS is still not well understood, especially by the agencies that lie on the periphery of ITS activities. Although these agencies do not represent core ITS stakeholders, they often have input that benefit ITS projects. Without a common understanding of ITS, stakeholders may not grasp what is required of them, and needed input may be missed.

The Physical ITS Architecture is a high-level representation or framework that describes how existing and planned ITS elements along the Glenn Highway interconnect with other elements to deliver desired transportation services. To this extent the Physical ITS Architecture can be portrayed as a "blue print" that illustrates the existing and future state of ITS integration along the corridor. It identifies the individual pieces or elements that comprise the ITS, the functions these pieces perform, and the information and data that are exchanged. Since the Physical ITS Architecture is developed at a high-level it is not intended to serve as the detailed design of the system, but rather gives guidance to those individuals involved in design and implementation of ITS systems. The physical architecture does not define how ITS elements will be implemented, but rather defines the interactions elements have among each other. This helps Glenn Highway ITS stakeholders easily visualize where in the "big picture" their ITS elements fit, and with what other elements they communicate. This also eases understanding of ITS integration and enables system implementers to improve integration efforts leading to greater return on investment.

To understand the Physical ITS Architecture, one must first familiarize themselves to the terms often used when describing the physical architecture. ITS elements are classified by the National ITS

Architecture as either a Subsystem or a Terminator. A brief overview of the various components that comprise the Physical ITS Architecture is provided below. These terms will be mentioned later in this chapter when defining the Glenn Highway Architecture.

5.2.1 Subsystems

As its name implies, a subsystem is a stand alone, independent component of a larger system – in this case the Glenn Highway ITS. Subsystems are critical components of the larger system and in some regards can be viewed as a system themselves. Subsystems are composed of related, yet smaller groups of technologies referred to in the National ITS Architecture as Equipment Packages that together can be bundled to deliver specific transportation services. Subsystems represent the primary building blocks of a physical architecture.

The National ITS Architecture v 6.0 identifies 22 possible subsystems in which ITS elements are categorized. It is certainly possible that identified ITS systems do not fit in any of these 22 sub-system categories. In these rare cases, these systems are preserved for inclusion into the architecture at some point in the future. These systems are preserved because the National ITS Architecture has yet to mature to a point where these systems are widely accepted and included within this framework.

The 22 subsystems identified within the National ITS Architecture are grouped into four classes: Travelers, Centers, Vehicles, Field. Subsystems are grouped within their respective Class, in what is known as the National ITS Architecture Sausage Diagram shown in Figure 5-1. Following Figure 5-1, a description of subsystem classes is provided.

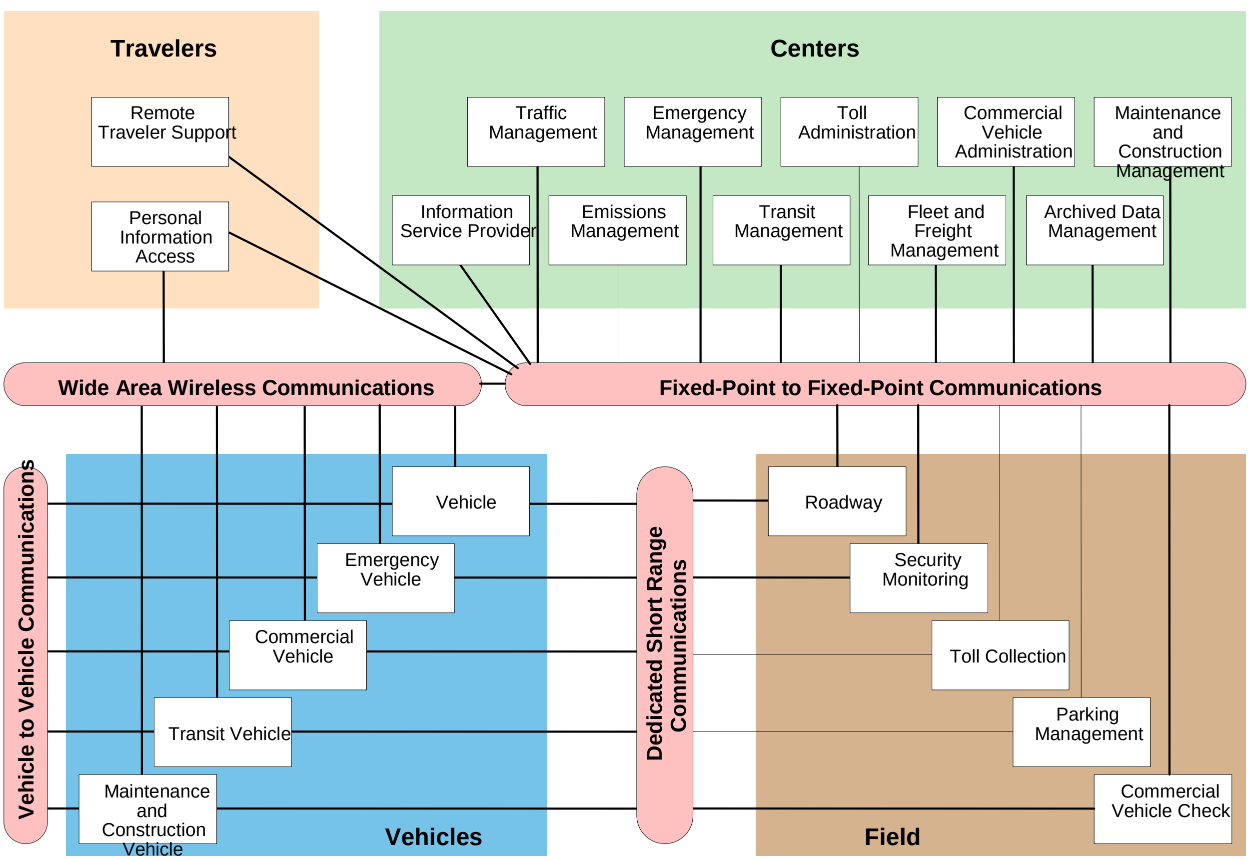


Figure 5-1:
National ITS Architecture Subsystems and Communications (Sausage Diagram)

Traveler Subsystems: These are systems that are used by travelers to access ITS services pre-trip and en-route. This includes services that are owned and operated by the traveler as well as services that are owned by transportation and information providers. Examples of traveler subsystems include but are not limited to; kiosks, personal digital assistants and cell phones. National ITS Architecture Traveler Subsystems are shown in the Travelers box within Figure 5-1, and listed below:

- Remote Traveler Support
- Personal Information Access

Center Subsystems: These are systems that provide management, administrative, and support functions for the transportation system. Center subsystems each communicate with other centers to enable coordination between modes and across jurisdictions. National ITS Architecture Center Subsystems are shown in the Centers box of Figure 5-1, and listed below:

- Traffic Management
- Transit Management
- Commercial Vehicle Administration
- Archived Data Management
- Emissions Management
- Toll Administration
- Emergency Management
- Information Service Provider
- Fleet and Freight Management
- Maintenance and Construction Management

Vehicle Subsystems: These are systems located on or within vehicle platforms. Vehicle subsystems include general driver information and safety systems applicable to all vehicle types. National ITS Architecture Vehicle Subsystems are shown in the Vehicles box in Figure 5-1, and listed below:

- Vehicle
- Emergency Vehicle
- Commercial Vehicle
- Transit Vehicle
- Maintenance and Construction Vehicle

Field Subsystems: These are systems that are located along the roadway, or in the field, which perform surveillance, collect or provide information, or carry out maintenance or management functions. Field subsystems are primarily controlled by center subsystems, however, field elements may also interface directly with other field or vehicle subsystems. National ITS Architecture Field Systems are shown in the field box in Figure 5-1, and listed below.

- Roadway
- Security Monitoring
- Toll Collection
- Parking Management
- Commercial Vehicle Check

5.2.2 Terminators

Terminators are similar to Subsystems in that they also comprise the physical world in which ITS services take place. Unlike subsystems however, terminators are not key to delivering transportation services, but are still important in that they are involved in these services albeit to a much lesser degree. Terminators are generally defined as the people, systems and general environment that lie outside the boundary of ITS but still impact ITS systems. The National ITS

Architecture includes interfaces between terminators and subsystems and processes, but does not allocate functional requirements to terminators. To this extent understanding the role of terminators is less critical than subsystems, however, where possible it is still important to illustrate the relationships that exist among terminators so as to complete the picture of ITS activities and information flow.

5.3 Project Architecture Tools

Several resources were used as tools to develop the Glenn Highway ITS Architecture, as described in the following sections.

5.3.1 The National ITS Architecture

The National ITS Architecture is a common, mature framework for planning, defining, and integrating ITS elements. It reflects the contributions of a broad cross-section of the ITS community and specifically defines:

- The functions that are required for ITS.
- The physical entities or subsystems where these functions reside.
- The information flows and data flows that connect these functions and physical subsystems together into an integrated system.

The listing of functions, subsystems and flows contained in the National Architecture is comprehensive and is intended to serve as a guide for developing ITS architectures at the corridor, regional or state level. It is unlikely that a corridor, state or regional architecture will contain every function identified in the National Architecture. For this reason, the Glenn Highway Architecture reflects only a sub set of all the possible functions, subsystems and flows brought forward in the National Architecture. Similarly, since the Glenn Highway is only part of Alaska's surface transportation system, it is therefore only a sub set of the Iways Architecture.

Although Regional and Project Architectures do not contain all the functions identified in the National Architecture, it is certainly possible that there will be functions required by states, regions, and projects that are not reflected in the National Architecture. The National Architecture is updated periodically to reflect changes to the ITS landscape. When ITS technologies become mature and are able to address new functions, they may be added to the National Architecture. Currently, version 6.0 (released April 2007) is the most recent version of the National Architecture. Version 6.0 was used to develop the Glenn Highway ITS Architecture.

5.3.2 The Turbo Software

The Project Architecture was created through use of the USDOT's Turbo Architecture (Version 4.0) software (hereafter referred to as Turbo). Turbo is a software application that supports development of Regional and Project ITS Architectures using the underlying framework defined by the National Architecture. The electronic Turbo database file contains attributes of the Regional/Project-level Architecture, including stakeholders, existing and planned ITS elements, high-level functions, system-to-system interconnects and information flows, and applicable standards. The Turbo electronic database file is a valuable tool in that it preserves the knowledge and effort expended to develop the Regional and Project Architectures, so that knowledge can be brought forward when changes necessitate that these Architectures be updated.

5.4 Linkage with the Statewide Iways Architecture

The Alaska Iways Architecture can be viewed as the master ITS Architecture for the State of Alaska. This is because the Iways Architecture includes all relevant ITS activity occurring in the state. Because of the rather large geographic scale of the Iways Architecture however, it is rather difficult to capture all the necessary details required to advance ITS projects. This is best done by breaking down the State into regions of interest and developing similar efforts at a more detailed level. The Glenn Highway ITS Plan attempts to accomplish just that. Regional ITS Architectures like that developed for the Glenn and Seward Highways are subsets of the Iways Architecture, and provide additional details specific to these regions. Since the Glenn Highway ITS Plan was developed concurrently with the Update to the Statewide Iways Architecture new ITS elements and services identified during development of the regional architecture were brought forward in the Update to the Iways Architecture. Therefore, the Alaska Statewide Iways Architecture completely encapsulates the entire Glenn Highway ITS Architecture. To reduce redundancy between architectures, the Glenn Highway ITS Architecture is shown within the Alaska Iways Architecture Turbo Database as a separate Project Architecture. It is recommended that project champions reference the Iways Architecture to view the Glenn Highway ITS Architecture in its entirety. To demonstrate consistency with the Statewide ITS Architecture as well as the National ITS Architecture, ITS elements associated with the Glenn Highway are summarized in the following sections. Each element listed in the following sections can be traced back to the Iways Architecture.

The Glenn Highway Physical ITS Architecture is completely encapsulated within the State's Iways Architecture. The Glenn Highway Architecture is a sub set of, and served as a mechanism of updating the Iways Architecture. Because the Glenn Highway Architecture is fully captured in the Iways Architecture, and to reduce redundancy between architecture documentation, the Glenn Highway Architecture is not provided in this document. Instead, ITS elements of the Iways Architecture which pertain to the Glenn Highway ITS Architecture are identified and mapped to the National ITS Architecture to demonstrate consistency with Federal requirements.

5.5 National ITS Architecture Subsystem Mapping

Of the 22 subsystems identified within the National ITS Architecture, 17 currently apply to the existing and planned ITS infrastructure along the Glenn Highway. These 17 are illustrated in Figure 5-2, as boxes that are not shaded gray. Figure 5-2, is a depiction of the National ITS Architecture sausage diagram that has been customized to reflect the existing and planned ITS subsystems applicable to the Glenn Highway.

A mapping of the Glenn Highway existing and planned ITS elements to National ITS Architecture Subsystems is provided in Table 5-1. This table is color coded to match the color scheme of the National ITS Architecture Subsystem classes shown in Figure 5-1 and Figure 5-2. As shown in Table 5-1, each ITS Subsystem can be comprised of more than 1 ITS element.

5.6 National ITS Architecture Terminator Mapping

A mapping of the Glenn Highway existing and planned ITS elements to National ITS Architecture Terminators is provided in Table 5-2. Again, each ITS Terminator can be comprised of more than 1 ITS element.

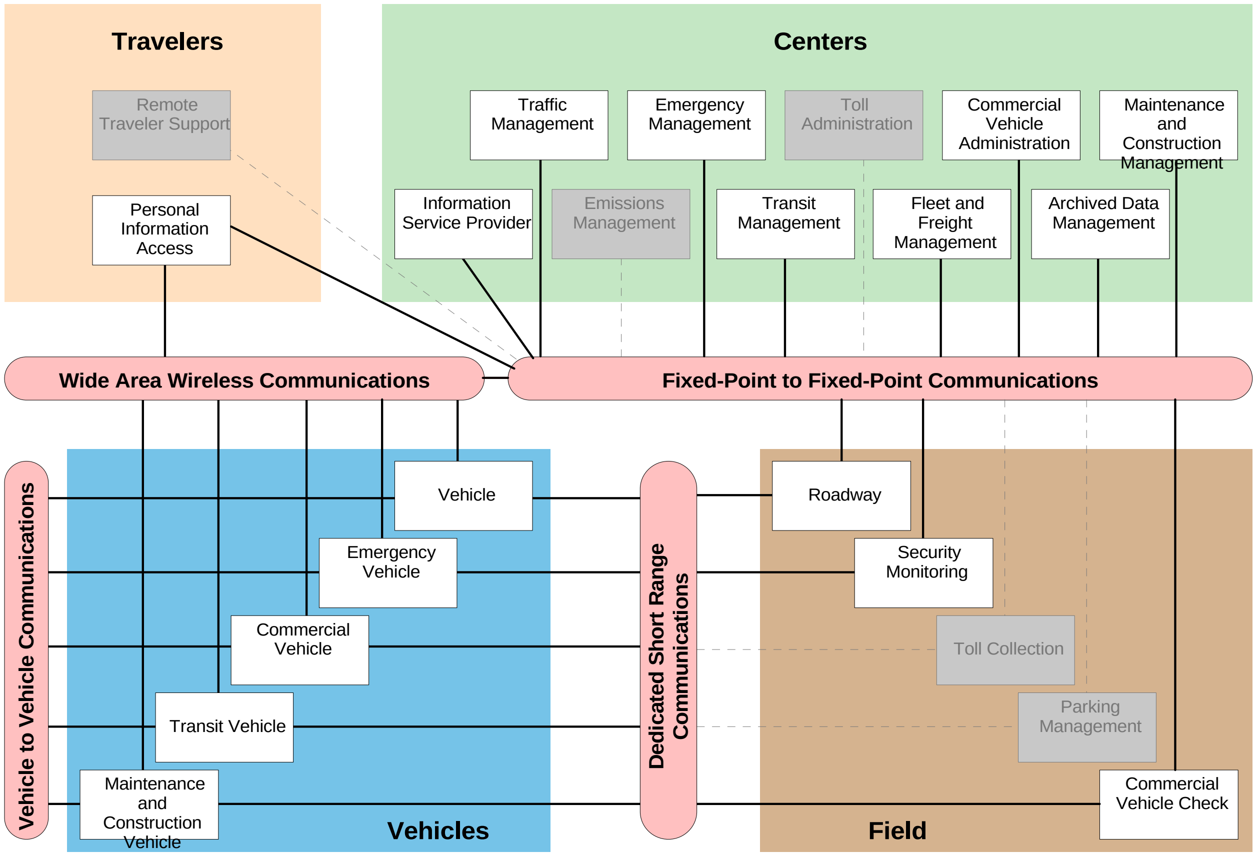


Figure 5-2:
National ITS Architecture Subsystems Relevant to the Glenn Highway

Table 5-1:
Mapping of Glenn Highway ITS Elements to National ITS Architecture Subsystems

National ITS Architecture Subsystem Class	National ITS Architecture Subsystem	Corresponding Glenn Highway ITS Elements
Traveler	Personal Information Access	• Travelers/ Personal Communications/Computing Devices (en-route) • Travelers/ Personal Communications/Computing Devices (pre-trip)
Center	Information Service Provider	• Center/ 511 (phone and web) • Center/ Condition Acquisition and Reporting System • Center/ Division of Tourism Website • Center/ FAA Website • Center/ MOA Integrated Transportation Operations and Communication Center • Center/ National Weather Service Offices • Center/ Transit Agency Websites
	Traffic Management	• Center/ ADOT&PF Traffic and Safety Offices • Center/ APD Headquarters and Dispatch • Center/ Highway Database Section Office • Center/ Law Enforcement Dispatch • Center/ MOA Integrated Transportation Operations and Communication Center • Center/ MOA Maintenance Dispatch Office • Center/ MOA Signal Control • Center/ MSCVE Offices • Center/ Regional Maintenance Stations • Field/ Variable Speed Limit System
	Emergency Management	• Regional 911 System • Center/ APD Headquarters and Dispatch • Center/ Condition Acquisition and Reporting System • Center/ Law Enforcement Dispatch • Center/ MOA Emergency Operations Center • Center/ MOA Integrated Transportation Operations and Communication Center • Center/ EMS Dispatch Centers • HazMat
	Transit Management	• Center/ AMHS Dispatch and Communications • Center/ Transit Agency Dispatch • Vehicle/ ARRC Collision Avoidance System
	Fleet and Freight Management	• Center/ Commercial Vehicle Operations Offices • Center/ Motor Carrier Administrative Systems • Motor Carrier Management Information System (MCMIS) • SAFETYNET
	Commercial Vehicle Administration	• ALVIN CDL • ALVIN Registration

National ITS Architecture Subsystem Class	National ITS Architecture Subsystem	Corresponding Glenn Highway ITS Elements
		• CAPRI • CDLIS • Center/ Customs and Border Protection • Center/ CVIEW • Center/ Motor Carrier Administrative Systems • Center/ MSCVE Headquarters • CVE Insurance • HazMat • International Border System • Motor Carrier Management Information System • SAFER • SAFETYNET • SEPP • State Treasury • Transponder Administration System • Web-Based Electronic Registration System
	Archived Data Management	• Center/ Bridge Management System • Center/ Law Enforcement Data Archives • Center/ Condition Acquisition and Reporting System • Center/ Credentials Data Integration and Access System • Center/ Highway Data Weather Portal • Center/ Law Enforcement Dispatch • Center/ Maintenance Management System • Center/ MOA Integrated Transportation Operations and Communication Center • Center/ Pavement Management System • SEPP
	Maintenance and Construction Management	• Center/ Bridge Design Section Offices • Center/ Bridge Scour System • Center/ Condition Acquisition and Reporting System • Center/ Highway Data Weather Portal • Center/ Maintenance Management System • Center/ MOA Integrated Transportation Operations and Communication Center • Center/ MOA Maintenance Dispatch Office • Center/ Regional Maintenance Stations
Vehicle	Vehicle	• Vehicle/ ADOT&PF Maintenance Vehicle AVL • Vehicle/ EMS Vehicle AVL • Vehicle/ General Public • Vehicle/ Law Enforcement Vehicle AVL • Vehicle/ MOA Maintenance Vehicle AVL • Vehicle/ Transit Vehicle AVL
	Emergency Vehicle	• Vehicle/ EMS Vehicle On-board Systems • Vehicle/ Law Enforcement Vehicle On-board Systems
	Commercial Vehicle	• Vehicle/ Commercial Vehicle On-board Systems

National ITS Architecture Subsystem Class	National ITS Architecture Subsystem	Corresponding Glenn Highway ITS Elements
	Transit Vehicle	• Vehicle/ Ferries On-board Systems • Vehicle/ Transit Vehicle On-board Systems
	Maintenance and Construction Vehicle	• Vehicle/ Maintenance Vehicle On-board Systems (MOA) • Vehicle/ Maintenance Vehicle On-board Systems (State)
Field	Roadway	• Field/ Automated Bridge Anti-Icing • Field/ Bridge Scour Sensors • Field/ Cameras (at RWIS) • Field/ Cameras (FAA) • Field/ Cameras (MOA) • Field/ Highway Advisory Radio • Field/ Permanent Dynamic Message Signs (Anchorage) • Field/ Permanent Dynamic Message Signs (Port of Anchorage) • Field/ Pre-emption and Priority Systems (MOA) • Field/ Pre-emption and Priority Systems (State) • Field/ Remote Video Monitoring System • Field/ traffic Detectors • Field/ Traffic Signal Controllers • Tunnel Control System • Weather Prediction System
	Security Monitoring	• Field/ Bridge Scour Sensors • Field/ Cameras (at RWIS) • Field/ Seismic Sensors
	Commercial Vehicle Check	• ASPEN • AVI/WIM • Border Data Collection System • Field/ Intra-red Inspection System • Field/ Remote Video Monitoring System • Field/ Weight and Border Station and Handheld Equipment • Integrated Roadside Operations Computer • International Border System

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Table 5-2:
Mapping of Glenn Highway ITS Elements to National ITS Architecture Terminators

National ITS Architecture Terminator	Corresponding Glenn Highway ITS Elements
Alerting and Advisory Systems	• Emergency Alert System • Field/ Avalanche Detection System • Field/ Seismic Sensors
Archived Data User Systems	• Travelers/ Personal Communication/Computing Devices (en-route) • Travelers/ Personal Communication/Computing Devices (pre-trip)
Asset Management	• Center/ Computerized Materials and Maintenance Management System
Basic Commercial Vehicle	• Vehicle/ Commercial Vehicle On-board Systems
Basic Vehicle	• General Public Vehicle
CVO Information Requestor	• Center/ MSCVE Headquarters
CVO Inspector	• CVO Inspector
Driver	• Travelers/ Personal Communications/Computing Devices (en-route)
Enforcement Agency	• CVO Inspector
Financial Institution	• Carrier Banks • Paymentech • State Treasury
Freight Equipment	• Vehicle/ Commercial Vehicle On-board Systems
Maintenance and Construction Administrative Systems	• Center/ Maintenance Management System
Media	• Media Systems (T.V. and Radio)
Other CVAS	• Weigh Stations
Other Emergency Management	• Regional 911 System • Center/ Law Enforcement Dispatch • Center/ MOA Integrated Transportation Operations and Communications Center
Other Roadway	• Field/ Train Signal System • Tunnel Control System • Field/ Traffic Detectors
Other Traffic Management	• Center/ MOA Integrated Transportation Operations and Communications Center
Surface Transportation Weather Service	• Field/ Weather and Pavement Sensors (NWS) • Weather Prediction System
Weather Service	• Center/ NWS Offices • Field/ Weather and Pavement Sensors (Military Bases) • Field/ Weather and Pavement Sensors (NWS)

5.6.1 Service Areas and Market Packages

Operational Concepts that are applicable for fulfilling desired ITS functions and services for the Glenn Highway were discussed in Chapter 4. Operational Concepts were derived from, and use the same names as National ITS Architecture Market Packages.

Market Packages are groupings of different subsystems, terminators, and architecture flows needed to deliver a desired transportation service (e.g., Network Surveillance or Roadway Automated Treatment). Market Packages can work separately, or in combination to address the real-world transportation needs and desires expressed by stakeholders in Chapter 1.

The National Architecture identifies 91 Market Packages, categorized into 8 general service areas. These service areas are:

- Archived Data Management
- Public Transportation
- Traveler Information
- Traffic Management
- Vehicle Safety
- Commercial Vehicle Operations
- Emergency Management
- Maintenance and Control Management

National ITS Market Packages are identified by their general service area in Table 5-3. Of the 91 possible Market Packages in the National Architecture, 32 are applicable to the Glenn Highway. These are marked with a (●) within Table 5-3. The market packages that are marked support the delivery of user needs and desires documented in Chapter 1.

Table 5-3:
National ITS Architecture Service Areas and Market Packages with those applicable to the Glenn Highway Highlighted

	ARCHIVED DATA MANAGEMENT SERVICE AREA
	ITS Data Mart
	ITS Data Warehouse
●	ITS Virtual Data Warehouse
	PUBLIC TRANSPORTATION SERVICE AREA
●	Transit Vehicle Tracking
●	Transit Fixed-Route Operations
	Demand Response Transit Operations
	Transit Fare Collection Management
●	Transit Security
	Transit Fleet Management
	Multi-modal Coordination
	Transit Traveler Information
	Transit Signal Priority
	Transit Passenger Counting
	TRAVELER INFORMATION SERVICE AREA
	Broadcast Traveler Information
	Interactive Traveler Information
	Autonomous Route Guidance
	Dynamic Route Guidance
	ISP Based Trip Planning and Route Guidance
	Transportation Operations Data Sharing
●	Yellow Pages and Reservation
	Dynamic Ridesharing
	In Vehicle Signing
	VII Traveler Information
	TRAFFIC MANAGEMENT SERVICE AREA
●	Network Surveillance
	Traffic Probe Surveillance
●	Surface Street Control
	Freeway Control
	HOV Lane Management
●	Traffic Information Dissemination
	Regional Traffic Management
●	Traffic Incident Management System
	Traffic Forecast and Demand Management
	Electronic Toll Collection
	Emissions Monitoring and Management
	Roadside Lighting System Control
	Standard Railroad Grade Crossing
	Advanced Railroad Grade Crossing
	Railroad Operations Coordination
	Parking Facility Management
	Regional Parking Management
	Reversible Lane Management
	Speed Monitoring
	Drawbridge Management
	Roadway Closure Management

	VEHICLE SAFETY SERVICE AREA
	Vehicle Safety Monitoring
	Driver Safety Monitoring
	Longitudinal Safety Warning
	Lateral Safety Warning
	Intersection Safety Warning
	Pre-Crash Restraint Deployment
	Driver Visibility Improvement
	Advanced Vehicle Longitudinal Control
	Advanced Vehicle Lateral Control
	Intersection Collision Avoidance
	Automated Highway System
	Cooperative Vehicle Safety Systems
	COMMERCIAL VEHICLE OPERATIONS SERVICE AREA
●	Fleet Administration
●	Freight Administration
●	Electronic Clearance
●	CV Administrative Processes
	International Border Electronic Clearance
●	Weigh-In-Motion
●	Roadside CVO Safety
●	On-board CVO and Freight Safety & Security
	CVO Fleet Maintenance
●	HAZMAT Management
●	Roadside HAZMAT Security Detection and Mitigation
●	CV Driver Security Authentication
	Freight Assignment Tracking
	EMERGENCY MANAGEMENT SERVICE AREA
●	Emergency Call-Taking and Dispatch
●	Emergency Routing
●	Mayday and Alarms Support
	Roadway Service Patrols
●	Transportation Infrastructure Protection
●	Wide-Area Alert
●	Early Warning System
	Disaster Response and Recovery
	Evacuation and Reentry Management
	Disaster Traveler Information
	MAINTENANCE AND CONSTRUCTION MANAGEMENT SERVICE AREA
●	Maintenance and Construction Vehicle and Equipment Tracking
	Maintenance and Construction Vehicle Maintenance
●	Road Weather Data Collection
●	Weather Information Processing and Distribution
●	Roadway Automated Treatment
●	Winter Maintenance
●	Roadway Maintenance and Construction
	Work Zone Management
	Work Zone Safety Monitoring
●	Maintenance and Construction Activity Coordination
	Environmental Probe Surveillance
	Infrastructure Monitoring

6 ITS IMPLEMENTATION PLAN

The ITS Implementation Plan is the last in the series of documents that comprise the Glenn Highway ITS Plan. The Implementation Plan focuses on implementing the corridor ITS strategies identified in the previous chapters, over the near- (0-3 years), mid- (3-5 years), and long-term (5-10 years). The plan is based upon the transportation-related needs and recommendations expressed by regional stakeholders, however it also takes into account the resources available for implementing ITS technologies, previous, on-going and planned ITS activity, and the supporting infrastructure needed to successfully deploy ITS elements.

In the near-term, resource constraints would make it difficult for ADOT&PF, the MOA, and other stakeholders in the region to implement all the systems that would help fulfill the ITS Long-Range Vision for the Glenn Highway. ITS projects must compete for funding with more traditional transportation improvement projects. Therefore, phased ITS implementation will prove most effective and help the ITS technologies identified in this Implementation Plan meet the diverse and unique needs of the public and the agencies that serve them. The purpose of this chapter is to identify and recommend implementation phases for technological solutions that can address the transportation needs and desires in the Glenn Highway corridor. Although a timeframe is suggested, it is by no means a requirement of when projects should be implemented. Rather, the timeline simply serves as a phased approach for project implementation assuming a favorable environment. Such an environment would ensure that project funding and staff are available to implement, operate and maintain systems, and that there is suitable level of institutional and technical readiness, etc.

By phasing projects, ITS implementation can occur in a controlled, cost effective, and efficient manner, allowing some benefits to be realized in the near-term while providing the foundation needed to implement larger, more complex projects with additional benefits in the long-term. Phasing projects serves as a way to sequence projects so that they build off each other taking into consideration need, project and technology dependencies, available funding, and institution agreement and cooperation. For instance a TMC will yield little benefit if implemented in the near-term if the communications, detection, and surveillance systems were not in place first to allow TMC operators the ability to monitor roads and communicate conditions with other agencies. This ITS Implementation Plan phases or sequences projects for implementation over the near- (0-3 years), mid- (3-5 years), and long-term (5-10 years), focusing on obtaining benefits as quickly as possible while providing the infrastructure that supports the completion of an integrated ITS network.

6.1 ITS Implementation Plan Approach

Development of this Implementation Plan was an iterative effort that included the activities listed below. These activities have been discussed in detail in the preceding chapters.

- Stakeholder outreach, including identification of stakeholder needs and desires,
- Mapping of stakeholder needs and desires to National ITS Architecture User Services,
- Defining ITS Goals, Objectives and Vision,
- Mapping of National ITS User Services to National ITS Architecture Market Packages,
- Identifying stakeholder roles and responsibilities with respect to fulfilling ITS services, and
- Mapping stakeholders and applicable elements to the Alaska Iways Architecture.

6.2 Architecture Traceability

ITS elements associated with projects phased for implementation and discussed later in this chapter are reflected in the update to Alaska's Iways Architecture. However, projects may evolve over time that are not anticipated in the architecture. As new concepts arise, the architecture will be revisited to include newly identified ITS elements. Therefore, before any new ITS project is funded, officials need to determine whether or not the proposed ITS elements fit into the Iways Architecture. If all ITS elements of the project are completely covered then no action is needed and the project can proceed to implementation. However, if some or all aspects are not accounted for in the architecture and they satisfy a transportation need for the region, then ADOT&PF will need to update the Statewide Iways Architecture to include the new ITS project, or the ITS elements associated with the project. It is assumed that the project champion will assist the ADOT&PF in this effort.

The Implementation Plan sets an approach for satisfying the Region's shared vision for ITS along the Glenn Highway. The vision was documented in Chapter 3, and is again articulated below.

> *"The Glenn Highway intelligent transportation system should strive to become an integrated "system of systems" that improves safety and mobility, enhances efficiency and convenience of travel for all residents, visitors and commerce, and supports where practical local, regional, state, and national transportation objectives.*

The vision speaks to the organizational linkage and understanding needed to bring forward the adoption and deployment of ITS concepts presented in the Operational Concept. The Implementation Plan recommends a course of action for deploying ITS in a cost effective, and efficient manner so that ITS investment builds upon itself, leading to an interoperable system where benefits are maximized and costs minimized.

6.3 Issues and Considerations for Successful ITS Implementation

There are several issues to consider of before implementing ITS projects. These issues, if not addressed, may ultimately act as barriers to project implementation or may simply affect the success of the project upon completion. However, if considered and addressed before projects are implemented, the resolution to these issues prepare agencies so that ITS elements can be successfully implemented, operated and maintained. So as a result, the agencies are better able to satisfy corridor transportation goals and objectives. It is best that these issues are addressed as early as possible in the project's life cycle so results can be taken into consideration when weighing projects against each other for possible implementation and prioritization. These issues include:

- Outreach
- Funding
- Staffing
- Implementation approach
- Continuity of operations, and
- Standards

Failure to consider and address these issues may lead to outcomes that decrease the effectiveness of the regional planning process, lead to poor perception of public agencies and their investment, and result in ITS being viewed as an inefficient means of addressing transportation goals and objectives.

6.3.1 Outreach

Funding ITS projects, and for that matter incorporating ITS into traditional planning processes, cannot be achieved without broad-based support and approval of ITS. Outreach helps to break-down barriers and misconceptions of ITS, making it easier for individuals to visualize how ITS can be used alongside traditional highway improvements to deliver benefits at significantly lower costs. To be effective in implementing ITS projects, the ADOT&PF, MOA and other agencies involved in the traditional planning process must be comfortable with ITS, what it does, and how it can be used to satisfy regional goals and objectives, perhaps more from the institutional than technological perspective. This means providing continuing education for those individuals and agencies that do not have a solid understanding of ITS. This includes not only individuals and agencies associated with a project, but also elected officials, agency staff, and the general public. The newly created ITS Alaska (the state chapter of ITS America) can provide a forum for reaching out to individuals, providing information pertaining to state and regional ITS activities and educating those unfamiliar with ITS concepts and terminology.

The State of Alaska and the ADOT&PF have already been active in this area, and have to a large extent achieved broad-based understanding and support for ITS in the region. This support is demonstrated by the support and active participation of agencies in ITS activities in the region, the formation of the ITS Alaska, as well as their acceptance and compliance with Federal ITS requirements for implementing ITS projects.

To continue this course and to solidify support for ITS, the ADOT&PF and its partner agencies must continue to strengthen these efforts and should continue to gather support through effective and targeted outreach.

Outreach provides a medium through which the reasons for, and benefits of ITS can be expressed. It is also a valuable tool for smoothing the implementation of strategies by promoting inter-agency cooperation, while at the same time mitigating any adverse reaction. ITS outreach activities include both delivering and gathering information from at least four key stakeholder groups:

- Intra-agency stakeholders,
- Inter-agency stakeholders,
- General public, and
- Key decision makers.

Outreach activities should be on-going, whether or not anything “new” is happening in the region. Additionally, project champions should tailor their outreach efforts to the specific groups to which information is being delivered. In doing so, the benefits of ITS activities will be more easily understood and consistently communicated, breeding an environment where ITS can flourish.

6.3.2 Funding

As with any type of project, the ADOT&PF and other regional transportation agencies must secure the funds needed to support ITS projects. The funding needs for ITS differ significantly when compared with traditional highway improvement projects. With traditional highway projects, funding is needed to design, build, operate and maintain hard highway infrastructure. The capital costs are relatively high, so the design, operation, and maintenance costs are a relatively low percentage of capital costs. Operations costs often are not even identified and, if they are, are a very small percentage of capital costs. ITS projects, on the other hand, have relatively lower capital costs but require higher percentage for design, operations, and maintenance. The systems must be operated and electronic maintenance requires trips to the field for preventive maintenance that is not required in traditional highway projects. In Alaska, preventative maintenance is of particular concern. Alaska must rely on State funding to maintain ITS elements, unless they are being replaced because they are at the end of their designed life cycle. Because state funding is limited, it is increasingly difficult to implement ITS elements because it would require additional staff and resources to maintain a growing number of elements.

Because budgets are becoming more and more limited, ITS projects will also encounter more and more competition with other types of both traditional and non-traditional transportation projects. Because of this competition, individuals responsible for ITS project implementation should look for any alternative funding available and be flexible in using federal, state and local revenues. Although, this Implementation Plan phases potential ITS projects within a 10 year planning horizon, the timing of project implementation is of lesser importance than the general sequencing of project implementation. Therefore, project implementation should occur as funding becomes available, and follow the general phasing of project implementation. Depending on the type of ITS project being implemented, funding may be needed to support the following activities:

Planning and Design

As with most capital projects, ITS projects require planning and design work to determine what will be built, how it will be built, and what level of mitigation (if any) is required. Special attention needs to be given to ensuring that enough funds are allocated for planning and design. This is crucial for adequately defining the project so cost estimates are reasonably accurate to budget for the construction, operation, and maintenance phases.

Project Capital

Funding is also needed to purchase and install the physical hardware, software, and communications needed to build and support development of systems being implemented. Again, project champions need to verify that costs for equipment and materials are reflected in proposed project budgets, if applicable. Capital expenditures for ITS will include, but are not limited to:

- Infrastructure, including roadside devices, communications mediums (e.g., fiber-optic cable), and the infrastructure required for the ITOCC,
- Software, and
- Other materials directly tied to project implementation (e.g., marketing, training materials, etc.). These are generally one-time charges.

Operations and Maintenance

Adequate operations and maintenance funding is needed for effective system operation. Because the level of sophisticated technical and software systems inherent in most ITS projects is substantial, operating agencies like ADOT&PF need to account for responsive and preventative maintenance to ensure a full design lifecycle for each system. New ITS projects will likely employ new functions and will involve additional maintenance activities that staff currently do not perform. Depending on the workloads of existing maintenance personnel, providing training may require that staff work overtime to fix problems, or new staff may need to be hired to assist with these problems. Adding additional staff or hiring contractors to perform this work puts additional strain on already limited operating budgets. This is especially the case when contractors are used.

The operations and maintenance activities that have an effect on funding levels include:

- Increased complexity of maintenance activities.
- Lack of personnel experienced on how to maintain new systems.
- Difficulties that arise from system implementation.

One of the benefits of adopting ITS standards will be the development of more interoperable equipment and common system platforms. This will encourage more choices of vendors, which helps reduce maintenance costs associated with the replacement of ITS elements. More vendors also means more competition and lower capital costs.

Staffing

Staff are needed to plan, build, manage, support, and maintain ITS projects. Contractors may be hired on a full-time or part-time basis to satisfy or supplement staffing needs. Outside contractors may be especially useful and effective for maintenance needs. Contractors in these situations can be hired only when conditions warrant thus saving the funds needed to employ a staff person on a full- or part-time basis. With this said, however, the response when systems need to be fixed may be much slower if the contractors selected are not local or if maintenance contracts don't specify short response times. Additionally, the associated labor costs of hiring contractors may be more than that of using in-house staff, partially off-setting the benefit received of only employing contractors on an as needed basis. Project champions need to carefully consider the advantages and disadvantages of these various staffing options and select the ones that best fit the needs and budget constraints of their respective agency.

Training

As ADOT&PF continues to deploy ITS, it will be increasingly important to ensure that the staff responsible for operating and maintaining these devices receive adequate training, and that training costs are included in proposed project budgets. Training should be required for all existing and new employees responsible for operating and maintaining ITS within the corridor. Providing proper and adequate training will help ensure that maximum benefits are derived and system life is maximized. Training should not only cover how to use new or modified systems, but also the reasoning behind why system's are being implemented or updated. Similarly, staff will need to know when they should begin using the ITS system and the recommended procedures for migrating their existing files to the new system (if the project is replacing an existing system). Project champions need to plan on how to train staff, who will be responsible for training them and assessing the potential cost implications training requirements have on overall project implementation.

6.3.3 Staffing, Skills and Knowledge

Before ITS projects are approved for implementation, the ADOT&PF or other implementing agency should verify that the project can be adequately supported given current agency staffing levels. Agency staff are needed to plan, deploy, operate, and maintain ITS projects. It is critical that an appropriate number of staff be available to ensure that subsystems are operated effectively, maintained, and replaced accordingly. Agencies need to identify specific individuals that will be responsible for operation and maintenance of ITS. If, for some reason, these individuals are unavailable, it is wise to have additional staff trained so seamless operations will not be affected. If staff are not available to perform these functions, maintenance issues may be ignored and subsystems may be operated in an unsafe and/or inefficient manner. This may result in costly and otherwise unneeded replacements, inefficient use of expensive resources and a poor public perception of ITS investment. Sponsoring agencies should consider hiring outside contractors to supplement staffing needs, if necessary.

Staff responsible for implementing, operating, and maintaining ITS elements should be appropriately trained. Staff should have knowledge of the system engineering process, ITS standards and their applicability, ITS procurement process, communications requirements, and needs for ITS deployments. Agencies may find it beneficial to develop staff skill matrices to quickly identify the skills or knowledge needed when staff leaves.

6.3.4 Continuity of Operations

Maintaining operational continuity is an absolute must for ITS projects. Failure to keep systems up and running will result in public distrust. For most new ITS applications, maintaining operational continuity will not be much of an issue, since this activity is simply a process of adding on additional functionality; however, consideration should be given to operating the system correctly. Besides new projects, there will be ITS projects proposed that will replace existing systems. In this regard, halting operations for a designated period of time, while the new subsystem is being installed, is not an effective option. Operating in this fashion opens the door to several problems, the biggest being a reduction in safety. Maintaining operational continuity before, during, and after systems are implemented is a challenge that system implementers must address to ensure that the public's perception of ITS remains positive.

6.3.5 Standards

Standards define how elements associated with an ITS project will interconnect and interact with other ITS elements. The underlying principal behind standards is that they enable subsystems to be designed using "open" platforms. In other words, standards allow subsystems to be easily upgraded or replaced when they fail, and are interoperable. Before the introduction of standards, subsystems were often developed using proprietary software, that could not be replaced with a similar subsystem or product other than those made by the same manufacturer.

ITS systems proposed for implementation should be selected to be consistent with USDOT approved standards. Standards must be identified prior to implementing projects funded by the National Highway Trust Fund. The FHWA Rule and FTA Policy on Regional ITS Architectures states that, "… federally funded ITS projects use, where appropriate, USDOT adopted ITS standards". To find more information on ITS-related standards, visit:

http://www.standards.its.dot.gov/

6.4 Project Implementation and Phasing

ITS initiatives proposed for the Glenn Highway are phased for deployment over the next ten years. However, due to the dynamic nature of ITS and likely shift in regional priorities a specific deployment sequence is not proposed. Instead, projects are phased for deployment in either the short-, mid- or long-terms. In a few cases, project implementation may occur in one phase with additional project development and implementation occurring in a latter term. Project implementation phases are described in greater detail below.

Short-term – present to three years into the future. Short-term initiatives are projects that are already programmed in either the Statewide Transportation Improvement Program (STIP) or Anchorage Transportation Improvement Program (TIP). Since these projects are already in the STIP or TIP they are obviously desired by regional stakeholders and will work quickly at addressing previously identified needs.

Mid-term – three to five years into the future. Mid-term initiatives focus on the continued provision of 1) ITS infrastructure including communications needed to physically integrate ITS elements and to develop a corridor wide understanding of ITS operations, 2) regional traveler information, and 3) surveillance and monitoring. The intent of mid-term ITS initiatives is to build upon the foundation of ITS previously completed prior to and within the short-term so as to immediately realize benefits while providing the necessary infrastructure needed to support long-term initiatives and a more robust ITS network.

Long-term – five to ten years into the future. Long-term initiatives build upon the projects and project initiatives phased in the short-, and mid-terms. These projects are intended to complete portions of the corridor level ITS system, and to maximize benefits of earlier deployments through advanced system integration.

Short-, mid- and long-term ITS initiatives for the Glenn Highway are described in greater detail in the following sections.

6.5 Short-Term (Programmed) Projects

The STIP and the Anchorage TIP provide a set of transportation projects slated for implementation over the next several years. Within this set of projects, is a subset of projects that either contain or entirely deploy ITS elements along the Glenn Highway. For this reason, ITS-related projects in the STIP and Anchorage TIP are valid in determining the direction of ITS deployment along the Glenn Highway. These proposed and approved projects fill in gaps in ITS deployment and specifically address transportation related needs. For instance, projects identified in the ADOT&PF STIP were derived in part through the transportation related needs documented in the ADOT&PF Needs List, as well as through other outreach activities.

Programmed projects listed in the STIP and Anchorage TIP essentially serve as the near-term deployment of ITS in that they are either currently being deployed or are slated to be deployed within the next 3 years. These projects while setting the direction for ITS deployment, serve as the foundation from which future ITS deployment will occur. With that said, proposed and approved projects must be considered in recommending future projects, so that ITS deployment can occur in an incremental, phased fashion that builds upon previous efforts. Projects listed in the STIP and TIP that affect the Glenn Highway are described in the following sections.

6.5.1 Statewide Transportation Improvement Program Projects

Projects listed in the STIP are funded through various sources available to the state most notably the FHWA and Federal Transit Administration (FTA). The state receives several categories of funding from each of these agencies. Each category has distinctive rules for project eligibility, match ratios, and other programming factors. Projects included in the STIP are discussed below.

Table 6-1:
Synopsis of the Bridge Scour Monitoring and Retrofit Project (ST1)

Project ST1: Bridge Scour Monitoring and Retrofit Project	
Description:	This project will install monitoring and telemetry and/or construct physical scour countermeasures at State bridges identified as scour critical by the federally mandated Scour Evaluation Program. This project has been on-going since 2001 and is expected to be funded through 2013. Although this is a statewide project, it is possible that bridges within the corridor, like the Knik River Bridge which is already equipped, may qualify for additional funding.
Key Agencies:	ADOT&PF
Desired Outcomes:	• Improved safety • Improved infrastructure protection and security
Timeframe:	Short-term (0-3 years) - Programmed
Market Package Traceability:	• MC12 – Infrastructure Monitoring
Physical Elements:	• Sensors • Communications
Dependencies:	None
Rough Order of Magnitude Cost:	Approved STIP funding allocation (2008-2009) 2008: $950,000 2009: $950,000

Table 6-2:
Synopsis of the Geographic Information Systems (GIS) Development Project (ST2)

Project ST2: Geographic Information Systems (GIS) Development	
Description:	This project will upgrade ADOT&PF's transportation and GIS capabilities to develop a Highway Analysis System (HAS)-GIS interface that can be accessed via the internet by staff and the public. This interface will improve State road data distribution by analyzing user needs and requirements for integrating GIS with HAS, and making implementation recommendations. The objective of the project is to develop targeted HAS–GIS upgrade strategies that can be implemented in three to five years that will: • Establish a HAS – GIS interface to improve data access, display, analysis, and output; • Unify the processing, management, maintenance, and output of Roadlog and the road centerline network data in an integrated system; and • Establish HAS as a foundation for linear reference-based GIS within the Department. • Develop the HAS-GIS interface that will form the foundation to deploy Intelligent Transportation Systems (ITS) statewide. • The project will use GIS capabilities to spatially display information for quick analysis and improved understanding.
Key Agencies:	• ADOT&PF (Primary) • Other regional transportation data users (Secondary)
Desired Outcomes:	• Improved agency operations • Enhanced data collection, dissemination and use • Improved decision making
Timeframe:	Short-term (0-3 years) - Programmed
Market Package Traceability:	NA
Physical Elements:	Geographic Information System
Dependencies:	RoadNet Phase 2
Rough Order of Magnitude Cost:	Approved STIP funding allocation (2008-2009): 2008: $300,000 2009: $300,000

Table 6-3:
Synopsis of the Weigh-in-Motion Equipment Project (ST3)

Project ST3: Weigh-in-Motion Equipment	
Description:	This project provides funding to purchase and install weigh-in-motion equipment at sites on the National Highway System, as well as maintenance and enhancements at these and existing sites. It is estimated that over the next 2 years an additional 4 WIM system sites will be built. Project funding will be used to install equipment at these sites. Additionally, funding will be used to address software and communications issues to allow viewing of near real-time WIM data via the web.
Key Agencies:	ADOT&PF, Division of Measurement Standards and Commercial Vehicle Enforcement (MSCVE)
Desired Outcomes:	• Improved data collection and reporting • Improved weight enforcement
Timeframe:	Short-term (0-3 years) - Programmed
Market Package Traceability:	CVO06 – Weigh-in-Motion
Physical Elements:	• Sensors • Dynamic message signs • Communications
Dependencies:	None
Rough Order of Magnitude Cost:	Approved STIP funding allocation (2008-2009): 2008: $1,094,200 2009: $1,567,700

Table 6-4:
Synopsis of the Highway Data Equipment Acquisition and Installation Project (ST4)

Project ST4: Highway Data Equipment Acquisition and Installation	
Description:	This project provides additional funding to design, construct or rehabilitate traffic data collection sites and develop software for Alaska's federally required Traffic Monitoring System for Highways. ITS elements included in this project are; traffic data counters, cameras and computer hardware and software for remote data collection and analysis.
Key Agencies:	ADOT&PF
Desired Outcomes:	• Enhanced data collection • Improved Transportation planning
Timeframe:	Short-term (0-3 years) – Programmed
Market Package Traceability:	ATMS01 – Network Surveillance
Physical Elements:	• Traffic data counters • Cameras • Hardware and software
Dependencies:	Initiative MT6 - Traffic Speed Sensor Planning and Implementation proposes to implement traffic speed sensors along the Glenn Highway. To reduce deployment costs, consideration should be given to the possibility of deploying traffic detectors capable of fulfilling the needs of this project as well as the needs of Initiative MT6. This will retain the funding needed to implement speed sensors, and ensure greater return on investment.
Rough Order of Magnitude Cost:	Approved STIP funding allocation (2008-2009): 2008: $2,534,500 2009: $1,320,000

Table 6-5:
Synopsis of the Wideband Multi-media Mobile Emergency Communications Pilot Project (ST5)

Project ST5: Wideband Multi-media Mobile Emergency Communications Pilot	
Description:	This project provides roughly 4.6 million to increase the efficiency of public safety communication systems by adding a secure wideband data network. This pilot will establish a 4.9GHz mesh communications network that can only be accessed by emergency service providers in the Wasilla area. This network will allow these users to transmit pictures, video, voice and text over a high-speed broadband connection similar to an internet site. This communication will allow dispatchers to communicate effectively with other agencies as well as personnel located in the field. The network will also serve to transmit video images to initiate an effective and timely response to incidents. Video will also be used during non-incident periods, for traveler information purposes, allowing travelers to make effective decisions and alter driving behavior when incidents do occur or when weather conditions are severe.
Key Agencies:	• ADOT&PF • City of Wasilla • City of Wasilla Police Department • Other emergency management agencies as identified during the project planning phase.
Desired Outcomes:	• Increased efficiency of public safety communication systems • Improved incident response and provision of emergency services • Improved mobility
Timeframe:	Short-term (0-3 years) - Programmed
Market Package Traceability:	NA
Physical Elements:	• Communications • In-vehicle and roadside cameras • Mobile data terminals
Dependencies:	Camera images and video from this project can supplement images and video proposed in Initiative MT2 - Camera Planning Study and Expansion Project.
Rough Order of Magnitude Cost:	Approved STIP funding allocation (2008-2009): 2008: $200,000 2009: $3,662,500

Table 6-6:
Synopsis of the Glenn Highway Corridor: MP 5 – Parks Highway Interchange, ITS Project (ST6)

Project ST6: Glenn Highway Corridor: MP 5 – Parks Highway Interchange, ITS Project	
Description:	This project provides $1,450,000 for planning, design and construction additional dynamic message signs, low power FM or highway advisory radio, bridge automated de-icing systems, and environmental sensors for the Glenn Highway from milepost 5-Parks Highway Interchange.
Key Agencies:	ADOT&PF
Desired Outcomes:	• Improve traveler safety • Improve traveler decision making
Timeframe:	Short-term (0-3 years) - Programmed
Market Package Traceability:	• MC03 - Road Weather Data Collection • MC05 – Roadway Automated Treatment • ATMS06 - Traffic Information Dissemination
Physical Elements:	• Dynamic Message Signs • Low Power FM/Highway Advisory Radio • Automated anti-icing/de-icing systems • Environmental Sensor Stations
Dependencies:	This project funds some of the ITS elements proposed in mid-term initiatives. Depending on available funding, it is anticipated that additional ITS elements will need to be deployed in the mid-term, and are therefore reflected in the mid-term ITS initiatives discussed later in this chapter. The implementation of DMS or ESS will reduce the funding requirements to install similar devices proposed in initiatives MT2 and MT4.
Rough Order of Magnitude Cost:	Approved STIP funding allocation (2008-2009): 2008: $0 2009: $1,450,000

Table 6-7:
Synopsis of the Intelligent Transportation Systems Implementation Project (ST7)

Project ST7: Intelligent Transportation Systems Implementation Plan	
Description:	This project implements projects that were included in the Alaska Iways Architecture. These projects align with the original 6 program areas which were: • Snow and Ice Removal, • Multi-modal information connections, • Traveler Communications, • Internal Operation, • Commercial Vehicle Operations, and • Traveler Safety and Infrastructure Security.
Key Agencies:	• ADOT&PF • Other agencies as applicable
Desired Outcomes:	• Varies on projects implemented
Timeframe:	Short-term (0-3 years) - Programmed
Market Package Traceability:	• Varies on projects implemented
Physical Elements:	NA
Dependencies:	Yet to be determined. This project is a significant funding source that may be tapped to implement mid-term ITS initiatives.
Rough Order of Magnitude Cost:	Approved STIP funding allocation (2008-2009): 2008: $1,675,000 2009: $550,000

Table 6-8:
Synopsis of the Intelligent Transportation Systems Operations and Maintenance Project (ST8)

Project ST8: Intelligent Transportation Systems Operations and Maintenance	
Description:	This project funds operations and maintenance of ITS projects that are part of the Alaska Iways Architecture Implementation Plan. Additionally, this project would deploy additional RWIS equipment at critical sites and support operation and maintenance of this system.
Key Agencies:	ADOT&PF
Desired Outcomes:	Continued and improved operations and maintenance of existing ITS
Timeframe:	Short-term (0-3 years) - Programmed
Market Package Traceability:	• MC03 - Road Weather Data Collection
Physical Elements:	• Environmental sensor stations • Communications
Dependencies:	Funding for the operations and maintenance of ITS elements is critical to every ITS project. Funding ensures that ITS elements are operated effectively and efficiently and routinely maintained so as to prevent system malfunction or failure.
Rough Order of Magnitude Cost:	Approved STIP funding allocation (2008-2009): 2008: $360,000 2009: $360,000

Table 6-9:
Synopsis of the Maintenance Management System Project (ST9)

Project ST9: Maintenance Management System	
Description:	In 2002, the ADOT&PF began development of the Department's Maintenance Management System (MMS). The MMS project was initiated to comply with the Government Accounting Standards Board Statement Number 34 (GASB 34) reporting requirements, which require documentation of maintenance and preservation activities on Alaska's highways, airports, and ports and identification of the system's overall conditions and level of service. To date, the department has used roughly 2.1 million to establish the system which has been operational for several years. The system effectively manages ADOT&PF maintenance responsibilities and is able to track and plot assets within a GIS, which can be publicly viewed over the internet. This project provides additional funding to automated time sheet reporting, tracking of budget expenditures, work planning, deferred maintenance tracking, forecast budget requirements, and public service levels.
Key Agencies:	ADOT&PF
Desired Outcomes:	• Improved asset management, availability and reliability • Improved internal operations • Reduced maintenance costs • Improved safety • Improve operational planning and budget control
Timeframe:	Short-term (0-3 years) – Programmed
Market Package Traceability:	MC07 – Roadway Maintenance and Construction
Physical Elements:	Hardware and software
Dependencies:	None
Rough Order of Magnitude Cost:	Approved STIP funding allocation (2008-2009): 2008: $1,311,000 2009: $766,000

6.5.2 Anchorage Transportation Improvement Program (TIP) Projects

Projects listed in the Anchorage Transportation Improvement Program are funded primarily through USDOT funds. The TIP prioritizes and describes capital projects to be completed in the coming years, and indicates the amount of funding currently available or needed to implement projects. Projects requiring the use of federal funds are coordinated through the AMATS group which is a cooperative effort between the MOA and the ADOT&PF. Projects included in the Anchorage TIP are discussed below.

Table 6-10:
Synopsis of the Traffic Control Signalization Program (ST10)

Project ST10: Traffic Control Signalization Program	
Description:	This project provides 1.65 million in approved and estimated funding for a combination of updated traffic signal timing plans, a new traffic management center, and additional emergency vehicle and low priority transit signal pre-emption. The MOA Traffic Department Signal Division will be responsible for implementing and operating projects under this program.
Key Agencies:	• Municipality of Anchorage (Primary) • ADOT&PF (Secondary)
Desired Outcomes:	• Improved traffic flow • Improved emergency response • Improve public transportation operations • Improved safety
Timeframe:	Short-term (0-3 years) - Programmed
Market Package Traceability:	• APTS 09 – Transit Signal Priority • EM 02 – Emergency Routing
Physical Elements:	• Traffic Signals • Traffic signal priority and pre-emption systems
Dependencies:	None
Rough Order of Magnitude Cost:	Approved TIP funding allocation (2008-2011): 2008: $250,000 2009: $200,000 2010: $200,000 2011: $200,000 Beyond 2011: $300,000 (estimated)

Table 6-11:
Synopsis of the ITS Automated Operating System Project (ST11)

Project ST11: ITS/ Automated Operating System	
Description:	This AMATS project provides $600,000 to People Mover to implement/operate public transportation ITS projects. Projects include automated ticketing, smart fare boxes, web-based interfaces, and automated telephone system for the para-transit system.
Key Agencies:	People Mover
Desired Outcomes:	• Improved transit operations and administration • Improved public perception and use of transit • Reduced congestion
Timeframe:	Short-term (0-3 years) – Programmed
Market Package Traceability:	• APTS 04 – Transit Fare Collection Management • APTS 10 – Transit Passenger Counting
Physical Elements:	• Automated ticketing machines • Smart fare boxes • Web interfaces • Automated telephone system
Dependencies:	None
Rough Order of Magnitude Cost:	Approved TIP funding allocation (2008-2011): 2008: $100,000 2009: $100,000 2010: $100,000 2011: $100,000 Beyond 2011: $0 (estimated)

Table 6-12:
Synopsis of the Anchorage Integrated Roadnet (Phase 2) Project (ST12)

Project ST12: Anchorage Integrated Roadnet, Phase2	
Description:	In 2002, the Municipality of Anchorage began the Integrated Roadnet project in an overall effort to integrate the Municipality's existing road network information system (Roadnet) into an integrated geodatabase management system. The Roadnet project, which is a joint project between the MOA and ADOT&PF, will result in a multi-agency, single and comprehensive source of GIS information for the Municipality. The project supports the needs of several stakeholders including; Planning, Public Works, Traffic Engineering, Public Safety, and Transit. This list represents just a sub-set of agencies that will benefit from the Roadnet system. The system has the support from the ADOT&PF, and will be integrated with ADOT&PF geodatabases. Funding for Phase 2 of this project will complete and refine the Roadnet system. When completed, the system will establish a common roads network and database for multiple State and Municipal agencies/ reducing data redundancy, staff time, and errors.
Key Agencies:	• Municipality of Anchorage (primary) • ADOT&PF (secondary) • Other regional transportation, emergency and transit management agencies with interest in data collection and analysis.
Desired Outcomes:	• Improved data analysis and interpretation • Reduced data redundancy and data collection costs • Improved transportation planning
Timeframe:	Short-term (0-3 years) – Programmed
Market Package Traceability:	AD2 – ITS Data Warehouse
Physical Elements:	Data archive
Dependencies:	This project should be coordinated with other GIS efforts in the Region, including Project ST9 – Maintenance Management system to ensure that data collected from these efforts is shared and able to be integrated into a common GIS platform for viewing with other data types.
Rough Order of Magnitude Cost:	Approved TIP funding allocation (2008-2011): 2008: $0 2009: $50,000 2010: $50,000 2011: $0 Beyond 2011: $0 (estimated)

Table 6-13:
Synopsis of the People Mover Fleet Improvement and Support Equipment Project (ST13)

Project ST13: People Mover Fleet Improvement and Support Equipment	
Description:	This project funds improvements to existing transit and para-transit fleets. Projects that might fall under this project include: a ticket reader and issue system, security systems, transit/signal improvements for headway enhancements, mobile display terminals, and vehicle communications and location systems.
Key Agencies:	People Mover
Desired Outcomes:	• Improved transit operations and schedule adherence • Improved security and rider safety
Timeframe:	Short-term (0-3 years) - Programmed
Market Package Traceability:	• APTS01 - Transit Vehicle Tracking • APTS04 – Transit Fare Collection Management • APTS05 – Transit Security • APTS09 – Transit Signal Priority
Physical Elements:	• Ticket readers and issue systems • Security systems • Transit signal priority • Mobile data terminals • Automatic vehicle location
Dependencies:	NA
Rough Order of Magnitude Cost:	Approved TIP funding allocation (2008-2011): 2008: $250,000 2009: $250,000 2010: $350,000 2011: $350,000 Beyond 2011: $0 (estimated)

Table 6-14:
Synopsis of the Transit Management Information Systems Project (ST14)

Project ST14: Management Information Systems	
Description:	This project funds information systems necessary for efficient management of the public transportation system. Typical projects include: Geographic Information Systems (GIS) capabilities, upgrades to the automated maintenance system, refueling and inventory system, a new computer aided dispatch system.
Key Agencies:	People Mover
Desired Outcomes:	• Improved Transit Operations • Improved Dispatch • Operational Cost Savings
Timeframe:	Short-term (0-3 years) - Programmed
Market Package Traceability:	APTS 02 – Transit Fixed-Route Operations APTS 06 - Transit Fleet Management
Physical Elements:	• Computer Aided Dispatch • Geographic Information System
Dependencies:	If a new GIS will be purchased, consideration should be given to purchase a system similar to that of the MOA and other regional partners so GIS information and data can be exchanged among agencies.
Rough Order of Magnitude Cost:	Approved TIP funding allocation (2008-2011): 2008: $50,000 2009: $50,000 2010: $50,000 2011: $50,000 Beyond 2011: $0 (estimated)

6.6 Future Projects

In April 2008, the Glenn and Seward Highway ITS Implementation Plan workshop was held at the ADOT&PF central region facility in Anchorage. The purpose of the workshop was two fold. First, the project team summarized project activity occurring up to that point. This included the work completed to date on the Statewide Iways Architecture Update as well as the Glenn and Seward Highway ITS Implementation Plans. Additionally, a brief background on what ITS is and purpose of the Implementation Plan was discussed. Second, the project team facilitated discussion among the stakeholders to identify candidate ITS projects for the 2 highway corridors. Needs and issues as identified by stakeholders in a previous workshop were used to facilitate this discussion. Eventually, workshop participants recommended a series of projects thought to positively impact transportation along the corridor.

Identified projects were recorded as they were identified and are listed in Table 6-15. Upon fleshing out the possibilities for candidate ITS projects stakeholders were asked to vote up to six times for any combination of 1-3 projects. Project voting served as a means to identify highly desirable projects. The results of voting were then taken into consideration to prioritize and phase projects for implementation. It should be noted that the results of voting served as one of many inputs taken into consideration in the formal process of recommending projects and phasing them over the short-, mid-, and long-term. Other considerations taken into consideration were technical feasibility and intuitional readiness. In other words, projects were also assessed based on weather supporting infrastructure was in place to support the project as well as if there were staff available to operate and maintain the project. The point of the exercise was to determine the highly desirable projects so that these could be implemented as quickly as possible so long as the desired project satisfied a transportation need and has the supporting infrastructure and personnel to ensure success over the long-term.

The total number of votes each project received is also shown in Table 6-15. There were several other projects initially recommended by stakeholders that did not receive any votes. Since these projects did not receive any votes they were eliminated from further consideration and removed from the list of candidate projects in Table 6-15.

6.7 Recommended Potential ITS Projects (Mid- and Long-Term)

Recommended potential projects are projects that can be conceptually deployed or integrated along the Glenn Highway within the 3-10 year timeframe. These projects have been either identified by a wide group of stakeholders as being applicable for addressing corridor related issues or needs, or work directly at further developing existing ITS elements so as to fill in gaps in technology to make a more robust system. Potential ITS projects also offer the opportunity to grow the existing ITS and short-term projects that have been approved and programmed for funding.

Because ITS cannot be integrated all at once, new systems should be integrated with new ones over time. This section describes how potential ITS projects along the corridor can be integrated over time to maximize benefits of each system. For this reason, potential ITS projects are classified as being planned for deployment in the mid- (3-5 years) or long-term (5-10 years). This functionality is also predicated on the assumption that adequate and reliable communications will be provided.

The summary of project initiatives described in following sections contain rough order of magnitude cost estimates, which should be considered highly variable due to dependence on a number factors that cannot be accurately gauged until preliminarily engineering, including but not limited to precise functional requirements required of systems, field conditions including access to communications and power, current build out of existing infrastructure, and the types of equipment installed. Additionally, the costs provided for each project should be assumed applicable for only the capital costs unless otherwise noted. Many of the recommended projects contain equipment that needs to be operated and maintained, therefore, the labor costs associated with these actions need to be taken into consideration prior to project implementation to ensure that equipment can be operated correctly, and regularly maintained to maximize benefits and to ensure public trust and support. All costs reported are in today's dollars.

Table 6-15:
Summary of Potential Glenn Highway ITS Projects as Identified by Workshop Participants and Votes Received (Only Projects Receiving Votes Shown)

Project Name	Total Votes
Assess feasibility/ deploy DMS/CCTV/Detection	22
Real-time traffic data and speed collection/dissemination (travel times)	13
Concepts for disseminating info/system integration	12
Data link between public and private sectors	10
Incident management plan	9
Central data archive for traffic data/communications study for retrieval	8
Variable speed limits	8
Highway Advisory Radio	8
Enhanced Transit Traveler Information	6
Traffic management center for focused operations	6
Real-time construction feeds to 511	6
Avalanche/landslide detection risk assessment	5
Enhanced 511 information	4
Transit Signal Priority for MOA/Matsu Transit	4
Red light running study	4
Automated fog detection and integration with DMS	3
Corridor concept of operations	3
Integrating Transit Management across different modes	3
Lane management (HOV lanes, etc.)	3
Outfitting buses with temperature sensors/other vehicle probes	2
Subscription service for alerts	2
Emergency communications for incident/emergencies (integration of data with other non-emergency agencies)	2
Speed Trailers (feasibility)	2
Smart work zones enhancement or replacement	1
Crash investigation (Photogrametry)	1

6.7.1 Mid-Term (3-5 Years)

Recommended potential mid-term projects are envisioned for Alaska within the three to five year timeframe. Within the five-year horizon, ITS deployments will begin to migrate into an integrated system. This will be fostered by an increasing number of ITS deployments and by the development of enabling technologies that will provide the basis for multiple functions. The goal of this period is to continue to incrementally expand ITS deployment that currently exist today or is programmed for deployment in the near-term. For instance, it will be beneficial to expand coverage of the existing networks of cameras, ESS, and DMS. These types of projects are relatively inexpensive, highly visible, and provide the infrastructure needed to enable future projects like an integrated traffic operations and communication center. In comparison to the long-term projects, those slated for the mid-term as well as the near-term focus on deploying ITS elements that show the greatest potential to produce immediate benefits, or work to enable the implementation of other systems, thus forming the foundation for future ITS applications to be developed in the long-term. Initiatives identified in Table 6-16, are considered viable for the mid-term. These initiatives are outlined in greater detail in Tables 6-17 – 6-23.

Table 6-16:
Recommended Mid-term ITS Initiatives

Project Number	Project Name
MT1	Incident Management Plan
MT2	Environmental Sensor Station Study and Expansion
MT3	Camera Planning Study and Expansion
MT4	Dynamic Message Sign Planning Study and Expansion
MT5	Fog Detection and Warning System Planning Study and Deployment
MT6	Assessment and Feasibility of Public/Private Partnerships
MT7	Traffic Speed Sensor Planning and Implementation

Table 6-17:
Synopsis of the Incident Management Plan Initiative (MT1)

Initiative MT1: Incident Management Plan	
Description:	A traffic incident management plan defines a coordinated approach for responding to and managing various types of major incidents, that is agreed by regional stakeholders. Furthermore, incident management plans outline how human, institutional, and technical resources such as ITS investments are coordinated to reduce the impacts of incidents, and improve the safety of motorists. This initiative will develop an incident management plan to provide specific guidelines and procedures that agencies can follow when different types of incidents occur on the Glenn Highway. The incident management plan will improve incident response and safety by identifying specific emergency scenarios and detailing the roles and responsibilities of various agencies during each scenario. This will lead to improved understanding and coordination among emergency agencies, and will strengthen institutional relationships in the region. The incident management plan will also detail a list of emergency resources such as specialized fire suppression equipment, incident command vehicles, heavy towing equipment for trucks, as well as DOT and emergency management resources.
Key Agencies:	• ADOT&PF (Primary) • MOA • Law Enforcement • Emergency Medical Services (including Fire and Rescue) • 911 Dispatch and emergency management agencies • Tow Service Providers
Desired Outcomes:	• Reduced clearance times (i.e., reduced congestion and improved mobility) • Improved Safety and Treatment of Victims.
Timeframe:	Mid-Term (3-5 years)
Market Package Traceability:	NA
Physical Elements:	NA
Dependencies:	This initiative should be completed before additional permanent CCTV and Dynamic Message Signs are implemented along the Glenn Highway. This initiative will identify locations along the highway where incidents often occur. Based on these identified locations, CCTV and DMS can be located upstream of the locations to provide motorists with advance warning and or directions for rerouting around the incident. Additionally, surveillance systems can monitor these locations to detect incidents and provide details of the incident so appropriate resources can be deployed to treat injured persons and/or clear the roadway.
Rough Order of Magnitude Cost:	$250,000-$300,000

Table 6-18:
Synopsis of the Environmental Sensor Station Study and Expansion Initiative (MT2)

Initiative MT2: Environmental Sensor Station Study and Expansion	
Description:	Additional deployment of environmental sensor stations will lead to a more robust network of weather instrumentation, data from which can be used to better pin-point weather conditions and phenomenon, and lead to improve micro-scale weather forecasts. Additional ESS are needed to fill in gaps in existing ESS coverage along the Glenn Highway. By filling in these gaps in coverage, a more complete picture of weather conditions can be observed leading to improve response in treating roadways and overall operational decision making. Additional deployment of ESS along the Glenn Highway will work toward improving weather forecasts, and support developing a variable speed limit and fog detection and warning systems. This initiative is comprised of 2 parts. First, a study will be preformed to develop a strategy for implementing additional environmental sensor stations along the Glenn Highway. This study will include guidelines on sitting RWIS stations and determine locations where additional ESS are needed. The second part of this initiative will take the preliminary ESS locations recommended by the study and physically deploy the equipment at the sites. ESS will be integrated with ADOT&PF's existing RWIS system so weather information can be used for operational decision making and dissemination to the public.
Key Agencies:	• ADOT&PF
Desired Outcomes:	• Improved agency operational decision making (ADOT&PF and other agencies) • Improved traveler information • Enhanced maintenance
Timeframe:	Mid- and Long-Term (3-10 years)
Market Package Traceability:	MC03 - Road Weather Data Collection
Physical Elements:	• Atmospheric and pavement environmental sensors • Communications
Dependencies:	This initiative should be implemented either before or concurrently with Initiative MT3-Camera Planning Study and Expansion. The ESS pole can be used to mount cameras to be deployed as part of Project MT3. Therefore, implementing this initiative first will eliminate the expense of additional poles for the cameras.
Rough Order of Magnitude Cost:	$370,000 plus annual maintenance. Assume 6 additional ESS. $100,000 for ESS study and sitting requirements. $45,000 per ESS for equipment purchase. Each ESS consists of pavement temperature sensor, subsurface pavement temperature sensor, precipitation sensor, wind sensor, air temperature and humidity sensors, visibility sensors, and remote processing unit. $5,000 per ESS for maintenance consisting of calibration and preventative and responsive maintenance.

Table 6-19:
Synopsis of the Camera Planning Study and Expansion Initiative (MT3)

Initiative MT3: Camera Planning Study and Expansion	
Description:	Camera images and video allow agencies and the public to view conditions in the field as they occur from a remote location. This improves decision making, as agencies and individuals can base decisions on near real-time, or real-time visual observations, without having to first travel to the site. From an agency's perspective, decisions can be made more quickly and without the cost and effort of traveling to the site. Additionally, the presence of cameras at critical infrastructure provides a sense of security, not only from a prevention stand point but also from the ability to verify conditions and initiating an effective response when incidents do occur. Furthermore, cameras are a highly visible tool, and will enhance public awareness and acceptance of ITS in general, but more importantly build public support for these types of systems which makes it easier to acquire funding to implement additional systems. From the public's perspective access to cameras images enables them to make better travel related decisions so as to avoid dangerous conditions and to arrive at selected destinations more quickly. This initiative will study the potential for deploying additional cameras along the Glenn Highway to augment the existing camera network already deployed along the highway. This will enhance operations, improve safety and improve decision making by providing a better picture of how the highway is operating. The initiative will determine where additional cameras are needed, and if communications and power can adequately be supplied at these locations. The initiative will include detailed cost estimates and communication analysis. Camera implementation and extent will be based on the study.
Key Agencies:	• ADOT&PF
Desired Outcomes:	• Improved incident detection, verification and response • Improved agency operations • Improved traveler information
Timeframe:	Mid- and Long-Term (3-10 years)
Market Package Traceability:	Network Surveillance
Physical Elements:	• Cameras • Communications • Firmware
Dependencies:	In the short-term this initiative works to supplement existing camera sites, with the eventual goal (as funding permits) of equipping the entire Glenn Highway corridor (from Anchorage to the MatSu) so that the entire stretch of pavement can be observed by at least 1 camera. This initiative provides the necessary field equipment to implement future initiatives like a traffic management center or variable speed limit system.
Rough Order of Magnitude Cost:	$516,000 plus annual maintenance. $80,000 for study. Assumes 24 cameras at $15,000 per camera. Cost includes color video camera with pan, tilt, and zoom (PTZ), cabinet, electrical services, encoder/decoder, and installation. Assumes 19 camera poles (35 feet tall) at $4,000 each. Remaining 5 cameras to be mounted to the ESS to be deployed as part of Initiative MT2.

Table 6-20:
Synopsis of the Dynamic Message Sign Planning Study and Expansion Initiative (MT4)

Initiative MT4: Dynamic Message Sign Planning Study and Expansion	
Description:	Dynamic message signs provide motorists with real-time incident, construction and road condition information that can be used by motorists to make effective travel choices and alter their driving behavior. Along the Glenn Highway, additional DMS will serve to notify motorists of severe weather conditions (e.g., fog, snow, wind), and the activation of systems used to mitigate the impact of these conditions. DMS may also be used to post Amber Alert messages when these alerts are issued. This initiative will study the potential for deploying additional DMS along the Glenn Highway for the purpose of providing additional en-route traveler information so as to improve safety and decision making. The initiative will determine where additional traveler information is needed and the potential for locating dynamic message signs at these sites. This will include detailed cost estimates, communication analysis, and review of crash records to identify locations where problems are known to occur. The study will also investigate the effectiveness of existing DMS and the potential for relocating these devices to other locations in an effort to maximize the value of these investments. Potential locations where DMS may be relocated include those where enhanced benefits are provided to motorists. DMS implementation to occur based on the results of the study.
Key Agencies:	ADOT&PF
Desired Outcomes:	• Enhanced traveler information • Improved safety • Improved mobility
Timeframe:	Mid-term (3-5 years)
Market Package Traceability:	ATMS06 - Traffic Information Dissemination
Physical Elements:	• Dynamic Message Signs • Communications
Dependencies:	This initiative provides the necessary field equipment to implement future initiatives like a traffic management center and variable speed limit system. This initiative may also enhance traveler information through integration with anti-icing and fog detection systems. This initiative should be closely coordinated with Initiative MT4 to ensure that selected locations for DMS take into consideration advance warning requirements for a fog detection system.
Rough Order of Magnitude Cost:	$1,020,000 plus annual maintenance. $80,000 for study. Assumes 4 over the roadway 3-line, full matrix dynamic message signs at $100,000 each and 4 overhead sign supports at $100,000 each. Costs include installation ($35,000 per sign), but not communications.

Table 6-21:
Synopsis of the Fog Detection System Planning Study and Deployment Initiative (MT5)

Initiative MT5: Fog Detection and Warning System Study and Deployment	
Description:	Fog occurs and is often a problem in MatSu valley, especially near the Knik River Bridge. A fog detection and warning system is a potential solution to this problem. Environmental sensors, including visibility sensors detect conditions that favor the formation of fog and can pass along advance warning to motorists when fog occurs. Additionally, freezing fog often occurs at these locations resulting in potentially hazardous driving conditions. If provided advanced warning of fog, motorists can reduce driving speeds well before affected areas, enabling them to travel through affected areas more safety. Additionally, when incidents do occur, advanced warning will reduce potential for secondary collisions. This initiative will study the potential for deploying fog detection and warning equipment at areas along the Glenn Highway where the formation of fog often occurs. This includes cost estimates, communications analysis, and extensive review of historical weather and crash data to identify locations where fog occurs and incidents are known to occur. If feasible, existing or planned ESS (See Initiative MT2) located in the affected areas will be equipped with visibility sensors (i.e., nephelometers) to measure scattered light and determine the density of fog. Data collected by visibility sensors will be integrated with that of other environmental sensors data to determine potential impact to motorists, and eventually disseminated to nearby motorists via DMS, HAR, and the 511 travel-in-the-know website. The study will dictate where and how fog detection and warning systems will be implemented.
Key Agencies:	ADOT&PF
Desired Outcomes:	• Improved safety • Improve traveler information
Timeframe:	Mid-term (3-5 years)
Market Package Traceability:	MC03 - Road Weather Data Collection MC04 – Weather Information Processing and Distribution
Physical Elements:	• Visibility sensors • Dynamic Message Signs • Static signs with flashing beacons • Communications
Dependencies:	Dynamic Message Signs deployed in Initiative MT3 may be used to provide fog alerts.
Rough Order of Magnitude Cost:	$60,000 $30,000 for study. Assumes 4 visibility sensors installed at 2 sites with 1 sensor in each direction at $7,500 per sensor including installation.

Table 6-22:
Synopsis of the Assessment and Feasibility of Public/Private Partnerships Initiative (MT6)

Initiative MT6: Assessment and Feasibility of Public/Private Partnerships	
Description:	Public-Private partnerships are excellent opportunities for public agencies to finance and offer additional public services that it could not otherwise offer working in isolation. Partnerships between public and private agencies are typically valuable to the operations of both agencies, and because of that are often viewed as "win-win". ADOT&PF will investigate public private partnerships to gain access to larger mediums through which traveler information can be communicated. This should also include public education to promote the benefits and use of ITS investments. Additionally, these agreements may allow the ADOT&PF the ability to provide additional public services without significant expenditure. This initiative will explore the possibility of developing public-private partnerships to improve public transportation operations and service.
Key Agencies:	• ADOT&PF • Other agencies as appropriate (e.g., Private Information Service Providers)
Desired Outcomes:	• Enhanced Public Services • Strengthened institutional partnerships • Maximized Public Investment
Timeframe:	Mid-Term (3-5 years)
Market Package Traceability:	NA
Physical Elements:	NA
Dependencies:	It is advantageous to begin this initiative as early as possible given the possibility of sharing deployment costs with other public and private agencies. For instance, it should be investigated if any other agencies are deploying ITS equipment and what impact this has on the planned phasing of ITS investment outlined in this plan. It may be adventurous to the ADOT&PF to accelerate or delay initiatives, if they can be implemented more cost effectively. A desired goal of this initiative is to open doors of communication with private sector entities so common interests and possibilities for addressing them can be further explored.
Rough Order of Magnitude Cost:	$100,000 – $175,000

Table 6-23:
Synopsis of the Traffic Speed Sensor Planning and Implementation Initiative (MT7)

Initiative MT7: Traffic Speed Sensor Planning, Implementation and Integration with Traveler Information Applications	
Description:	There is considerable interest in detecting and disseminating traffic vehicles speeds in the Anchorage area. The primary interest for speed detection is to provide en-route travelers with real-time vehicle speeds so as to allow these travelers to change their travel plans when congestion is present up stream of their location. However, detecting vehicles speeds in real-time also enables automatic detection of incidents by detecting significant variations in highway speeds. This initiative will deploy traffic speed sensors in even-spaced increments along the Glenn Highway (roughly every mile) to continuously collect traffic speed data. Collected data will be used as input into transportation planning applications and to establish a historical profile of traffic speeds. This historical profile can be used by operators or other individuals, to detect reductions in speeds, which is a strong indicator that an incident or other event is impacting travel. This will eventually lead to a quicker response to incidents and reduction in delay. This initiative will also integrate traffic speed data with the State's Travel-in-the-Know 511 website. Traffic speeds will be color coded and displayed on a map of the Glenn Highway. Motorists can access the website and view the speed map before embarking on a trip and make decisions about that trip based on the speed data displayed.
Key Agencies:	ADOT&PF
Desired Outcomes:	• Improved Incident Detection • Improved Emergency Response • Enhanced Traveler Information • Improved Mobility
Timeframe:	Mid-Term (3-5 Years)
Market Package Traceability:	ATMS19 – Speed Monitoring
Physical Elements:	• Traffic Speed Sensors
Dependencies:	This initiative provides necessary equipment and data for use in the future Variable Speed Limit Initiative. It also supports overall traffic management, and is a needed input for the future traffic management center.
Rough Order of Magnitude Cost:	$420,000 Assumes $10,000 for one sensor both directions of travel ($5,000 each). Includes microwave sensor, transceiver, cabinet, electrical service, pole and installation. Sensors every mile for 42 miles between Anchorage and Palmer.

6.7.2 Long-Term (5-10 Years)

Recommended potential long-term initiatives are envisioned for Glenn Highway within the five to ten year timeframe. Within the ten-year horizon, ITS deployments will begin to be fully integrated to create an integrated system-of-systems. The ITS deployment that will occur in the short-, and mid-term will lay down the foundation for this integration. These deployments will be integrated in the long-term to begin to maximize the benefits of ITS deployment. Initiatives like a traffic management center and lane control systems, will utilize individual ITS deployments to begin to foster a full picture understanding of current conditions, and to set in place strategies to address them. For instance, individual ITS deployments will be integrated through a traffic management center, providing operators with a robust set of real-time information enabling quick decision making and response. The goal of this period is to build off the foundation of ITS deployment developed in the short- and mid-term and to fully maximize the benefits these systems offer. Long-term initiatives are outlined in greater detail in Tables 6-24 to 6-26.

Table 6-24:
Synopsis of the Variable Speed Limit Initiative (LT1)

Initiative LT1: Variable Speed Limit System Study and Implementation	
Description:	Variable speed limit (VSL) systems use traffic speed and volume detection, weather information, and road surface condition technology to determine appropriate speeds for drivers, and display them on overhead or roadside dynamic message signs. A variable speed limit system may be especially beneficial to Alaska motorists, who are subject to Alaska's dynamic climate and rough topography, by quickly adjusting speeds as weather conditions change. Along the Glenn Highway a variable speed limit will be particularly beneficial to motorists as fog occurs, ice forms on bridges, or when other events occur such as blowing and drifting snow that necessitate that motorists slow down. This initiative conducts a study to determine the feasibility of a variable speed limit along the Glenn Highway, and if feasible begins deployment of a variable speed limit system.
Key Agencies:	• ADOT&PF (Primary) • Alaska State Troopers (Secondary) • Local law enforcement (Secondary)
Desired Outcomes:	• Improved Safety • Improved Mobility • Improved Traveler Information
Timeframe:	Long-Term (5-10 years)
Market Package Traceability:	ATMS04 - Freeway Control
Physical Elements:	• Environmental Sensors • Traffic and Speed Sensors • Cameras
Dependencies:	A variable speed limit system cannot be implemented until a network of environmental sensors and traffic detectors have first been installed along the corridor. A network of cameras is also desirable to verify that posted speeds are appropriate for observed conditions.
Rough Order of Magnitude Cost:	$4,000,000 – 5,000,000 Assumes 82 variable message signs at $5,000 each Conduit design and installation at $60,000 per mile Fiber Optic Cable installed in the ground at $40,000 per mile

Table 6-25:
Synopsis of the Regional Traffic Management Center Initiative (LT2)

Initiative LT2: Regional Traffic Management Center Planning, Design, and Implementation	
Description:	An Integrated Transportation Operations and Communications Center (ITOCC) will serve as the focal point for statewide and regional transportation control systems and information dissemination. The information collected and processed at the ITOCC will be used to assist with various functions and operations on the Glenn and Seward Highways. This will enhance both internal and external integration. The ITOCC will likely start as a virtual center that networks existing operations centers. A subsequent project phase may develop a physical, staffed center where coordination and control of these systems can take place. The ITOCC will in part act as a statewide data archive and it will support the collection/dissemination of real-time data to improve transportation operations, traveler safety, and infrastructure security. As the point for statewide transportation control systems and information dissemination, it is critical that ITOCC remain operational so Alaska's transportation system can be operated effectively. Therefore, a disaster response plan will be prepared dictating how Alaska's transportation network will be operated when the security of the ITOCC is compromised. Procedures outlined in this Plan may include operation of ITOCC systems from a secure remote facility or through an existing Regional Transportation Management Center.
Key Agencies:	• ADOT&PF (Primary) • Municipality of Anchorage • People Mover • Other regional traffic, emergency and transit management agencies as identified closer to project start.
Desired Outcomes:	• Improved inter-agency communication and coordination • Improved traffic information dissemination • Improved traffic management and incident response • Improved safety
Timeframe:	Long-term (5-10 years). Planning and design to be conducted in the long term with implementation occurring beyond 10 years.
Market Package Traceability:	Varies depending on functionally yet to be determined.
Physical Elements:	• Traffic Management Center (physical building) • TMC hardware
Dependencies:	This initiative focuses on the operation and management of previous deployed ITOCC elements that until this point have been operated in an isolated manner. The ITOCC will help operate ITS elements in a unified, seamless fashion, to improve operational decision making and dissemination of information to travelers and other agencies.
Rough Order of Magnitude Cost:	$2,000,000 - $5,000,000. Cost will vary considerably depending on size of center and function it will perform. Cost will include, site planning, center planning, design, software integration, internal communications, hardware, etc.

Table 6-26:
Synopsis of the Lane Control System Initiative (LT3)

Initiative LT3: Lane Control System	
Description:	The Anchorage 2025 Long Range Transportation Plan recommends HOV lanes as one of many possible solutions to meet mobility needs of the Glenn Highway Corridor. This initiative is identified as a long-term project (2016-2025). The year 2016 would fall just within the 10 year timeframe of this plan. With that said, it is likely that lane control systems will not be implemented within the 10 year limit of this plan, but is worth mentioning as lane control systems will likely be needed and planned for the construction of HOV lanes. This initiative will plan, design and deploy HOV lane control systems along the Glenn Highway between Anchorage and Eagle River. This not does include construction of the lane itself, but rather the systems used to detect vehicles and to convey messages.
Key Agencies:	• ADOT&PF • MOA
Desired Outcomes:	• Improved mobility without the cost of adding additional infrastructure • Reduced travel times and improved travel time reliability. • Reduced environmental impacts
Timeframe:	Long-term (5-10 years). Planning and design to be conducted in the long term with implementation occurring beyond 10 years.
Market Package Traceability:	ATMS05 – HOV Lane Management
Physical Elements:	• HOV lane sensors • Dynamic message signs (static signs may also be used) • Ramp meters
Dependencies:	This initiative should not be implemented before the planned construction of a third lane on the Glenn Highway between Anchorage and Eagle River. For HOV lanes to work there needs to be considerable investment to make transit widely available and attractive to potential users.
Rough Order of Magnitude Cost:	Depends on the scope and scale of the HOV lanes.

6.8 Funding Opportunities

As is the case with any project, mechanisms are needed to fund ITS projects. Funding is needed to support the ITS project throughout its entire life cycle. Specifically, funding is needed to design, implement, operate, and maintain ITS subsystems. Without adequate funding, it will be difficult to complete ITS projects on time, and to the desired functionality.

There are several types of funding opportunities available to implement ITS projects. These are discussed in greater detail later in this section. Project champions should understand the characteristics of these opportunities and be able to select those that best apply to potential ITS projects. In addition, project champions need to investigate how coordination among other agencies and departments can be drawn upon to help distribute funding responsibilities. This may include identifying how resources such as staff, equipment, and actual funding can be shared across different programs in an effort to reduce costs and maximize benefits when planning and implementing an ITS project.

The various funding opportunities available to fund ITS initiatives along the Glenn Highway are detailed below.

Federal Funding Mechanisms

Transportation funding at the federal level, unlike most other federal programs, is authorized as a massive nation-wide package every six years. The current package, which was signed into law in 2005, is the Safe, Accountable, Flexible, and Efficient Transportation Equity Act (SAFETEA). SAFETEA authorizes $244.1 Billion in funds for deploying multi-modal transportation projects, including ITS over a six-year period. This national package includes the following funding programs, which may be tapped to support ITS deployment:

- National Highway System (NHS)
- Surface Transportation Program (STP)
- Congestion Mitigation and Air Quality (CMAQ)

Each of these funding programs are discussed briefly below. Additional information on each of these funding programs is also available in the Alaska STIP located at the following website:

http://www.dot.state.ak.us/stwdplng/cip_stip/index.shtml

National Highway System

National Highway System (NHS) funds can be used for improvements to rural and urban roads that are part of the NHS, including the Interstate System and designated connections to major inter-modal terminals. Also included are highways that provide motor vehicle access between the NHS and major inter-modal transportation facilities, the defense strategic highway network, and strategic highway network connectors. These funds may also be used to fund transit improvements in NHS corridors, but certain restrictions apply.

In 2008 and 2009, Alaska's apportionment of NHS funds is over 61.4 and 54.0 million respectively. These amounts represent available funding (i.e., not programmed funds).

Surface Transportation Program

The Surface Transportation Program (STP) is a flexible funding program that state and local governments can use on any Federal aid Highway (including NHS). This includes any capital transit or bridge project. STP funds are allocated to the states, and must be distributed according to program specifications. Distribution requirements are outlined at:

http://www.fhwa.dot.gov/safetealu/factsheets/stp.htm

"Infrastructure-based intelligent system capital improvements" are eligible for STP funding. STP funds can be used for capital and operating costs for traffic monitoring, management, and control facilities. However, as with NHS funding, they cannot be used for routine maintenance. In 2008 and 2009, Alaska's apportionment of STP funds is over 96.8 and 88.6 million respectively. Again, these amounts represent available funding and not programmed funds.

Construction Mitigation and Air Quality (CMAQ)

"The CMAQ provides funding for projects and programs in air quality non-attainment and maintenance areas for ozone, carbon monoxide (CO), and particulate matter (PM-10, PM-2.5) which reduce transportation related emissions. [23 USC 149(a)]". States are eligible for CMAQ funds so long as the ITS project reduces emissions. The state of Alaska's share of CMAQ funds is over $5.3 million and 4.5 million in 2008 and 2009 respectively. These amounts do not include $750,000 in rollover CMAQ funding available from previous years.

General information on CMAQ funding can be found at:

http://www.fhwa.dot.gov/safetealu/factsheets/cmaq.htm

Programmed and available funding information for each of the funding classes described above (NHS, STP and CMAQ) is available for the State of Alaska in the state's 2006-2009 STIP located at:

http://www.dot.state.ak.us/stwdplng/cip_stip/assets/06_09stip/06_09amendments/00_Amdt_17_FINALDRAFTCorrected2.pdf

In addition to the funds authorized specifically for ITS, ITS activities are eligible for funding from other programs. Both NHS and STP funds may be used for infrastructure-based ITS capital improvements, and CMAQ funding may be used for implementing ITS strategies to improve traffic flow, which contributes to air quality improvement. Transit-related ITS projects are considered capital projects and are therefore eligible for funding under specific transit capital programs (e.g., the Urbanized Area formula grant program and the formula grant program for non-urbanized areas). This is in addition to the STP, NHS and CMAQ programs.

Bridge Program

"Bridge Program funds may be expended for replacement, rehabilitation, painting, performing systematic preventive maintenance or seismic retrofit of, or applying anti-icing or de-icing compositions to, eligible highway bridge projects."

Intelligent Transportation Systems Operational Testing to Mitigate Congestion (OTMC) Grant – The OTMC program provides funding for ITS projects that "make innovative uses of technology to address congestion on a specific facility or facilities, such as a corridor, an urban area or region. Accordingly, qualifying projects must be expected to directly result in significant, broad, and near-term congestion relief." Types of projects that apply include:

- Demand management pricing strategies
- Advance traffic signal control
- Innovative detection and management strategies
- Integrated corridor management
- Parking management strategies tied to transit service
- Highway occupancy/toll (HOT) lanes
- Managed lanes
- Ramp control
- Lane keeping devices
- Signal priority systems
- Contactless fare collection
- Real-time travel information
- Advanced traveler information systems
- Parking alerts or automatic vehicle locator systems

Project applications should demonstrate that proposed strategies will be implemented in a relatively short time frame (e.g., within 12 to 18 months from the date of procurement).

The USDOT will provide up to the statutorily allowable 80 percent share of the estimated costs of an approved project. Funds available for the ITS-OTMC Program are intended to support the implementation costs of the proposed operational testing. Costs of planning, testing, managing, operating, demonstrating, monitoring, evaluating, and reporting are eligible for reimbursement. The Department will evaluate the allowability of proposed costs in accordance with OMB Circular A-87 Cost Principles for State and Local Governments.

Additional information about this grant opportunity can be found at:

http://www.grants.gov/search/search.do?oppId=11970&mode=VIEW

The full announcement can be found at:

http://apply.grants.gov/opportunities/instructions/oppDTFH61-07-RA-00111-cfda20.200-instructions.pdf

Bus and Bus Facilities Discretionary Program Grants—this FTA funding program is open to State and local agencies and is intended to finance "capital projects to replace, rehabilitate, and purchase buses and related equipment (including ITS) and to construct bus-related facilities…." Grants under this program are subject to a 20% local match. Special consideration will be given to the following priority areas:

- Fleet replacement needs that cannot be met with formula funds,
- Fleet expansion that allows significant service increase and/or improvements and/or operating efficiencies,
- Facility construction or renovation to support increased service or introduction of clean fuels,
- Strategic investments in rural areas where formula funding is inadequate,
- Purchase of clean fuel vehicles,
- Intermodal terminal project that include intercity bus providers, and
- Gulf Coast Recovery – capital to support bus and bus facilities replacement and expansion related to the impacts of the 2005 hurricanes (special eligibilities requirements apply).

Proposals may be submitted electronically through the following Web site:

www.grants.gov

The full notice of this program can be obtained at:

http://a257.g.akamaitech.net/7/257/2422/01jan20071800/edocket.access.gpo.gov/2007/E7-4832.htm

Value Pricing Pilot Program (VPPP)—this FHWA funding program is open to state or local governments, or public authorities (e.g., tolling agencies) and is intended to finance local value pricing pilot programs to reduce congestion, improve system performance, and promote mobility. Funds provided by this program are not intended for commonly used and accepted value pricing concepts [e.g., high-occupancy vehicle (HOV) to high-occupancy toll (HOT) lane conversions]. Projects that are eligible for funding under this program include, but are not limited to:

- Cordon tolls,
- Fair lanes,
- Priced new lanes,
- Pricing on toll facilities,
- Usage-based vehicle charges,
- "Cash-out" strategies/parking pricing,
- Regional pricing initiatives, and
- Truck-only toll facilities.

The emphasis of project selection will be based on the ability to demonstrate near-term congestion relief and general alignment with the objectives outlined in the USDOT's national strategy to reduce congestion on America's transportation network.

The current VPPP makes available $12 million for applicable projects on a yearly basis through 2009. One forth of this annual distribution will be set aside for value pricing projects that do not include tolls.

Grants submitted under this program are subject to a 20% local match. Other projects costs applicable for funding under this program and details on how to submit an application can be found in the full notice at:

http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2006_register&docid=fr22de06-132

Additional information on this grant program can be obtained at:

http://ops.fhwa.dot.gov/tolling_pricing/value_pricing/index.htm

ITS Earmarks

ITS earmarks will continue to be another source for ITS project funding. Although its predictability is somewhat limited, this funding source can provide supplemental resources for various ITS projects in the pipeline for implementation, or help start ITS projects that haven't faired well through other more established TEA-21 funding programs.

State Funding

The State of Alaska may use collected taxes from gasoline, property, and/or sales taxes to fund the implementation of ITS initiatives. This income may be combined into a general use fund to be used for various purposes. Alaska may also impose a number of user charges, fees, and taxes to generate revenue for implementing, operating, and maintaining ITS. User charges, fees, and taxes are collected from those who directly benefit from or are associated with using a specific publicly provided service. One example of this is the gas tax - drivers on public roadways pay for them through a tax on fuel. The amount paid is proportional to the amount of product or service consumed. A partial list of user charges, fees, and taxes that may be applied to state and local transportation systems includes:

- Motor vehicle registration fee
- Vehicle sales tax
- Certificate of title fee
- Weight-distance tax for commercial vehicles
- Vehicle inspection charge
- Motor oil tax and tire tax, etc.

Innovative Funding Mechanisms and Special Programs

"Innovative financing" refers to changing the traditional federal highway financing process from a single strategy of funding on a "grants reimbursement" basis to a diversified approach that provides new options. Many of the ideas discussed in this section come from the most innovative financing concepts developed in the public and private sectors. A prime objective of innovative financing is to maximize the states' ability to leverage federal capital for needed investment in transportation systems, and to foster the efficient use of funds.

Transportation Infrastructure and Finance Act (TIFIA) – The Transportation Infrastructure and Finance Act offers three types of funding that can be used by public or private entities to fund expensive transportation projects, including ITS. These funding options include: direct loans, loan guarantees, and lines of credit. Only ITS projects in excess of 30 million are eligible, however almost any project that costs over $100 million would likely be eligible. Additionally, the project must conform to the following conditions to be eligible for funding:

- Must support in whole or in part by user charges or other non-federal funding mechanisms.
- Must be included in the State's Transportation Plan.

Federal credit assistance may not exceed 33% of the total project cost.

More information on TIFIA can be found at:

http://www.fhwa.dot.gov/innovativefinance/brochure/credit.htm#3

State Infrastructure Bank - State Infrastructure Banks (SIBs) are revolving loan programs that can be created at the state or regional (multi-state) level. SIBs provide states with a wide range of loan and credit enhancement for eligible transportation projects. Eligible projects include transportation facility projects on the State Highway System or that provides for increased mobility on the State's transportation system. Under the SIB program, states are allowed to transfer a portion (up to 10%) of its allocated highway trust fund allocation to a SIB. The availability of Alaska's SIB funds may be limited due to the fact that much of the original 2.5 million federal seed money has been loaned to the Whittier Project. It is anticipated that this money will be repaid through collection of tolls received from the project.

Barter

Barter has been used by other states to fund some ITS elements of projects. Barter allows agencies to exchange or trade assets (e.g., goods and services) without exchanging money. Often barter involves the exchange of undesired or excess assets with another agency in exchange for that agencies undesired or excess assets. By exchanging undesired assets, agencies can obtain assets they need without having to pay for them. If agencies can come to an agreement on the assets to be exchanged, it often results in a win-win situation for both parties. An example of this would be when the DOT allows the media to use their right of way to install cameras, in exchange for images or use of cameras. The cameras, which are purchased by the media, could be used to provide traffic images to the public without the DOT incurring any cost. This may enable the ADOT&PF to provide additional services to the public without incurring additional costs. Similarly, the media benefits in that they are able to provide enhanced content to their website via the use of ADOT&PF

right-of-way, which draws in additional viewers and advertising revenue. The ADOT&PF should determine the feasibility of using Barter as a possible method of supporting ITS projects, since it is possible that Alaska state statutes may prevent Barter from being used.

Partnerships

A public/private partnership is a business relationship between the public and private sectors. To a specific degree, both entities share responsibilities and the costs, risks, and rewards associated with delivering goods and/or services. From a transportation standpoint, a public/private partnership is a form of service delivery with a collaborative approach based on reallocating traditional responsibilities, costs, risks, and rewards between the public agency and private entities.

[i] http://www.muni.org/iceimages/transplan/Anchorage_Bowl_2025_LRTP.pdf

[ii] http://www.ak-prepared.com/community_services/

[iii] http://www.gov.state.ak.us/omb/04_OMB/budget/Trans/comp565.pdf

[iv] http://www.dot.state.ak.us/stwdplng/FTP/iways/IntegratedGISNetworkFINAL.doc

[v] http://www.muni.org/iceimages/transit1/HSTP%20final.pdf

[vi] http://www.dot.state.ak.us/stwdplng/cip_stip/assets/04_06needslist/need_list_report.pdf

[vii] http://www.state.ak.us/local/akpages/ADMIN/info/taskorder/new/0038.doc

[viii] http://www.muni.org/iceimages/OMB/04APD2007CIP.pdf

[ix]http://www.ak-prepared.com/plans/acrobat_docs/StateHazardMitigationPlan/Appendix_16_potential_projects.pdf

[x] http://www.akrr.com/pdf/MED_CT_20014.pdf

[xi] http://www.adn.com/news/alaska/v-printer/story/7210568p-7122964c.html

[xii]http://www.legis.state.ak.us/basis/get_single_minute.asp?session=23&beg_line=00228&end_line=00390&time=1340&date=20040427&comm=TRA&house=H

[xiii]http://www.legis.state.ak.us/BASIS/get_single_minute.asp?session=23&beg_line=00152&end_line=00327&time=0805&date=20040319&comm=JUD&house=S

[xiv] http://www.muni.org/iceimages/OMB/Section_7aHiPriRoads6.pdf

[xv] http://www.dot.state.ak.us/mscve/webdocs/2006AnnualReport_FINAL.pdf

[xvi] http://www.dot.state.ak.us/iways/proj-AVI.shtml

[xvii] http://alaskarailroad.com/pdf/PR_2335%202003%20Report%20To%20the%20Legislature%20-January%202004.pdf

[xviii] http://alaskarailroad.com/pdf/2007%20POP%20Summary%20Brochure.pdf

[xix] http://www.dot.state.ak.us/sef/bid_files/1100-1199/1190.doc

[xx] http://www.dot.state.ak.us/iways/proj-smartsnowplow.shtml

[xxi] Matsu Coordinated Transportation Human Services Transportation Coordination Plan Phase 1. Draft Copy. April 20, 2007.

[xxii] http://www.akrr.com/arrc119.html