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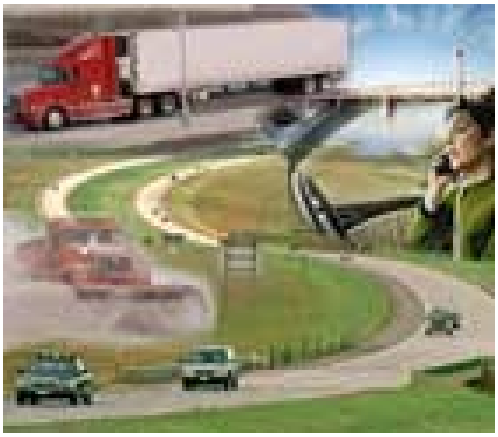

South Dakota Rural ITS Architecture

Study SD2002-03
Final Report

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February 2003

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16. Abstract

A statewide ITS (Intelligent Transportation System) architecture was developed for South Dakota conforming to FHWA Rule 940 and corresponding FTA policy. Following a literature review to identify the ITS architecture of existing projects and ITS project investments in neighboring states, a series of stakeholder workshops were held, and a consensus based ITS architecture was developed responsive to the requirements articulated by the stakeholders. This ITS architecture was documented using the defacto standard for ITS architecture: Turbo Architecture V2, and was additionally documented on a website for broad dissemination as a tool for stakeholder review. Finally, an institutional and technical methodology for maintaining the ITS architecture is included in this report. A Users Guide to the Turbo Architecture Extensions that were developed to prepare the website documentation is also included here, so that South Dakota DOT staff or their consultants can maintain this ITS architecture in the future.

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1. Executive Summary

Federal regulations require that major ITS (Intelligent Transportation Systems) projects deployed with federal funding after 8 April 2005 conform to a regional ITS architecture based on the US National ITS Architecture, and that the ITS architecture of planned and deployed ITS projects be documented. A number of ITS projects are in progress, and others are planned in the near future. By April 2005, it will be necessary for the Department to be capable of reviewing ITS projects to determine their compliance with a regional ITS architecture based on the National ITS Architecture. Research was needed to define and develop a "regional" ITS architecture for South Dakota.

1.1. Research Objective

The technical panel overseeing Research Project SD2002-03 "South Dakota Rural ITS Architecture", defined the following objective for the study:

To develop a regional architecture that includes South Dakota and the Metropolitan Planning Organizations that include Sioux Falls, Rapid City and Sioux City.

1.2. Research Approach

The general approach taken for this research was to develop a single Statewide regional ITS architecture (or *statewide ITS architecture*) for South Dakota, to include all ITS projects in the state, including the Metropolitan Planning Organizations (*MPOs*) in the state. This statewide ITS architecture considered both the current deployments of ITS in the state (*legacy* investments) as well as planned projects and harmonized them with other statewide architecture efforts such as the CVO/CVISN architecture development (which is being performed under a separate research effort).

The initial phase of the research was to perform a literature search of other state's efforts to produce statewide ITS architecture plans, to provide context within which to develop the South Dakota Statewide ITS Architecture. Then recent literature and research efforts were surveyed to identify and document existing and near term ITS projects and efforts. With this information in hand the architecture development could commence.

The Statewide ITS Architecture, developed to be fully responsive to the federal requirements for regional ITS Architectures, contained the following items:

- A description of the region, participating agencies and other stakeholders.
- An inventory of systems, existing and planned, that are owned, operated or maintained by the stakeholders
- A description of the ITS services (e.g. market packages) that the regional ITS architecture will provide.

- An operational concept that identifies the roles and responsibilities of participating agencies and other stakeholders in the operation and implementation of the elements included in the regional ITS architecture.
- A definition of functional requirements for the ITS systems identified.
- A description of the interface requirements and information exchanges with planned and existing systems and subsystems and architecture flows as defined in the National ITS Architecture.
- Projects that may require sequencing for implementation.
- Existing ITS standards to support regional and national interoperability.
- Agreements that may need to be considered for operations including those affecting ITS project interoperability, utilization of ITS related standards, and the operation of the projects identified in the regional ITS architecture.

Development of the South Dakota Rural ITS Architecture relied heavily on stakeholder input to ensure that the ITS architecture reflected local, regional, and statewide needs. A five-step process was used to develop the ITS architecture: 1) create an initial draft inventory of architecture elements and a draft list of Services to be provided, 2) conduct stakeholder outreach through a two day Workshop, 3) create a draft ITS architecture for review, and 4) conduct stakeholder review of the draft ITS architecture, 5) finalize the ITS architecture based on review comments.

1.3. Findings

The ***South Dakota Statewide ITS Architecture*** is a statewide roadmap for transportation systems integration over the next approximately 15 years. The architecture has been developed through a cooperative effort by the state's transportation agencies, covering all modes and all roads in the state. The architecture represents a shared vision of how each agency's systems will work together in the future, sharing information and resources to provide a safer, more efficient, and more effective transportation system for travelers in the region.

The ITS architecture is an important new tool that will be used by:

- Operating Agencies to recognize and plan for transportation integration opportunities in the region.
- Planning Agencies to better reflect integration opportunities and operational needs into the transportation planning process.
- Other organizations and individuals that use the transportation system in South Dakota.

The ITS architecture provides an overarching framework that spans all of these organizations and individual transportation projects. Using the ITS architecture, each transportation project can be viewed as an element of the overall transportation system,

providing visibility into the relationships between individual transportation projects and ways to cost-effectively build an integrated transportation system over time.

The Statewide ITS Architecture provides a detailed view of the stakeholders, their roles and responsibilities, the ITS systems that exist or are planned, the transportation services that are or will be provided, the connections and information exchange requirements between the systems, the key functions of the systems, the standards applicable to planned deployments and the agreements needed for planned deployments. In addition the relationship of ITS projects to the overarching statewide ITS architecture was developed. The Statewide ITS Architecture is documented in an detailed report (of which this represents the executive summary) and in a hyperlinked website (at www.consystec.com) that provides an easily accessible method of reviewing the details of elements and interfaces. The following paragraphs of this executive summary provide some key outputs of the effort.

Stakeholder coordination and involvement was one of the key elements of the development of a statewide ITS architecture. Because ITS often transcends traditional transportation infrastructure, it was important to consider a range of stakeholders beyond the traditional traffic, transit, and maintenance areas. In addition, it was important to consider stakeholders in adjoining states.

Architecture Inventory

Each stakeholder agency, company, or group owns, operates, maintains or plans ITS systems in the state. The architecture development effort created an inventory, or list of "elements" that represent all existing and planned ITS systems in the state as well as non-ITS systems that provide information to or get information from the ITS systems. The focus of the inventory is on those systems that support, or may support, interfaces that cross stakeholder boundaries (e.g., inter-agency interfaces, public/private interfaces). Table 1 provides a listing of the 45 stakeholders and 101 elements that make up the Statewide ITS Architecture. The table also indicates if the element is *existing* or *planned*.

Table 1 Summary of Inventory by Stakeholder

Stakeholder Name	Element Name	Status
Cable Public Access Television Systems	Cable Public Access Channels	Planned
County and Municipal Public Safety	County Sheriff and Municipal Police Vehicles	Planned
	County, Municipal and Tribal Fire Rescue Vehicles	Planned
	County, Municipal and Tribal Public Safety Dispatch	Planned
County and Municipal Transportation Agency	County, Municipal and Tribal Equipment Repair Facility	Existing
	County, Municipal and Tribal Infrastructure Inventory System	Planned
	County, Municipal and Tribal Roadway Maintenance Dispatch	Existing
	County, Municipal and Tribal Roadway Maintenance Vehicles	Planned
	County, Municipal and Tribal Traffic Data Collection System	Planned

Stakeholder Name	Element Name	Status
	County, Municipal and Tribal Traffic Operations and Communications Center	Existing
	State, County and Municipal Traffic Operations Field Equipment	Existing
County Civil Defense or EOC	County Civil Defense or EOC	Planned
Emergency Telecommunications System	Emergency Telecommunications System	Existing
FMCSA	CAPRI	Existing
	Motor Carrier Management Information System	Existing
	SAFER	Existing
IFTA, Inc.	IFTA Clearinghouse	Existing
IRP, Inc.	IRP Clearinghouse	Existing
Local and Municipal EOCs	Local and Municipal EOC	Existing
Local Taxi Operators	Local Taxi Operator Scheduling System	Planned
Local Van Pool Operators	Local Van Pool Operator Scheduling System	Planned
Motor Carriers	Automated Vehicle Identification	Existing
	Commercial Vehicle	Existing
	Commercial Vehicle Driver	Existing
	Motor Carrier System	Existing
MPO Operational Database Users	MPO Operational Database Users	Planned
MPOs	MPO Operational Database	Existing
National Weather Service	National Weather Service	Existing
Other States	Other Road and Weather Information Systems	Planned
Private Financial Institutions	Carrier Banks	Existing
Private Sector Service Provider	Private Sector Service Provider EOC	Planned
	Private Sector Service Provider Information Operations Center	Planned
Private Travelers	Private Travelers Personal Access Equipment	Existing
	Private Travelers Vehicles	Existing
Private Weather Service Providers	Meridian Maintenance Weather Forecast System	Existing
Rail Operators	Rail Operators	Existing
	Rail Operators Wayside Equipment	Existing
Rest Area Operators	Rest Area Operators CCTV	Planned
SD Department of Tourism	SD Department of Tourism Public Information Office	Existing
SD Governors Office	SD Governors Office of Homeland Security	Existing
SD Office of Emergency Management	SD Office of Emergency Management EOC	Existing
SD Regional Airport Operators	SD Regional Airports	Existing
SD State Web Site Administrative Agency	SD State Web Site	Existing
SDDOT Office of Data Inventory Users	SDDOT Office of Data Inventory Users	Planned
South Dakota Bureau of Information and Telecommunications	State Radio Query Application	Existing
South Dakota DCR	CDL/DL	Existing

Stakeholder Name	Element Name	Status
South Dakota Department of Game, Fish and Parks and National Parks	SD Dept of GFP and National Parks Emergency Vehicles	Planned
	SD Dept of GFP and National Parks Kiosks	Planned
	SD Dept of GFP and National Parks Operations Centers	Existing
	SD Dept of GFP and National Parks Parking Management Systems	Planned
	SD Dept of GFP and National Parks Web Site	Planned
South Dakota Dept. of Environment and Natural Resources	HazMat	Planned
South Dakota Dept. of Revenue	COVERS	Existing
	COVERS ft	Existing
	COVERSnet	Planned
South Dakota Dept. of Transportation	Accident Reporting System Client	Planned
	Accident Reporting System Server	Planned
	ASPEN	Existing
	Electronic Screening	Planned
	Roadside System Server	Planned
	SDDOT 511 Traveler Information System	Existing
	SDDOT CCTV	Planned
	SDDOT DMS	Existing
	SDDOT Equipment Repair Facility	Existing
	SDDOT Fixed Anti-Icing Systems	Planned
	SDDOT HAR	Existing
	SDDOT Infrastructure Inventory System	Existing
	SDDOT Integrated Traveler Information Webpage	Existing
	SDDOT Kiosks	Existing
	SDDOT Maintenance Vehicles	Planned
	SDDOT Mobile Field Equipment	Planned
	SDDOT Mobile Traffic Management Center	Planned
	SDDOT Office of Data Inventory	Existing
	SDDOT Office of Operations	Planned
	SDDOT Region and Area Construction and Maintenance Office	Planned
	SDDOT Remote Controlled Snow Gates	Planned
	SDDOT Road and Weather Information System	Planned
	SDDOT Roadway Design Office	Existing
	SDDOT RWIS Stations	Existing
	SDDOT Statewide Signal Maintenance Archive	Planned
	SDDOT Statewide Signal Maintenance Archive Users	Planned
	SDDOT Traffic Data Collection System	Existing
	SDDOT Work Zone Field Sensors	Planned
	South Dakota Automated Permitting System Client	Planned
	South Dakota Automated Permitting System Server	Existing
	xCVIEW	Planned

Stakeholder Name	Element Name	Status
South Dakota Dept. of Treasury	South Dakota State Treasury	Existing
South Dakota Highway Patrol	CVO Inspector	Existing
	Emergency Services Hand Held Reporting Devices	Planned
	SAFETYNET 2000	Existing
	SDHP District Offices	Existing
	SDHP Vehicles	Planned
South Dakota Public Utilities Commission	SSRS, Interstate Exempt Reg.	Existing
	Title/Registration	Existing
South Dakota Unified Judicial System	Unified Judicial System	Planned
State, County, Local Law Enforcement Agencies	SD LETS Teletype	Existing
State, County, Municipal and Tribal Infrastructure Inventory System Users	State, County, Municipal and Tribal Infrastructure Inventory System Users	Planned
Telephone Service Providers	Statewide Telephone Services	Existing
Transit Operators	Transit Kiosks	Planned
	Transit Operator Transit Management Systems	Planned
	Transit Vehicles	Planned

ITS Services

The ITS systems in the region currently provide a number of transportation services and that list will grow as more systems are developed or upgraded. Table 2 provides a list of the services that area provided by elements within the state, or which may be provided in the future. This list uses a concept called Market Packages from the National ITS Architecture to describe the ITS services.

Table 2 Services provided by ITS systems

Service Area	ITS Service	Applicability
Archived Data	ITS Data Mart	Planned
Public Transportation	Transit Vehicle Tracking	Planned
	Transit Fixed-Route Operations	Planned
	Transit Security	Planned
	Multi-modal Coordination	Planned
	Transit Traveler Information	Planned
Traveler Information	Interactive Traveler Information	Planned
Traffic Management	Network Surveillance	Existing
	Surface Street Control	Existing

Service Area	ITS Service	Applicability
	Traffic Information Dissemination	Existing
	Regional Traffic Control	Planned
	Incident Management System	Planned
	Standard Railroad Grade Crossing	Planned
	Railroad Operations Coordination	Planned
	Parking Facility Management	Planned
Commercial Vehicle Operations	Electronic Clearance	Planned
	CV Administrative Processes	Existing
	Weigh-In-Motion	Planned
	Roadside CVO Safety	Planned
	HAZMAT Management	Planned
Emergency Management	Emergency Response	Planned
	Emergency Routing	Planned
	Mayday Support	Planned
Maintenance Operations	Maintenance and Construction Vehicle Tracking	Planned
	Maintenance and Construction Vehicle Maintenance	Planned
	Road Weather Data Collection	Planned
	Weather Information Processing and Distribution	Planned
	Roadway Automated Treatment	Planned
	Winter Maintenance	Planned
	Roadway Maintenance and Construction	Planned
	Work Zone Safety Monitoring	Planned

Interconnects and Information Exchanges

While it is important to identify the various systems and stakeholders as part of a regional ITS architecture, a primary purpose of the ITS architecture is to identify the *connectivity* between transportation systems in the region. The details of the Statewide ITS Architecture describe how the elements are interconnected to provide the ITS services. The 101 elements of the inventory have 245 unique connections in the architecture that results in 811 separate information exchanges. The details of these connections and information exchanges are described in two basic formats. The first is a set of customized market packages that show the connections and exchanges required to perform a particular service. Figure 1 shows a sample customized market package for providing Surface Street Control by State, County, Municipal or Tribal Traffic Operations. The architecture interconnection details are described by a set of similar diagrams.

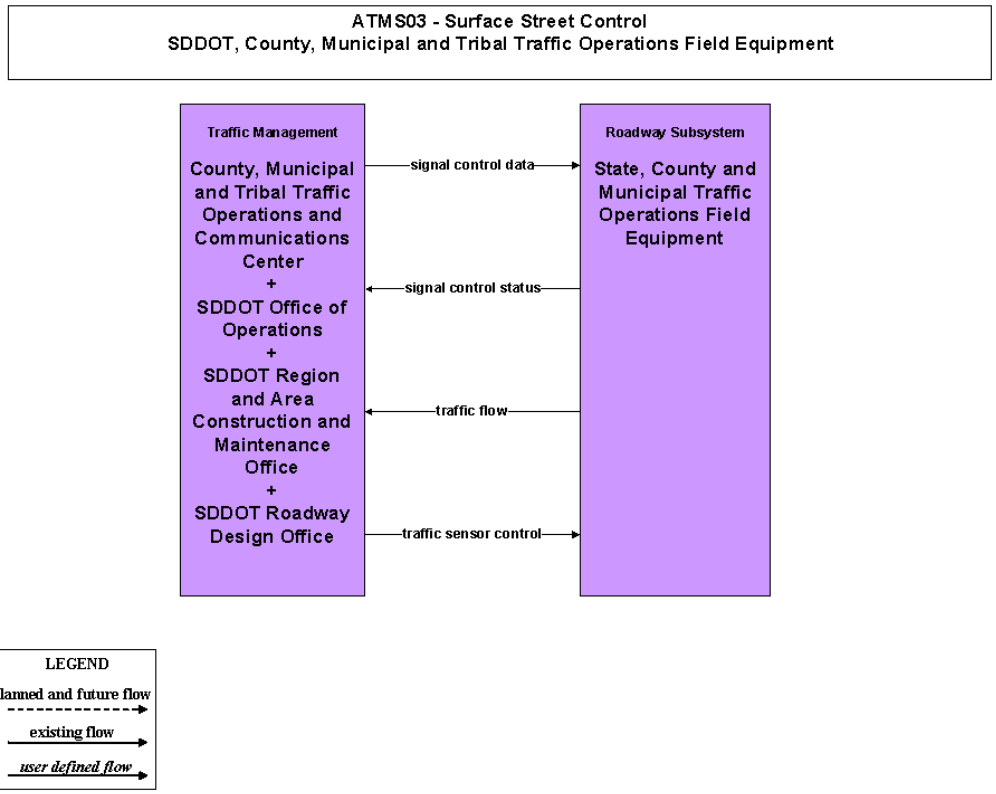


Figure 1 Sample Customized Market Package

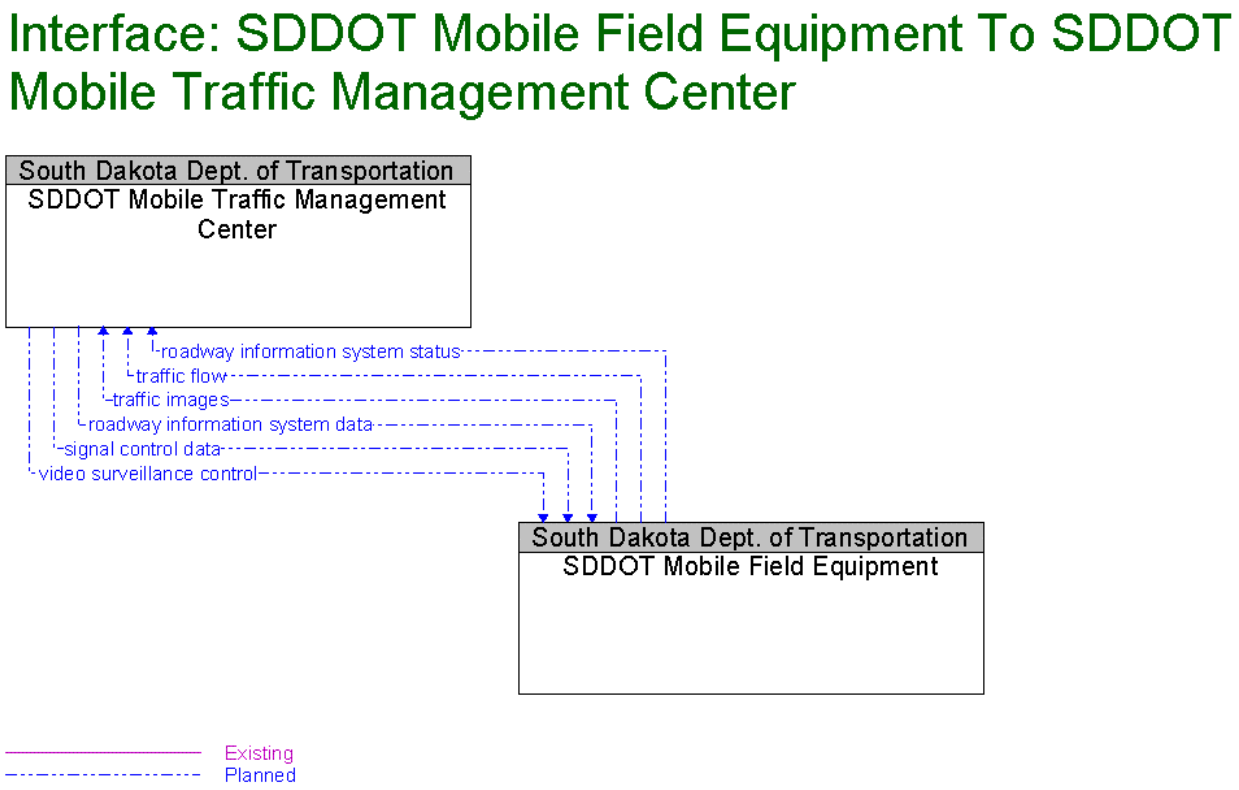
A second type of interconnection and information exchange representation used in the architecture is an interface diagram, which shows the architecture flows that exist or are planned on a single one of the 245 possible interconnections. Architecture flows between the elements define specific information that is exchanged by the elements. Each architecture flow has a direction, name and definition. Most of the architecture flows match ones from the National ITS Architecture (the mapping of elements to National ITS Architecture entities allowed the developers to match the architecture flows to the appropriate interfaces.) In some cases new user defined flows have been created for interfaces or connectivities that are not expressed in the National ITS Architecture. These architecture flows define the interface requirements between the various elements in the regional ITS architecture.

An example of the architecture flows between two elements is shown in Figure 2 . In this interface the flows that go between the planned element *SDDOT Mobile Traffic Management Center* and *SDDOT Mobile Field Equipment* (which might include portable dynamic message signs or CCTV). These elements are planned, so all the flows on this interface are shown as planned.

Each of the individual element interfaces can be accessed on the web page by clicking on the “Interfaces” button. Selecting any of the interfacing elements from the column on the right will display an interface diagram and architecture flows between two specific elements, similar to the diagram shown in Scrolling further down the web page each

architecture flow is defined. In addition, if there are any ITS standards associated with that architecture flow there will be a standards icon next to the architecture flow name. Clicking on the icon will display another page identifying the applicable standards.

Figure 2 Sample Interface definition



Each of the individual element interfaces can be accessed on the web page version of the architecture referenced above.

1.4. Recommendations

The following section provides a set of recommendations for actions that should be performed following the development of the Statewide ITS Architecture. These actions fall within the general areas of Using the Statewide ITS Architecture and Maintaining the Statewide ITS Architecture. The specific recommendations are numbered within the following section, followed by explanation of the action.

1.4.1. Using the Statewide ITS Architecture

Once a regional ITS architecture has been created, it's important that it be used as a key reference in the transportation planning process. This will ensure all proposed ITS projects are consistent with the regional ITS architecture and additional integration opportunities are considered, leading to more efficient implementations.

1. **Update the Recommended Projects portion of the South Dakota Rural ITS Deployment Plan using the information developed for the Architecture.**

At the state level the primary planning document from an ITS standpoint is the South Dakota Rural ITS Deployment Plan, which was published in January 2001. The original Deployment Plan provided a blueprint for the integrated deployment of Intelligent Transportation Systems (ITS) in the state, and has been used to support the integration of ITS actions underway and to insure that future projects contribute to the effective use of transportation technologies. The Deployment Plan included a list of recommended projects and identified the funding needed to implement this plan. As a part of this original plan, the need to create a Statewide ITS Architecture was identified. A Statewide ITS architecture would provide in some level of detail the ITS systems and integration opportunities in the region.

With the completion of the initial version of the South Dakota Statewide ITS Architecture, it is recommended that the Recommended Projects portion of the Deployment Plan be revisited and updated

2. **Use the updated Project Information as input to the Statewide Intermodal Long Range Plan.**

The update of the project information can then serve as a key input to the Statewide Intermodal Long Range Plan, which was last updated in 1999. It is the long-range guide for major investments in the State's ground transportation system.

3. **Use the Statewide architecture to support the next updates of the regional Long Range Plans (e.g. Sioux Falls Metropolitan Area Long-Range Transportation Plan.**

The Statewide ITS Architecture should also be considered a key reference in the MPO planning process. Its suggested transportation system integration should be considered in the next updates of the regional Long Range Plans (e.g. Sioux Falls Metropolitan Area Long-Range Transportation Plan).

The statewide ITS architecture should also be considered for support in ITS project development cycle. This begins with project definition, followed by procurement, leading to implementation. Information in the regional ITS architecture can assist in all three of these areas of project development.

4. **Consider use of the Statewide Architecture in the development of individual Research Plans.**

Project Definition may occur at several levels of detail. Early in the planning process a project may be defined only in terms of the transportation services it will provide, or by the major system pieces it contains. At some point prior to the beginning of implementation the details of the project must be developed. This could include further

system definition and interface definition including exactly what systems or parts of systems will make up the project, what interconnections the project entails, and what information needs to flow across the system interconnections. Requirements definition may go through similar levels of detail, starting with very high level description of project functions and moving toward system specifications. By identifying the portions of the statewide ITS architecture that define the project, the statewide ITS architecture outputs can be used to create key aspects of the project definition.

The areas that the statewide ITS architecture can assist in project definition are:

- The identification of agency roles and responsibilities (including any inter-agency cooperation) can come from the operational concept developed as part of the regional ITS architecture. This operational concept can either serve as a starting point for a more detailed definition, or possibly provide all the needed information.
- Requirements definition can be completely or partly defined by using the regional ITS architecture functional requirements applicable to the project.
- The ITS architecture includes a map to ITS standards and the project mapping to the regional ITS architecture can extract the applicable ITS standards for the project.

Once a project is defined, and funding for it is committed, the implementation process can commence with the generation of a Request For Proposal (RFP), which is the common governmental practice for initiating a contract with the private sector to implement the project. Once a contract is in place, project implementation begins and moves through design, development, integration, and testing.

The statewide ITS architecture, and the products produced during its development, can support this RFP generation. First the project definition described above forms the basis for what is being procured.

5. Map each ITS project to the Statewide Architecture.

Mapping the project to the regional ITS architecture allows bidders to have a clear understanding of the scope of the project and of the interfaces that need to be developed. The functional requirements created as part of the regional ITS architecture can be used to describe the functional requirements for the project. In addition a subset of the ITS Standards identified as part of the regional ITS architecture development can be specified in the RFP.

6. Use the outputs of the Statewide architecture to meet the system engineering requirements levied upon ITS projects that utilize Federal funds.

Because ITS projects involve systems and their interconnections, it is very important to follow a system engineering approach to designing and implementing the project. While the exact process followed is at the discretion of the local agency, the ITS Architecture

and Standards Rule/Policy lay out a set of required system engineering analyses for ITS projects funded through the highway trust fund.

The required system engineering analysis steps are:

- Identification of portions of the regional (or in this case statewide) ITS architecture being implemented (or if a regional ITS architecture does not exist, the applicable portions of the *National ITS Architectur*e);
- Identification of participating agencies' roles and responsibilities;
- Requirements definitions;
- Analysis of alternative system configurations and technology options to meet requirements;
- Procurement options;
- Identification of applicable ITS standards and testing procedures; and
- Procedures and resources necessary for operations and management of the system.

In summary, the regional ITS architecture represents a detailed plan for the evolution of the ITS systems in the region and can be used to support regional transportation planning efforts and project development efforts.

1.4.2. Maintaining the Statewide ITS Architecture

The South Dakota Statewide ITS Architecture is not a static set of outputs. It must change as plans change, ITS projects are implemented, and the ITS needs and services evolve in the region. This section describes a proposed plan for the maintenance of the architecture. The plan covers the following three key areas:

- Who will maintain the architecture?
- What will be maintained?
- How it will be maintained (i.e. what configuration control process will be used)?

The statewide ITS architecture is created as a consensus view of what ITS systems the stakeholders in the region have currently implemented and what systems they plan to implement in the future. The statewide ITS architecture will need to be updated to reflect changes resulting from project implementation or resulting from the planning process itself.

- Changes for Project Definition.
  When actually defined, a project may add, subtract or modify elements, interfaces, or information flows from the regional ITS architecture. Because the regional ITS architecture is meant to describe the current (as well as future) regional implementation of ITS, it must be updated to correctly reflect how the developed projects integrate into the region.

- Changes for Project Addition/Deletion.
  Occasionally a project will be added or deleted through the planning process and some aspects of the regional ITS architecture that are associated with the project may be expanded, changed or removed.
- Changes in Project Priority.
  Due to funding constraints, or other considerations, the planned project sequencing may change. Delaying a project may have a ripple effect on other projects that depend on it. Raising the priority for a project's implementation may impact the priority of other projects that are dependent upon it.
- Changes in Regional Needs.
  Transportation planning is done to address regional needs. Over time these needs can change and the corresponding aspects of the regional ITS architecture that addresses these needs may need to be updated.

In addition, new stakeholders may come to the table and the statewide ITS architecture should be updated to reflect their place in the regional view of ITS elements, interfaces, and information flows.

Finally, the National ITS Architecture may be expanded and updated from time to time to include new user services or better define how existing elements satisfy the user services. These changes should also be considered as the regional ITS architecture is updated. The National ITS Architecture may have expanded to include a user service that has been discussed in a region, but not been included in the statewide ITS architecture, or been included in only a very cursory manner.

1.4.3. Maintenance Responsibility

7. Determine who will maintain the architecture and what group will act as an Institutional Framework for the maintenance of the architecture.

Responsibility for maintenance of the South Dakota Statewide ITS Architecture should lie with SDDOT. This organization was responsible for the original development effort and will be one of the primary users of the ITS architecture. While it is recommended that SDDOT assume responsibility for maintenance, it is further recommended that a group of core stakeholders act as an "institutional framework" to review proposed changes to the ITS architecture. The regional ITS architecture is a consensus framework for integrating ITS systems in the state. As it was a consensus driven product in its initial creation, so it should remain a consensus driven product as it is maintained.

1.4.4. Architecture Baseline

8. Define the Architecture Baseline that will be maintained.

Establishing an ITS architecture baseline requires clear identification of the architecture products that will be maintained, including specific format and version information. For

the South Dakota Statewide ITS Architecture the following outputs are recommended as the architecture baseline:

- Architecture Document (this document)
- Turbo Architecture Database
- Statewide ITS Architecture Web pages

Regarding the Architecture document, it is recommended that the source document, in Microsoft Word format, be held by SDDOT, while a PDF version of the document is created for general distribution.

Regarding the Turbo Architecture Database, it is recommended that SDDOT maintain a zipped version of the final delivered South Dakota Statewide Architecture database. The name, date, and size of the database file inside the zipped file should be entered into an architecture log as version 1.0 of the architecture.

Regarding the web site, a CD-ROM version of the final web site should be maintained by SDDOT. It is further recommended that the version number of the architecture be entered somewhere on the home page of the web site so that the version being viewed is immediately identifiable.

1.4.5. Configuration Control

9. Define the configuration control process that will be used to maintain the architecture and develop specific procedures for configuration control.

Once the baseline is defined, the process for making changes to this baseline must be established. The change management process specifies how changes are identified, how often they will be made, and how the changes will be reviewed, implemented, and released.

How Changes are Identified

This involves two issues-

- who can identify a change to the architecture and
- how will the change request be documented

For an architecture that covers an entire state, the question of who can make change requests is an important one. If literally anyone can input requests the region runs the risk of being overrun by requests that will tax scarce resources to review and decide upon. On the other end of the spectrum, if too much formality or paperwork is added to the process then many valid or needed changes may go unexpressed. The recommendation is that only members of the "core stakeholders" who make up the institutional framework be allowed to identify potential changes. This effectively means that any change suggested has the approval of a member of the core group. This has the

added benefit of spreading the resources needed to generate or evaluate changes among the group.

As to how the change request should be documented—it is recommended that a simple change request form be created that contains at least the following information:

1. Name of change
2. Description of change
3. Part of baseline affected (could be check boxes for document, database, web site, and not known)
4. Rationale for change
5. Originator name or agency
6. Date of origination

This information will ultimately be added to a change database (recommended to be maintained by SDDOT personnel) that will add the following additional fields of information:

7. Change number (some unique identifier)
8. Change disposition (accepted, rejected, deferred)
9. Change type (minor or significant)
10. Disposition comment
11. Disposition date

How often Changes are Made

It is recommended that the first update to the architecture baseline be made approximately a year after completion of the initial version. Depending upon the amount of change requests submitted, this could be anything from a minor update to correct errors found to a more significant update to include changes in stakeholders, elements, and connections. Also some changes could be deferred until the next major update of the architecture. It is recommended that a major review and update of the architecture (including possibly additional stakeholder meetings) be tied to the update of a major planning document such as the Statewide Intermodal Long Range Plan. This will allow an updated version of the architecture to be used as the basis for the Plan update. Additional minor revisions of the baseline could be considered on a yearly basis.

Change Review, Implementation, and Release.

The general steps in the change review process are:

1. Define changes per the recommendations given above.

2. Assess the impact of the change. Someone needs to evaluate the change and determine what impact it has upon the architecture baseline. There are three options for who performs this evaluation
    a. the person proposing the change (i.e. the member of the core group that brings it forward)
    b. a staff member of SDDOT (the agency responsible for architecture maintenance) or
    c. a contractor through some architecture support contract.

   Each of these options has positive and negative implications. The first option will work well for minor changes (e.g. changes in status, connections, or descriptions). However, it does require each submitting person to have sufficient knowledge of the architecture to suggest appropriate solutions. The second option requires the architecture knowledge to be available through SDDOT personnel. Their long-term availability to perform the work is a possible risk. The third implies contracting for the necessary expertise, so has the negative of additional cost associated with it.
3. Provide a recommendation to the Change Control Group. For proper change control some group should be assigned responsibility for reviewing and approving changes to the baseline. The recommendation is that a subgroup of the core stakeholders be appointed for this purpose. This Change Control Group (sometimes referred to as a Configuration Control Board) should be lead by the individual responsible for maintaining the architecture (or by one of the individuals if it is a group activity). The job of the Group is to decide what changes go into the architecture baseline. This could be done through periodic meetings (say quarterly), through electronic correspondence, or a combination of both. A recommendation is that minor changes be handled through monthly email distribution and approval, while major changes or areas of disagreement are handled at the periodic face to face meetings. It is important to maintain the consensus nature of the architecture by having a group of core stakeholders agree on changes.
4. The Change Control Group makes a decision. Either it accepts the change, rejects it, or asks for additional evaluation.
5. The decision is implemented. If the decision is to accept the change, then the appropriate portions of the architecture baseline are updated (per the schedule discussed above) and an updated architecture baseline is defined.

The time required to perform this configuration control process will be a direct function of the number of changes suggested to the architecture, which will be driven by how much the architecture is being used. It is suggested that the process be reviewed within the first year and fine-tuned to most appropriately address the level of change that has occurred.

10. Implement the configuration control process and maintain the architecture

2. Problem Description

Federal regulations require that major ITS (Intelligent Transportation Systems) projects deployed with federal funding after 8 April 2005 conform to a regional ITS architecture based on the US National ITS Architecture, and that the ITS architecture of planned and deployed ITS projects be documented. The South *Dakota Rural ITS Deployment Plan*, completed in 2000, recommended a program of ITS projects over the next eight years. A number of ITS projects are in progress, and others are planned in the near future. By April 2005, it will be necessary for the Department to be capable of reviewing ITS projects to determine their compliance with a regional ITS architecture based on the National ITS Architecture.

Research was needed to define and develop a "regional" ITS architecture for South Dakota. The approach taken was to develop a single Statewide regional ITS architecture (or *statewide ITS architecture*) for South Dakota, to include all ITS projects in the state, including the Metropolitan Planning Organizations (*MPOs*) in the state. This statewide ITS architecture considered both the current deployments of ITS in the state (*legacy* investments) as well as accommodated planned projects and harmonized them with other statewide architecture efforts such as the CVO/CVISN architecture development under a separate research effort. The widest possible array of stakeholders was identified, contacted and engaged in developing the statewide ITS Architecture. The research project identified each stakeholder's ITS systems, subsystems (i.e. *ITS elements*), and information exchange requirements between subsystems (i.e. *interconnects* and *architecture flows*). The statewide ITS architecture considered how regional and local ITS projects fit into the larger statewide view. The research created a statewide ITS architecture that not only reflects the consensus of the stakeholders, but the project's technical panel. Other ITS stakeholders had a method (over the Internet) of accessing and reviewing the architecture that allowed them to quickly and easily identify their ITS elements and information exchange requirements to/from those elements, and comment (also over the Internet) on these architecture views. Statewide ITS architectures can be large and complex, with a large number of elements and information exchange interconnections. Making this information analysis easily accessible to the stakeholders was a key problem that was solved. The documentation of the statewide ITS architecture clearly mapped to the requirements of the Federal regulations (i.e. the 8 April 2001 *FHWA Rule* and corresponding *FTA Policy* on ITS Architecture).

Beyond the Federal Requirements, a regional ITS architecture represents a coherent plan for efficient deployment of information processing and data communications technologies to satisfy local stakeholder surface transportation requirements. In a coherent ITS architecture, each ITS element's functions and information exchange requirements with other ITS elements are clearly documented and can be incorporated into the ITS element's design requirements at the time of ITS element design and deployment. These design requirements include the specification of open standards, which will lead to lower long-term deployment and maintenance costs. The benefits of

interoperability can then be increasingly realized, as ITS elements are deployed over time.

3. Objective

To develop a regional architecture that includes South Dakota and the Metropolitan Planning Organizations that include Sioux Falls, Rapid City and Sioux City.

4. Task Descriptions

Research Project Number SD2002-03 was undertaken to develop a statewide ITS architecture. It included the following 9 tasks:

1. Perform a literature search regarding other state's efforts to produce statewide ITS architecture plans.

One of the first efforts asociated with the outline and construction of the South Dakota Statewide ITS Architecture included investigation and review of current and future ITS architecture elements and plans within South Dakota. This was followed by an investigation of other state ITS architectures for innovative elements, stakeholders and approaches to projects that may provide additional insight into ITS architecture application that may be included or desirable across South Dakota. The results of this investigation are presented in Section 7 of this report.

2. Identify and document existing and near term ITS projects and efforts.

Candidate projects were identified from the existing documentation. The following documents and webpages were the primary sources of project information:

1. South Dakota Rural ITS Deployment Plan
2. South Dakota Office of Research Project Webpages
3. Intelligent Transportation Systems (ITS) Strategy- Phase 2, Sioux Falls, South Dakota, SHE No. A-SIOUX0103.01, December 16, 2002

The documentation of these projects is contained in section 5.10 of this report.

3. Identify and bring together stakeholders to inventory existing projects, identify needs, and begin the architecture development process.

A wide array of stakeholders across all aspects of surface transportation in the state was invited to a two-day Workshop that was held on August 19 and 20, 2002. The list of stakeholders invited was coordinated with the SDDOT Technical Panel and SDDOT Rural ITS steering committee in order to address the full range of potential stakeholders.

The first day of the workshop focused on refinement of the draft inventory, with each participant's ITS elements being discussed and clarified. In addition the services planned at local, regional, and statewide levels were discussed.

Following the first day of the workshop, a set of customized market packages were created based upon the information collected during the first day. On Day 2 of the workshop these customized market packages were reviewed with the stakeholders to

identify which elements are associated with each market package (or transportation service), and to identify the interconnections associated with the market packages. The details of the workshop are described in Section 5.2.

4. Meet with the panel to summarize literature, findings and initial development of architecture based on stakeholder meetings.

The consultant met with the panel (and Research Review Board) on the morning of November 19, 2002 to discuss the results of the workshops and the status of architecture development.

5. Using the National ITS Architecture, develop a draft statewide architecture, including architecture flows, market packages, and sausage diagrams, and provide in Turbo Architecture format that allows future modification. Include also written descriptions indicating how subsystems interconnect.

Following the two-day Workshop, a draft architecture was created. Using the customized market package diagrams (as modified during the second day of the workshop), the TurboArchitecture database was completed to create a draft ITS architecture. This draft architecture was merged with the TurboArchitecture database created by the concurrent *South Dakota CVISN Program Support Project* to create an overall Statewide ITS Architecture. The draft ITS architecture was placed on a generally accessible website (www.consystec.com), stakeholders notified and asked to review the draft. A one-day draft ITS architecture review meeting was held in Pierre on October 4, 2002. At the workshop, stakeholders reviewed the external interfaces for each stakeholder element of the inventory. Following revisions, a final draft architecture was created, documented and placed on the website.

The statewide architecture included:

- A description of the region, participating agencies and other stakeholders.
- An inventory of systems, existing and planned, that are owned, operated or maintained by the stakeholders.
- A description of the ITS services (e.g. market packages) that the regional ITS architecture will provide.
- An operational concept that identifies the roles and responsibilities of participating agencies and other stakeholders in the operation and implementation of the elements included in the regional ITS architecture.
- System functional requirements.
- A description of the interface requirements and information exchanges with planned and existing systems and subsystems and architecture flows as defined in the National ITS Architecture.
- Projects that may require sequencing for implementation.
- Existing ITS standards to support regional and national interoperability.
- Agreements that may need to be considered for operations including those affecting ITS project interoperability, utilization of ITS related standards, and the operation of the projects identified in the regional ITS architecture.

6. **Outline an implementation plan that provides SDDOT staff a method to evaluate future ITS projects to assure they comply with the statewide architecture.**

An Implementation plan was developed and is documented in Section 6 of this document. Because regional stakeholders will have ongoing ITS-related activities, the regional ITS architecture will be expected to change as stakeholder ITS requirements evolve. This dynamic nature creates the need for a plan to maintain the architecture. This plan is contained in Section 6 of this document.

7. **Meet with the panel to present architecture materials and provide training to select SDDOT staff.**

An ITS architecture and SD Statewide ITS Architecture training presentation and workshop was made to the Technical Panel and additional SDDOT personnel on the afternoon of November 19, 2002 and again on February 18, 2003. This included training on the use of Turbo Architecture and SDTurboExtensions to maintain the ITS architecture and web site.

8. **Provide a report including methodology, findings, conclusions, recommendations, and architecture deliverables.**

The result of this task is this final report.

9. **Make an executive presentation to the Research Review Board.**

An executive briefing was prepared and presented to the Research Review Board on the morning of November 19, 2002.

5. Findings

5.1. Introduction

The ***South Dakota Statewide ITS Architecture*** is a statewide roadmap for transportation systems integration over the next approximately 15 years. The architecture has been developed through a cooperative effort by the state's transportation agencies, covering all modes and all roads in the state. The architecture represents a shared vision of how each agency's systems will work together in the future, sharing information and resources to provide a safer, more efficient, and more effective transportation system for travelers in the region.

The ITS architecture is an important new tool that will be used by:

- Operating Agencies to recognize and plan for transportation integration opportunities in the region.
- Planning Agencies to better reflect integration opportunities and operational needs into the transportation planning process.

- Other organizations and individuals that use the transportation system in South Dakota.

The ITS architecture provides an overarching framework that spans all of these organizations and individual transportation projects. Using the ITS architecture, each transportation project can be viewed as an element of the overall transportation system, providing visibility into the relationships between individual transportation projects and ways to cost-effectively build an integrated transportation system over time.

Background

ITS Architecture development is done within the context of previous efforts. The *South Dakota Rural ITS Deployment Plan*, completed in 2000, represents the most important previous work from the standpoint of this research. This plan described at a high level (from an ITS architecture perspective) the current (or legacy) as well as proposed future ITS inventory and ITS projects. The description of these ITS projects in this report, while general from an ITS architecture perspective, includes the important existing and planned ITS elements and information sharing concepts.

CVO will be an important aspect of the South Dakota Statewide architecture and several completed and concurrent efforts will support the development of the ITS architecture. The documentation of *South Dakota's ITS/CVO Data Architecture, SD99-07* represents one completed effort that will impact this research. This report clearly documents the existing processes allocated to specific agency and private sector entities and their information sharing relationships. Second is the *South Dakota ITS/CVO Business Plan Study SD97-10*, which contains a list of CVO related projects. Finally, the concurrent *South Dakota CVISN Program Support Project* has been an important resource for ITS architecture development. This effort has provided important inputs with regard to existing and future ITS architecture inventory as well as information exchange requirements.

Findings Overview

The Findings section of this report is organized into 11 subsections. Section 5.1 provides introductory information. Section 5.2 describes the process used to develop the South Dakota Rural ITS architecture. The stakeholders are identified in Section 5.3, while their systems are inventoried in Section 5.5. The operational concept is described in Section 5.4. The transportation services are described in Section 5.6. Interfaces and Information exchanges is the topic of Section 5.7, while functional requirements and standards associated with the systems are discussed in Sections 5.8 and 5.9, respectively. Section 5.10 describes regional ITS projects and sequencing, while Section 5.11 discusses the agreements needed between stakeholders to maximize system benefits.

5.2. ITS Architecture Development Process

5.2.1. Process used to create the ITS architecture

Development of the South Dakota Rural ITS Architecture relied heavily on stakeholder input to ensure that the ITS architecture reflected local, regional, and statewide needs. A five-step process was used to develop the ITS architecture: 1) create an initial draft inventory of architecture elements and a draft list of Services to be provided, 2) conduct stakeholder outreach through a two day Workshop, 3) create a draft ITS architecture for review, and 4) conduct stakeholder review of the draft ITS architecture, 5) finalize the ITS architecture based on review comments.

1) Create Initial Inventory and Services

A review of existing documentation and existing and planned projects was used to establish the initial draft inventory of elements for the architecture. The South Dakota architecture elements identified through this review were mapped to National ITS Architecture Version 4 entities (subsystems and terminators). This created an initial inventory mapped to the National ITS Architecture. The existing and planned ITS projects were used to establish an initial list of services that the elements of the architecture would provide. The elements and their mapping to National ITS Architecture entities were entered into the software tool TurboArchitecture in preparation for stakeholder outreach.

2) Stakeholder Outreach- two-day Workshop

A wide array of stakeholders across all aspects of surface transportation in the state was invited to a two- day Workshop that was held on August 19 and 20, 2002. The list of stakeholders invited was coordinated with the SDDOT Technical Panel and SDDOT Rural ITS steering committee in order to address the full range of potential stakeholders. A key overall objective of the workshop is that the resultant Statewide ITS Architecture should be a *consensus architecture,* that is, each of the participants *understands and agrees* to the ITS elements and specific information exchanges between the ITS elements identified in the Statewide ITS architecture that they participated in defining. *(This is not to say that the resulting ITS Architecture has credible funding identified that would lead to full deployment. The ITS architecture only identifies ITS elements and interfaces that the stakeholders agree to. Existing funding processes will continue to be used to decide how to allocate limited resources to which ITS elements and interfaces for deployment.)* The workshop also incorporated training in the National ITS Architecture and regional ITS architecture so that stakeholders would understand and more fully participate in the ITS Architecture development process. The first day of the workshop focused on refinement of the draft inventory, with each participant's ITS elements being discussed and clarified. In addition the services planned at local, regional, and statewide levels were discussed.

To accomplish this, the Market Packages of the National ITS Architecture were discussed with the stakeholders and each Market Package was classified by the analyst-moderators to be either:

- Existing: some or all of this market package is already deployed in the State,
- Planned: funds may be programmed for this market package at some time in the future or,
- Not Used: the service(s) represented by this market package are not sufficiently relevant to the foreseeable needs of the region to warrant any further consideration.

Following the first day of the workshop, a set of customized market packages were created based upon the information collected during the first day. For each existing or future market package identified on Day 1, the market package diagram was edited so that each National ITS Architecture subsystem or terminator was associated with the local stakeholder element name. In some cases, multiple instances of the market package were developed, where the service has more than one instance in the state. On Day 2 of the workshop these customized market packages were reviewed with the stakeholders to identify which elements are associated with each market package (or transportation service), and to identify the interconnections associated with the market packages.

3) Create a Draft Architecture for Review

Following the two-day Workshop, a draft architecture was created. Using the customized market package diagrams (as modified during the second day of the workshop), the TurboArchitecture database was completed to create a draft ITS architecture. This involved the following activities:

- Updating the ITS inventory
- Customizing the ITS architecture interconnects (specifying which stakeholder elements are connected to which other elements)
- Customizing the architecture flows (specifying what information is sent from one specific stakeholder ITS element to another).

In addition to creating the TurboArchitecture database, the following architecture products were developed or updated:

- Set of customized market package diagrams
- A high level *Architecture Interconnect Diagram* (*AID*, also known as a *Sausage Diagram*) of all the elements in the ITS architecture.

The concurrent *South Dakota CVISN Program Support Project* had also created a TurboArchitecture database representing the commercial vehicle operations architecture for the state. The next step in the development process was to merge these two Turbo Architecture databases so that the CVO aspects of ITS architecture were fully covered in the statewide ITS architecture.

The final draft ITS architecture product developed was a hypertext version of the complete Turbo Architecture database placed on a generally accessible website (www.consystec.com). This website described each ITS element of the ITS architecture and all of its interconnections with other elements of the architecture. The website was developed using additional software tools that go beyond the basic TurboArchitecture software. One of the additional tools, *SDTurboExtensions*, is being provided to SDDOT (with a license restriction to use this software only for South Dakota's Statewide ITS Architecture) as a part of this contract so that the aspects of architecture outputs that go beyond TurboArchitecture can be updated through SDDOT's ITS Architecture maintenance process. Appendix E provides a Users Guide for this software tool.

Stakeholders were notified by email and by a letter that a review period has commenced, and feedback was solicited. Stakeholders were encouraged to review the statewide ITS architecture on the website, and were encouraged to provide feedback electronically from the website. Comments received starting at this point in the process were maintained in a database. These stakeholders' comments and their dispositions are summarized in Appendix A.

4) Conduct stakeholder review of the draft ITS architecture

In addition to the stakeholder website review, a one-day draft ITS architecture review meeting was held in Pierre on October 4, 2002. At the workshop, stakeholders reviewed the external interfaces for each stakeholder element of the inventory. These external interfaces were defined in the hypertext version of the draft architecture on the website. During this one day workshop the focus was on those interfaces that cross institutional boundaries to assure that we have consensus between the affected stakeholders.

5) Finalize the architecture based on review comments.

Following the one-day workshop, the draft architecture was revised based on comments from the workshop and a new version of the website was generated. Additional architecture aspects such as operational concepts, functional requirements, project sequencing, and agreements were developed and additional stakeholder review comments were solicited. The information has been compiled in this draft final report.

In recognition of the dynamic nature of ITS activities (i.e. ITS elements and interfaces that at one time are designated *future*, and later become *existing*) and because stakeholder requirements in a region that drive an ITS architecture will evolve, a maintenance plan was developed to provide a systematic means of keeping the architecture updated.

5.2.2. Requirements of the Final FHWA Rule and FTA Policy on Architecture

The FHWA Final Rule (23CFR 940, and aka *Rule 940*) and corresponding FTA Policy on Intelligent Transportation System Architecture and Standards, which took effect on April 8, 2001 defines a set of requirements that regional ITS architectures should meet.

Table 3 shows how the requirements of the rule are met by the outputs developed for the ***South Dakota Rural ITS Architecture***

Table 3: Mapping of Requirements to Architecture Outputs

Regional ITS Architecture Requirements	Where Requirements documented
Description of region	Geographic definition, as well as timeframe and scope of services are given in Section 5.3.1 of this document.
Identification of participating agencies and other stakeholders	Listing of stakeholders and their definitions is given in Section 5.3.2 of this document. An inventory of the elements operated by the stakeholders is contained in Section 5.5 of this document. The same information is also available in the hyperlinked web site and in the Turbo Architecture database (downloadable from the website).
An operational concept that identifies the roles and responsibilities of participating agencies and stakeholders	The operational concept is defined in Section 5.4 of this document.
A list of any agreements (existing or new) required for operations	A discussion of existing and needed new agreements is given in Section 5.11 of this document
System functional requirements;	The functional requirements of the ITS systems are described in an overview in Section 5.8 of this document, and are provided in detail in the hyperlinked web site.
Interface requirements and information exchanges with planned and existing systems and subsystems	The Interfaces and information flows are described in an overview in Section 5.7 of the document, and are described in detail in the hyperlinked web site and in the Turbo Architecture database.
Identification of ITS standards supporting regional and national interoperability	An overview of the ITS standards is given in Section 5.9 of the document. The detailed listing of ITS standards applicable to each interface in the architecture is described in the hyperlinked web site and in the Turbo Architecture database.
The sequence of projects required for implementation	Projects and their sequencing are covered in Section 5.10 of this document.

5.3. Identification of Region and Stakeholders

5.3.1. Description of the Region

5.3.1.1. Background

South Dakota, while it is primarily a rural state, has 83,472 miles of highways, roads and streets. This statewide system carried over 8.3 billion vehicle miles of travel in 2000. SDDOT is responsible for 7,839 miles of the roadway system, with the remainder under the jurisdiction of county and municipal organizations. South Dakota currently has

three urbanized areas (population greater than 50,000) that are Rapid City - Pennington and Meade Counties, Sioux Falls - Minnehaha and Lincoln Counties, and North Sioux City - Union County.

The public transportation system in the state is composed of public and private bus services. The buses and vans serve school children, the general public and individuals with special needs such as senior citizens and persons with disabilities. The Office of Public Transportation lists 58 public and specialized transit service providers, with 19 providing public transportation. The state's largest specialized public transportation service is the school bus system, which is operated by the school districts and consists of 1,654 buses. South Dakota is served by three private bus lines-- Greyhound, Jack Rabbit, and Powder River.

Commercial vehicle operations represent a major aspect of transportation in the State of South Dakota. Approximately 30,000 in-state commercial license plates are issued yearly, and significant interstate commercial traffic is carried on state highways. Rail is another major transportation mode represented in the state. Currently there are 1,855 miles of rail lines operating in South Dakota with Class I, Shortlines & Regional Railroads operating on them.

The following constraints on the scope of the South Dakota Statewide ITS Architecture were discussed and agreed to at the first stakeholder workshop.

5.3.1.2. Geographic Extent

The "Region" addressed by the South Dakota Rural ITS Architecture is the entire state, and will include ITS elements and interfaces at the local, regional, and statewide levels. In additions, ITS elements outside South Dakota that communicate with ITS elements inside South Dakota will be included, and their interfaces that cross the state boundary will also be included.

5.3.1.3. Temporal Extent

The architecture provides approximately a 15-year outlook for ITS activities in the state. The architecture addresses existing ITS systems as well as those planned for development over the next 15 years. It represents a snapshot of the currently anticipated projects based on information from stakeholders. As such, the architecture will require regular updates to ensure that it maintains accurate representation of the region.

5.3.1.4. Service Scope in the ITS Architecture

The architecture covers services across a broad range of ITS, including traffic management, transit management, traveler information, commercial vehicle services, emergency services, archived data management, maintenance and construction operations, and electronic payment. The services in the South Dakota Statewide ITS Architecture were limited to those with a direct ITS impact. The ITS Architecture thus does not include services that might be considered business data processing or Information Technology (IT), such as payrolls, accounting and other personnel

management or general business tools, even if the staff affected have an ITS role in the execution of their jobs.

5.3.1.5. Communications Type Scope in the ITS Architecture

Information encoding for transmission can be broadly classified as either interpretable by machines or by humans. This ITS Architecture is constrained to include only data communication where the data is encoded and decoded by machines. This specifically excludes voice and fax communications, which require a human to interpret the information transmitted. For example, the Statewide ITS Architecture includes data communications between a Police dispatch CAD (Computer Aided Dispatch) system and a police vehicle MDT (Mobile Data Terminal), but does not include voice communications between police officers in the field and their police dispatchers.

5.3.2. Regional Stakeholders

Stakeholder coordination and involvement is one of the key elements of the development of a statewide ITS architecture. Because ITS often transcends traditional transportation infrastructure, it is important to consider a range of stakeholders beyond the traditional traffic, transit, and maintenance areas. In addition, it is important to consider stakeholders in adjoining states.

The South Dakota Rural ITS Architecture includes a wide range of stakeholders. Table 4 identifies the stakeholders and provides a description of the agency, department, or organization represented by the stakeholder.

Table 4: Stakeholders

Name	Description
Cable Public Access Television Systems	Cable television public access television operators. Programming provides traveler information.
Cellular Telephone Service Providers	Owner/Operators and service providers of cellular telephone service.
County and Municipal Public Safety	County and municipality public safety agencies Including law enforcement, fire rescue, and emergency medical.
County and Municipal Transportation Agency	County and municipal agency responsible for operation of the transportation system.
County Civil Defense or EOC	County civil defense or emergency operations center.
Emergency Telecommunications System	Telco owner operators of emergency telecommunications (9-1-1) call routing systems.
FMCSA	Federal Motor Carrier Safety Administration is part of the US Department of Transportation. Administration activities contribute to ensuring safety in motor carrier operations through strong enforcement of safety regulations, targeting high-risk carriers and commercial motor vehicle drivers; improving safety information systems and commercial motor vehicle technologies; strengthening commercial motor vehicle equipment and operating standards; and increasing safety awareness.
IFTA, Inc.	The corporation that administers the IFTA Clearinghouse.

Name	Description
IRP, Inc.	The corporation that administers the IRP Clearinghouse for netting of registration funds.
Local and Municipal EOCs	Local and Municipal emergency operations centers.
Local Taxi Operators	Owner operators of taxi services.
Local Van Pool Operators	Owner/operators of van pool services.
Motor Carriers	This stakeholder represents private companies who manage a fleet of commercial vehicles.
MPO Operational Database Users	Users of the Metropolitan Planning Organizations Operational Database archive.
MPOs	Metropolitan Planning Organizations
National Weather Service	National Weather Service provided by NOAA (National Oceanic and Atmospheric Administration).
Other States	Neighboring states with which information exchange and coordination of transportation activities (via ITS systems) take place.
Private Sector Service Provider	Private sector traveler information service provider.
Private Travelers	Individual travelers/owners of computing and information access equipment that can access traveler information.
Private Weather Service Providers	Private environmental and transportation weather information service providers. E.g. Meridian.
Rail Operators	Owner/operators of rail transportation facilities and associated ITS equipment and communications.
Rest Area Operators	Operators of Rest Areas whether DOT, County, Parks, etc.
SD Department of Tourism	South Dakota Department of Tourism
SD Governors Office	South Dakota Governors Office
SD Office of Emergency Management	South Dakota Office of Emergency Management
SD Regional Airport Operators	South Dakota Regional Airport Operators
SD State Web Site Administrative Agency	SD State Web Site Administrative Agency
SDDOT Office of Data Inventory Users	Users of the SDDOT Office of Data Inventory Archive.
South Dakota Bureau of Information and Telecommunications	The state agency responsible for all information systems and telecommunications, including support through the data center, application development services, telecommunications connectivity, and public broadcasting.
South Dakota DCR	South Dakota Department of Commerce and Regulation, which is responsible for regulating the banking, insurance, securities, and gaming industries and twenty-three (23) professions, enforcing traffic and criminal laws, licensing drivers, inspecting facilities, inspecting weighing and measuring devices, investigating charges of discrimination, providing fire service training, promoting highway safety, and providing funding for the cleanup of petroleum releases.
South Dakota Department of Game, Fish and Parks and National Parks	South Dakota Department of Game, Fish and Parks and National Parks including Conservation Officers. SD GF&P includes: Custer State Park, Camping, Hunting, Fishing, Boating, and Recreational Areas

Name	Description
	National Park units include: Badlands National Park, Wind Cave NP, Jewel Cave National Monument, and Mount Rushmore National Memorial.
South Dakota Dept. of Environment and Natural Resources	Department mission is to provide environmental and natural resources assessment, financial assistance, and regulation in a customer service manner that protects the public health, conserves natural resources, preserves the environment, and promotes economic development. The agency responsible for administering the Hazardous Materials system throughout South Dakota.
South Dakota Dept. of Revenue	Manages both the IFTA and IRP credentials applications, issuance, renewals, and refunds.
South Dakota Dept. of Transportation	South Dakota Department of Transportation
South Dakota Dept. of Treasury	State department responsible for financial transactions relating to commercial vehicles credentials and licensing.
South Dakota Highway Patrol	Agency of state government charged with promoting traffic safety, enforcing existing statutes, recognizing and eliminating traffic hazards, and encouraging motorists to practice safe driving techniques
South Dakota Public Utilities Commission	Mission of the commission is to serve and protect the public by ensuring safe, reliable and high quality utility services at rates reflecting either a competitive market, in areas where competition develops, or fair regulation, in areas where competition does not exist.
South Dakota Unified Judicial System	State agency responsible for the three tiers of the judicial system- supreme court, circuit courts, and magistrate courts.
State, County, Local Law Enforcement Agencies	State, County, Local Law Enforcement Agencies that participate in LETS
State, County, Municipal and Tribal Infrastructure Inventory System Users	Agencies, institutions, or individuals who access the information in the Infrastructure Inventory System.
Telephone Service Providers	Wireless and wireline local carriers in South Dakota.
Transit Operators	Publicly and privately (e.g. Greyhound and Casino buses) operated bus services.

The stakeholders listed in Table 4 represent a mix of specific agencies or organizations and generic names used to represent a variety of stakeholders. Examples of specific agencies or organizations would be South Dakota Department of Transportation and South Dakota Highway Patrol. An example of a generic stakeholder name would be County and Municipal Transportation Agency, which represents any of the counties or municipalities in the state that have ITS elements.

5.4. Operational Concept

An Operational Concept documents each stakeholder's current and future roles and responsibilities in the operation of the regional ITS systems. The operational concept documents these roles and responsibilities across a range of transportation services. The services covered are:

- Traffic Signal Control:
  the development of signaling systems that react to changing traffic conditions and provide coordinated intersection timing over a corridor, an area, or multiple jurisdictions.
- Freeway Control:
  the development of systems to monitor freeway (or tollway) traffic flow and roadway conditions, and provide strategies such as ramp metering or lane access control to improve the flow of traffic on the freeway. Includes systems to provide information to travelers on the roadway.
- Incident Management:
  the development of systems to provide rapid and effective response to incidents. Includes systems to detect and verify incidents, along with coordinated agency response to the incidents.
- Transit Management:
  the development of systems to more efficiently manage fleets of transit vehicles or transit rail. Includes systems to provide transit traveler information both pre-trip and during the trip.
- Traveler Information:
  the development of systems to provide static and real time transportation information to travelers.
- Emergency Management:
  the development of systems to provide emergency call taking, public safety dispatch, and emergency operations center operations.
- Maintenance and Construction Management:
  the development of systems to manage the maintenance of roadways in the region, including winter snow and ice clearance. Includes the managing of construction operations.
- Archive Data Management:
  the development of systems to collect transportation data for use in non-operational purposes (e.g. planning and research).

Table 5 identifies the roles and responsibilities of key stakeholders for a range of transportation services.

Table 5: Stakeholder Roles and Responsibilities

Transportation Service	Stakeholder	Roles/ Responsibilities
Traffic Signal Control	County and Municipal Transportation Agency	• Operate traffic signal systems on municipal or county owned roads. • Interconnect with signal systems operated adjacent municipalities or counties. • Provide intersection signal preemption for public safety vehicles.

Transportation Service	Stakeholder	Roles/ Responsibilities
Incident Management	County and Municipal Transportation Agency	• Perform incident detection and verification for municipal or county streets. • Coordinate incident response with County and Municipal Public Safety • Provide incident information to County and Municipal Public Safety, Local emergency operations, and the South Dakota Bureau of Information Technology (who are responsible for State Radio Query Application) • Provide incident video to County and Municipal Public Safety
	County and Municipal Public Safety	• Receive emergency calls for incidents within the stakeholder jurisdiction • Dispatch Police, Fire, and EMS to incidents within jurisdiction • Provide incident information to County and Municipal Transportation Agency
	South Dakota Department of Game, Fish and Parks and National Parks	• Receive emergency calls for incidents within the stakeholder jurisdiction • Dispatch Police, Fire, and EMS to incidents within jurisdiction • Provide incident information to County and Municipal Transportation Agency
	South Dakota Department of Transportation	• Perform incident detection and verification for interstate and major state operated highways. • Provide incident information to County and Municipal Public Safety
Transit Management	Transit Operators	• Provide fixed route and paratransit bus to municipal, county, or multi-county areas.
Traveler Information	South Dakota Department of Transportation	• Provide traffic and maintenance information to the public via website. • Provide telephone information system for state including travel times, road/lane closures, and construction information for interstate and state highways and major arterials. This includes the statewide 511 system. • Provide road weather information to the public via telephone system and at rest stop computer terminals. • Collect traffic and incident information from transportation agencies in the region • Provide traveler interface • Provide road congestion and construction data
Emergency Management	County and Municipal Public Safety Dispatch	• Provide emergency call taking (9-1-1) for municipal or county jurisdictions. • Dispatch police, fire, and EMS for municipal or county jurisdiction
	South Dakota Highway Patrol	• Dispatch of state police vehicles operating on the state roads within the region.

Transportation Service	Stakeholder	Roles/ Responsibilities
	Local or Municipal EOC	• Develop municipal emergency preparedness plan • Provide municipal Emergency Operations Center responsible for directing emergency operations during major emergencies and disasters.
	County Civil Defense or EOC	• Develop county emergency preparedness plan • Provide county Emergency Operations Center responsible for directing emergency operations during major emergencies and disasters.
Maintenance and Construction Management	County and Municipal Transportation Agency	• Maintains county or municipal signalized intersection equipment. • Provide maintenance of County or Municipal roads including snow and ice control and pavement maintenance.
	South Dakota Department of Transportation	• Provide maintenance of state highways including snow and ice control and pavement maintenance. . • Provide management of road construction projects on state highways
Archived Data Management	South Dakota Department of Transportation	• Collect and archive data generated from ITS sources in the state and coordinate archived information for use in planning, evaluation, program assessment, and research applications.

5.5. Inventory

Each stakeholder agency, company, or group owns, operates, maintains or plans ITS systems in the state. An ITS architecture inventory is a list of "elements" that represent all existing and planned ITS systems in the state as well as non-ITS systems that provide information to or get information from the ITS systems. The focus of the inventory is on those systems that support, or may support, interfaces that cross stakeholder boundaries (e.g., inter-agency interfaces, public/private interfaces).

The vast majority of the inventory represents ITS systems in South Dakota, but the inventory does contain some elements that represent systems in adjoining states. An example of an element in an adjoining region would be *Other Road and Weather Information Systems*, which represents road and weather information systems of other States, Cities, Counties, Tribal, or Private. Information is exchanged with the *SD Road and Weather Information System*. Most of the elements are statewide in nature (e.g. the *SD State Web Site*). A few of the elements represent a specific system (e.g. the *SD State Web Site*), but most represent a number of systems of the same type (i.e. with the same functions and with the same interfaces) that occur across the state (e.g. the *SDHP District Offices*).

Each element in the inventory is described by a name, the associated stakeholder, a description, general status (e.g. *existing* or *planned*), and the associated subsystem(s) or terminator(s) that it is most like from the National ITS Architecture.

5.5.1. Systems by Stakeholder

Table 6 sorts the South Dakota ITS inventory by stakeholder so that each stakeholder can easily identify all the relevant elements that are allocated to them in the ITS architecture. For each element in the inventory the table provides an element description and an indication of whether the element exists or is planned.

The majority of elements in the inventory represent a specific existing or planned system. Some examples of specific systems are *SDDOT Road and Weather Information System* and the *South Dakota Automated Permitting System Server*.

Some of the elements represent sets of devices, rather than a single specific system or device. An example of this type of element is the element *SDDOT Mobile Field Equipment*. This element represents all of the mobile Dynamic Message Signs (DMS), Highway Advisory Radio (HAR), and other equipment that will be operated by SDDOT. The element describes the type of devices, not the specific number of devices. For example, the element calls out DMS, but does say how many there are, or where they might be located.

A third type of element in the inventory is a "generic" element that represents all of the systems of a certain type in the region. An example of this type of element is *County, Municipal, and Tribal Public Safety Dispatch*, which represents the many county, municipal, or tribal public safety answering points (PSAPs) in the state.

These generic elements have been created for two primary reasons. First, they represent elements with similar types of interfaces, so from a standardization standpoint, describing how one of the major elements in the state (e.g. *SDDOT Road and Weather Information System*) interfaces with individual PSAPs describes all of them. Second, describing many (there are over 100 PSAPs in the state) systems with a single element helps keep the ITS architecture from growing large with no apparent benefit.

Table 6: Inventory sorted by Stakeholder

Stakeholder Name	Element Name	Element Description	Status
Cable Public Access Television Systems	Cable Public Access Channels	Sioux Falls, Rapid City, Aberdeen and Pierre all use public access television for posting transportation-related events, such as construction or road conditions. Source is: SDDOT, local public information offices data formatted by local cable company for their distribution system.	Planned
County and Municipal Public Safety	County Sheriff and Municipal Police Vehicles	Mobile Data Terminal (MDT) equipped vehicles. Enables reporting and updating traffic conditions and incident reports/status using standard forms.	Planned
	County, Municipal and Tribal Fire Rescue Vehicles	Mobile Data Terminal (MDT) equipped vehicles. Enables reporting and updating traffic conditions and incident reports/status using standard forms.	Planned
	County, Municipal and Tribal Public Safety Dispatch	County sheriff, municipal and local police, PSAPs, and fire and rescue dispatch. Exchanges mutual aid and incident information with other public safety agencies. To include: County Sheriff, Municipal Police, BIA Police, Tribal Police, National Park Service Police, Game Fish and Parks Conservation Officers, State Park Law Enforcement Officers.	Planned
County and Municipal Transportation Agency	County, Municipal and Tribal Equipment Repair Facility	County and municipal construction and maintenance vehicle and equipment repair.	Existing
	County, Municipal and Tribal Infrastructure Inventory System	County and municipal archive of transportation infrastructure (roadways, bridges, etc.) including dimension and location information. Provides location and dimension information to the Road and Weather Information System.	Planned
	County, Municipal and Tribal Roadway Maintenance Dispatch	E.g. City of Sioux Falls PWD. Maintenance Decision Support System (MDSS). Provide information to the central SDDOT on current status and plans regarding local roads, e.g. condition and treatment of roads/bridges, which roads have been plowed and when. Allocate local maintenance resources (MDSS).	Existing
	County, Municipal and Tribal Roadway Maintenance Vehicles	E.g. City of Sioux Falls PWD, County and Township Maintenance Vehicles.	Planned
	County, Municipal and Tribal Traffic Data Collection System	Archive of historical traffic data on county and local roadways including State Park Roads.	Planned

Stakeholder Name	Element Name	Element Description	Status
County and Municipal Transportation Agency	County, Municipal and Tribal Traffic Operations and Communications Center	Provide local roadway information to SDDOT Integrated traveler information center. Control local field equipment. Collect incident and event information, and weather information. Already deployed: Sioux Falls, Rapid City, Brookings In support of closed-loop signal systems and signal preemption. May physically be a laptop computer (if no or limited connections to mobile units).	Existing
	State, County and Municipal Traffic Operations Field Equipment	Traffic control/monitoring where required. Already deployed: Sioux Falls, Rapid City, Brookings In support of closed-loop signal systems and signal preemption. Future: Intersection collision avoidance where appropriate.	Existing
County Civil Defense or EOC	County Civil Defense or EOC	Emergency operation center at the county level.	Planned
Emergency Telecommunications System	Emergency Telecommunications System	Routes 911 call with caller ID (or cell site location) to appropriate PSAP (Public Safety Answering Point) based on callers location.	Existing
FMCSA	CAPRI	Used to complete compliance reviews of motor carriers. Reviews are done onsite at motor carriers' facilities. CAPRI interfaces with SAFETNETY 2000 for uploading of compliance data.	Existing
	Motor Carrier Management Information System	A central repository of comprehensive safety data on interstate motor carriers maintained by the Federal Motor Carrier Safety Administration.	Existing
	SAFER	SAFER provides safety fitness and credentials status data for motor carriers. Many different state and federal transportation agencies use SAFER for data retrieval and submission. SAFER has interfaces with MCMIS, SAFETYNET 2000, and state CVIEW systems.	Existing
IFTA, Inc.	IFTA Clearinghouse	The IFTA Clearinghouse supports the IFTA base state agreement. The IFTA Clearinghouse was devised to replace paper exchange of data with automated exchange to support business processes. The Clearinghouse will store information regarding carrier demographics and transmittal records. This information will only be shared by participating jurisdictions, except for reports that will be generated and distributed by IFTA, Inc. The Clearinghouse will also provide readily available information on carriers.	Existing

Stakeholder Name	Element Name	Element Description	Status
IRP, Inc.	IRP Clearinghouse	The IRP Clearinghouse supports the IRP base state agreement. The IRP Clearinghouse streamlines the exchange and reconcilement of registration information and fees by:· - enabling jurisdictions to electronically exchange motor carrier and fee information between jurisdictions· - providing an electronic remittance netting function with concurrent Electronic Funds Transfer (EFT) capability through a central IRP bank· - tracking all amounts due to/from a base jurisdiction, from/to all foreign jurisdictions· - providing reports on the information exchanged and netted fees processed	Existing
Local and Municipal EOCs	Local and Municipal EOC	Emergency operations centers at the local and municipal level, including airports.	Existing
Local Taxi Operators	Local Taxi Operator Scheduling System	Represents dispatch and scheduling functions of regional or local van pool operations. Also provide schedule and participation information to SDDOT Integrated Traveler Webpage.	Planned
Local Van Pool Operators	Local Van Pool Operator Scheduling System	Represents dispatch and scheduling system of regional or local taxi services. Also provide scheduling/booking and fare information to SDDOT Integrated Traveler Webpage. May charge for access to the web site.	Planned
Motor Carriers	Automated Vehicle Identification	Transponders and other electronic devices used for identification of individual commercial vehicles for a given motor carrier.	Existing
	Commercial Vehicle	This terminator represents the commercial vehicle platform that interfaces with and hosts ITS electronics. This terminator represents a vehicle that is used to transport goods or services which are operated by professional drivers, typically administered as part of a larger fleet, and regulated by a Commercial Vehicle Manager. This classification applies to all such vehicles ranging from small panel vans used in local pick-up and delivery services to large, multi-axle tractor trailer rigs operating on long haul routes.	Existing

Stakeholder Name	Element Name	Element Description	Status
Motor Carriers	Commercial Vehicle Driver	This terminator represents the human entity that operates vehicles transporting goods including both long haul trucks and local pick up and delivery vans. This terminator is complementary to the Driver terminator in that it represents those interactions which are unique to Commercial Vehicle Operations. Data flowing from the Commercial Vehicle Driver terminator will include those system inputs specific to Commercial Vehicle Operations, such as information back to the Commercial Vehicle Manager. Data flowing to the Commercial Vehicle Driver may include system outputs such as commands to pull into a roadside safety inspection facility. Showing the Driver as a terminator includes the user interface devices within the ITS architecture boundary. The CVO Driver will be expected to interact with the ITS with interface devices designed to provide support for their usage.	Existing
	Motor Carrier System	This represents the many different types of systems the motor carriers rely upon for their operations. These systems may communicate directly with state credentialing systems or via a web client for applications and renewals of credentials and permits.	Existing
MPO Operational Database Users	MPO Operational Database Users	Users of the SD MPO Operational Database including MPOs, County and Municipality agencies, etc.	Planned
MPOs	MPO Operational Database	Operational data collected include traffic counts, accident information (to and from with the State), land use, demographics.	Existing
National Weather Service	National Weather Service	National weather information provided by the NOAA.	Existing
Other States	Other Road and Weather Information Systems	Road and weather information systems of other States, Cities, Counties, Tribal, or Private. Information is exchanged with the SD Road and Weather Information System.	Planned
Private Financial Institutions	Carrier Banks	Banking and other financial related institutions used for electronic Funds Transfer (EFT) between motor carriers and state financial institutions and services.	Existing
Private Sector Service Provider	Private Sector Service Provider EOC	Private Sector Service Provider Emergency Operations Center e.g. Ford RESCUE, GM OnStar, AAA.	Planned
	Private Sector Service Provider Information Operations Center	Private sector traveler information service provider.	Planned
Private Travelers	Private Travelers Personal Access Equipment	User equipment with Internet Browsing capability.	Existing
	Private Travelers Vehicles	Private individuals vehicles possibly equipment with in-vehicle devices.	Existing

Stakeholder Name	Element Name	Element Description	Status
Private Weather Service Providers	Meridian Maintenance Weather Forecast System	Advanced Traveler and Weather Information System. This project is a multi-state (ND/SD) initiative that aims to improve advanced traveler information system inputs by including more detailed meteorological analysis and forecasting as well as specific winter road conditions. Provides high-resolution weather forecast statewide. Collects RWIS data (hourly) from four SDDOT Regional Maintenance Offices. Forecasts are sent to the SDDOT Regional Maintenance Offices, and published at a minimum of 4 times per day to a specific web site for the purposes of retrieval by the Regional Mtce Offices. This information can be accessed using telephone (via 511), or via the Internet.	Existing
Rail Operators	Rail Operators	Owner/operators of rail control and tracking systems.	Existing
	Rail Operators Wayside Equipment	Rail operators' equipment which communicates with traffic signal systems (or other traffic control devices) at highway rail intersections.	Existing
Rest Area Operators	Rest Area Operators CCTV	Rest Area Operators Security Cameras whether DOT, County, Parks, etc.	Planned
SD Department of Tourism	SD Department of Tourism Public Information Office	Statewide event information agency/office.	Existing
SD Governors Office	SD Governors Office of Homeland Security	South Dakota Governors office of homeland security.	Existing
SD Office of Emergency Management	SD Office of Emergency Management EOC	Emergency operations center of the South Dakota Office of Emergency Management.	Existing
SD Regional Airport Operators	SD Regional Airports	Represents the airports in Sioux Falls, Pierre, and other cities in the state.	Existing
SD State Web Site Administrative Agency	SD State Web Site	South Dakota State Web Site including traveler based information which may be accessed from the SDDOT kiosks.	Existing
SDDOT Office of Data Inventory Users	SDDOT Office of Data Inventory Users	Statewide historical traffic data inventory users.	Planned

Stakeholder Name	Element Name	Element Description	Status
South Dakota Bureau of Information and Telecommunications	State Radio Query Application	The State Radio application is a part of the NLETS network. South Dakota's portion of the network is called SDLETS. All queries from South Dakota law enforcement, other state's law enforcement or federal authorities to South Dakota come through the RS6000 or state switcher. Based on the type of query, there are a number of South Dakota databases accessed and the appropriate responses returned. The application connects to drivers licensing, title & registration, criminal history through various systems. Provides road conditions electronically to SDDOT. Exchanges mutual aid and incident information with other public safety agencies.	Existing
South Dakota DCR	CDL/DL	Functionally serves as the primary system for driver licensing issuance, data maintenance, retrieval, and dissemination. Connects to Unified Judicial System for moving-violation data coordination. This system also provides citation and violation data for commercial vehicle personnel to access. Roadside personnel will access CDL data from this system during inspections and other enforcement related operations.	Existing
South Dakota Department of Game, Fish and Parks and National Parks	SD Dept of GFP and National Parks Emergency Vehicles	SD Dept of Game, Fish and Parks and National Parks Emergency Vehicles. Dispatched by County and Municipal Public Safety Dispatch.	Planned
	SD Dept of GFP and National Parks Kiosks	SD Dept of GFP and National Parks kiosks and remote traveler information support.	Planned
	SD Dept of GFP and National Parks Operations Centers	SD Dept of Game, Fish and Parks and National Parks Operations Center (primarily law enforcement and security) - Conservation Officers.	Existing
	SD Dept of GFP and National Parks Parking Management Systems	Parking Management Systems of State and National Parks implemented primarily for monitoring of parking availability for tourists.	Planned
South Dakota Department of Game, Fish and Parks and National Parks	SD Dept of GFP and National Parks Web Site	SD Dept of GFP and National Parks Web Site	Planned

Stakeholder Name	Element Name	Element Description	Status
South Dakota Dept. of Environment and Natural Resources	HazMat	The system provides for the management and maintenance of HazMat data. Data from this system will be disseminated to other systems for use in other operations. One system the HazMat will send data to xCVIEW. Details of a centralized state HazMat system for all local jurisdictions to access is currently under consideration. The State of South Dakota maintains an internal database for Hazardous Waste, available to other DENR personnel for analysis. On the federal side, Hazardous Waste information is exchanged via RCRA Info and/or EnviroFax via EPA websites.	Planned
South Dakota Dept. of Revenue	COVERS	Primarily supports IRP administrative operations and integrates with COVERS ft (IFTA) in South Dakota. The system can be accessed by motor carriers and agency personnel via the COVERS.net. IRP data from COVERS will be exported for inclusion in the xCVIEW database.	Existing
	COVERS ft	Primarily supports the IFTA administrative operations in South Dakota and integrates with the IRP portion of COVERS. The system can be accessed by motor carriers and agency personnel via the COVERS.net. IFTA data from COVERS ft will be exported to the xCVIEW database.	Existing
	COVERSnet	Credentialing interface for access to IRP and IFTA administration handled in COVERS and COVERS ft. Revenue and motor carrier personnel both use COVERS.net for credentials applications, renewals, and administrative operations.	Planned
South Dakota Dept. of Transportation	Accident Reporting System Client	The Accident Reporting System consists of two components working in conjunction to record and manage accident/crash reporting data. The server component resides on a central database server, which hosts numerous other applications/databases. All accident/crash data will be transported and entered into this server component. The client component is central to entering and maintaining the accident/crash data. Most likely, the client component will be a web client that interconnects to the server component via XML and other Internet related protocols and standards. Pertinent data will be exported or queried by other systems such as xCVIEW.	Planned

Stakeholder Name	Element Name	Element Description	Status
South Dakota Dept. of Transportation	Accident Reporting System Server	The Accident Reporting System consists of two components working in conjunction to record and manage accident/crash reporting data. The server component resides on a central database server, which hosts numerous other applications/databases. All accident/crash data will be transported and entered into this server component. The client component is central to entering and maintaining the accident/crash data. Most likely, the client component will be a web client that interconnects to the server component via XML and other Internet related protocols and standards. Pertinent data will be exported or queried by other systems such as xCVIEW.	Planned
	ASPEN	Inspection reports recording and filing, in conjunction with PIQ (Past Inspection Queries) and ISS (Inspection Selection System) software used for support functions. Accesses SAFER to send inspection reports and for receiving safety ratings and inspection data.	Existing
	Electronic Screening	Computer systems and electronics equipment integrated together to provide bypass/pull-in services to motor carriers with transponder equipped commercial vehicles. Various criteria are used to establish screening ratings. The electronic screening system interfaces with xCVIEW for acquiring screening data. This system provides for roadside override, manual, and random selections.	Planned
	Roadside System Server	Functions as the distributed server for xCVIEW data providing quick query functionality. Other applications and processes may also be included. Electronic screening will interface with this system for screening criteria. SDAPS and accident reporting system data will also be made available through this system.	Planned
	SDDOT 511 Traveler Information System	SDDOT phone response system allows travelers to dial-in and receive weather information tailored to their trip. Available from wireline as well as wireless phones.Future enhancements might include other roadway conditions.	Existing

Stakeholder Name	Element Name	Element Description	Status
South Dakota Dept. of Transportation	SDDOT CCTV	CCTV (periodic snapshot images, low bandwidth) for visual verification to weather conditions that have been reported or forecasted. (Images for publication on the Internet.) (May also be used for incident detection or classification, but only if deployed densely.) Proposed locations associated with existing RWIS deployments to share utilities, e.g.: Ellsworth RWIS station I-90 at M.P. 65.2; Sheridan Lake Road in Rapid City; Vivian RWIS station on U.S. 83 at M.P. 101.9 in Pierre; Montrose RWIS station on I-90 at M.P. 376 in Sioux Falls; Belvidere RWIS station on I-90 at M.P. 172.5; Summit RWIS station on I-29 at M.P. 206.8.	Planned
	SDDOT DMS	Fixed and mobile Dynamic Message Signs (DMS).	Existing
	SDDOT Equipment Repair Facility	SDDOT construction and maintenance vehicle and equipment repair.	Existing
	SDDOT Fixed Anti-Icing Systems	Fixed Anti-Icing Systems are typically deployed at bridges. The communications requirement assumes remote monitoring of roadway sensors, chemical tank level and spray pump status (on/off). The pump may also be operated remotely.	Planned
	SDDOT HAR	The information that may be disseminated includes: · Special event and parking · Road closures and detours · Inclement weather conditions and · Alternative routes in known congested areas.	Existing
	SDDOT Infrastructure Inventory System	System for posting and accessing information pertaining to the roadway network, information such as location, dimensions and design to the SDDOT Road and Weather Information System.	Existing
	SDDOT Integrated Traveler Information Webpage	South Dakota DOT operates an Internet site with current and forecasted weather and road condition information specific to regions around the state. Includes weather information from the UND ATWIS Center and the Meridian Maintenance Weather Forecast System May include other lane closure and construction information, drawing information from various systems. Future: Publish CCTV images for validating weather forecasts and current conditions here as well.	Existing
	SDDOT Kiosks	In the future the Kiosk content comes from the Road and Weather Information System. Kiosks are located at Rest Areas.	Existing

Stakeholder Name	Element Name	Element Description	Status
South Dakota Dept. of Transportation	SDDOT Maintenance Vehicles	Provide AVL to dispatch. Provide status of salting/plowing operations. Receive dispatch instructions. Provide various vehicle measures (e.g. miles traveled, engine status, chemical storage loads, spread rates), and provide weather and road surface condition information (e.g. pavement temperature, salinity, dew point, wind direction and speed).	Planned
	SDDOT Mobile Field Equipment	Portable field equipment such as: HAR, DMS, Signal, weather sensors, vehicle sensors.	Planned
	SDDOT Mobile Traffic Management Center	Mobile TMC for deployment at events which impact local traffic conditions such as natural disasters (e.g. large fires or flooding) or special planned events (e.g. the Sturgis Motorcycle Rally).	Planned
	SDDOT Office of Data Inventory	Collects traffic count information from SDDOT Traffic Data Collection System.	Existing
	SDDOT Office of Operations	SDDOT Office of Operations	Planned
	SDDOT Region and Area Construction and Maintenance Office	Includes: 1). Maintenance Decision Support System. Attempts to optimally allocate maintenance resources. 2). Provides information to the SDDOT Road and Weather Information System on: condition and treatment of roads/bridges; which roads have been plowed and when; construction, lane closure and detour information; speed limits and restrictions (e.g. width, height and weight).	Planned
	SDDOT Remote Controlled Snow Gates	Freeway control gates for restricting access on roadways under heavy snow conditions. Possibly deploy in conjunction with RWIS (to assess conditions requiring road closure) and CCTV (to assist in road closure decision validation as well as validating operation of gate).	Planned
	SDDOT Road and Weather Information System	Central repository and distribution point to consolidate current and forecast weather (ATWIS), surveillance and operations/maintenance highway conditions information for the traveling public (i.e., have roads been plowed or treated, are roads open or closed, and the general "drivability" of roads). Planned to be located at Meridian Environmental Technology. Receives incident information from TMCs, TOCCs, and SDOT Region and Area Offices. Sends incident notification to TMCs, TOCCs, and SDOT Region and Area Offices. Can store and execute predetermined responses to specific incidents including e.g., programming DMSs on off-shifts, and e-mails/page (potentially to subscribers).	Planned

Stakeholder Name	Element Name	Element Description	Status
South Dakota Dept. of Transportation	SDDOT Roadway Design Office	Archive data user of the Statewide (State, County, and Municipal) Signal Maintenance Archive. Also Traffic Management subsystem which can access county and city systems and change traffic plans remotely.	Existing
	SDDOT RWIS Stations	Currently exist in several locations, e.g. : Ellsworth RWIS station I-90 at M.P. 65.2; Sheridan Lake Road in Rapid City; Vivian RWIS station on U.S. 83 at M.P. 101.9 in Pierre; Montrose RWIS station on I-90 at M.P. 376 in Sioux Falls; Belvidere RWIS station on I-90 at M.P. 172.5; Summit RWIS station on I-29 at M.P. 206.8.	Existing
	SDDOT Statewide Signal Maintenance Archive	Archive of timing plans and other traffic control system parameters both municipal and state.	Planned
	SDDOT Statewide Signal Maintenance Archive Users	Statewide users of the Statewide Signal Maintenance archive.	Planned
	SDDOT Traffic Data Collection System	50 locations throughout the State and currently dial-up access. Traffic Counts and potentially speeds. Information is archived by Office of Data Inventory.	Existing
	SDDOT Work Zone Field Sensors	Work zone field sensors including: warning devices and alarms, work zone intrusion monitoring devices, and communications equipment.	Planned
	South Dakota Automated Permitting System Client	The Automated Permitting System (SDAPS) consists of three components. The first component is the server component, which consists of the database and primary application. The second component is a client developed for SD personnel to administrator and maintains SDAPS data. The last component is a web client for motor carriers to apply for, review, and renew various commercial vehicle permits.	Planned
	South Dakota Automated Permitting System Server	The Automated Permitting System (SDAPS) consists of three components. The first component is the server component, which consists of the database and primary application. The second component is a client developed for SD personnel to administrator and maintains SDAPS data. The last component is a web client for motor carriers to apply for, review, and renew various commercial vehicle permits.	Existing

Stakeholder Name	Element Name	Element Description	Status
	xCVIEW	xCVIEW provides a central data warehouse and exchange service for all South Dakota CVISN orientated data and systems. It will exchange credentials and safety data with various data sources, such as SAFER, COVERS, COVERS ft, SDAPS, electronic screening, and roadside query systems. Data in xCVIEW will also be available to select public entities such as motor carriers, for personal review of their own data. xCVIEW is a key component of successful development of South Dakota's CVISN Program.	Planned
South Dakota Dept. of Treasury	South Dakota State Treasury	The treasury system is used to track all financial transactions that occur within state government for the State of South Dakota.	Existing
South Dakota Highway Patrol	CVO Inspector	This terminator represents the human entities who perform regulatory inspection of Commercial Vehicles in the field. CVO Inspectors support the roadside inspection, weighing, and checking of credentials either through automated preclearance or manual methods. The CVO Inspector is an inspection and enforcement arm of the regulatory agencies with frequent direct interface with the Commercial Vehicles and their Drivers.	Existing
	Emergency Services Hand Held Reporting Devices	Represents the use of hand-held devices (e.g., Palm Pilot, Visor) for communicating important on-site crash information to emergency dispatchers, and automating data collection.	Planned
	SAFETYNET 2000	SAFETYNET 2000 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 CAPRI. SAFETYNET-2000 is an Oracle based client/server system.	Existing
	SDHP District Offices	South Dakota Highway Patrol District Offices	Existing
	SDHP Vehicles	Mobile Data Terminal (MDT) equipped vehicles. Enables reporting and updating traffic conditions and incident reports/status using standard forms.	Planned
South Dakota Public Utilities Commission	SSRS, Interstate Exempt Reg.	Single State Registration System. Two separate systems operating in tandem each involved in the regulation of motor carriers. SSRS manages the electronic records for South Dakota motors carriers who have federal authority to operate on interstate roadways. The Interstate Exempt Registration helps manage all interstate motor carriers that travel through South Dakota. In conjunction with the authority data, insurance data is maintained for each motor carrier in the system. In terms of regulations, it means management of registration and insurance records.	Existing

Stakeholder Name	Element Name	Element Description	Status
South Dakota Public Utilities Commission	Title/Registration	The function of the title & registration system is to issue South Dakota titles and maintain license plate information on all units that are registered in South Dakota.	Existing
South Dakota Unified Judicial System	Unified Judicial System	The Unified Judicial System provides judicial data for various CVISN systems. An interconnection with the Accident Reporting System and CDL/DL for coordination of citation and accident data is also important to this system.	Planned
State, County, Local Law Enforcement Agencies	SD LETS Teletype	South Dakota Law Enforcement Teletype System	Existing
State, County, Municipal and Tribal Infrastructure Inventory System Users	State, County, Municipal and Tribal Infrastructure Inventory System Users	Users of the SDDOT and County, Municipal and Tribal Infrastructure Inventory Systems.	Planned
Telephone Service Providers	Statewide Telephone Services	Provides access to specialized ITS information (e.g. weather information or transit information) for travelers, possibly using special dialing options such as 511.	Existing
Transit Operators	Transit Kiosks	Traveler information and security kiosks at transit access locations.	Planned
	Transit Operator Transit Management Systems	Represents transit systems at the regional and local level. Provide routes, schedule, fare and hours of operation information to SDDOT Road and Weather Information System.	Planned
	Transit Vehicles	Busses, Trolleys and Paratransit: Computer Aided Dispatching (CAD) / Automatic Vehicle Location (AVL) / Mobile Dispatch Terminals (MDT) for Rural Transit.	Planned

5.5.2. Systems by Architecture Entity

Each element in the statewide ITS architecture inventory is mapped to one or more entities from the National ITS Architecture. In the current version of the National ITS Architecture (at the time this document was written, Version 4.0) there are 92 entities defined. These 21 subsystems and 71 terminators describe a wide array of systems that provide ITS services, or interface with systems that provide ITS services. The mapping of regional ITS architecture elements to National ITS Architecture entities has two primary benefits. First it allows the full set of information flows contained in the National ITS Architecture to be used in the description of regional ITS architecture interfaces, and second, it allows the elements of the regional ITS architecture to be grouped by like entity. Table 7 provided just such a sorting of inventory elements by entity. This table allows the users of the ITS architecture to immediately identify all the elements that have functions relating to transit management, or traffic management.

The ***South Dakota Rural ITS Architecture*** inventory contains the following number of elements mapped to different types of subsystem center or roadway infrastructure entities:

Archived Data Management: 6
Commercial Vehicle Administration: 21
Emergency Management: 11
Information Service Providers: 7
Maintenance and Construction Management: 5
Parking Management: 1
Roadway: 12
Traffic Management: 6
Transit Management: 1

Table 7: Inventory Sorted by Entity

Entity	Element	Stakeholder	Status
Archived Data Management Subsystem	Accident Reporting System Server	South Dakota Dept. of Transportation	Planned
	County, Municipal and Tribal Infrastructure Inventory System	County and Municipal Transportation Agency	Planned
	MPO Operational Database	MPOs	Existing
	SDDOT Infrastructure Inventory System	South Dakota Dept. of Transportation	Existing
	SDDOT Office of Data Inventory	South Dakota Dept. of Transportation	Existing
	SDDOT Statewide Signal Maintenance Archive	South Dakota Dept. of Transportation	Planned
Archived Data User Systems	Accident Reporting System Client	South Dakota Dept. of Transportation	Planned
	MPO Operational Database Users	MPO Operational Database Users	Planned
	SDDOT Office of Data Inventory Users	SDDOT Office of Data Inventory Users	Planned
	SDDOT Road and Weather Information System	South Dakota Dept. of Transportation	Planned

Entity	Element	Stakeholder	Status
Archived Data User Systems	SDDOT Roadway Design Office	South Dakota Dept. of Transportation	Existing
	SDDOT Statewide Signal Maintenance Archive Users	South Dakota Dept. of Transportation	Planned
	State, County, Municipal and Tribal Infrastructure Inventory System Users	State, County, Municipal and Tribal Infrastructure Inventory System Users	Planned
Basic Commercial Vehicle	Commercial Vehicle	Motor Carriers	Existing
Cellular Telecommunications Provider	Cellular Telephone Services	Cellular Telephone Service Providers	Existing
Commercial Vehicle Administration	Accident Reporting System Client	South Dakota Dept. of Transportation	Planned
	Accident Reporting System Server	South Dakota Dept. of Transportation	Planned
	CAPRI	FMCSA	Existing
	CDL/DL	South Dakota DCR	Existing
	COVERS	South Dakota Dept. of Revenue	Existing
	COVERS ft	South Dakota Dept. of Revenue	Existing
	COVERSnet	South Dakota Dept. of Revenue	Planned
	HazMat	South Dakota Dept. of Environment and Natural Resources	Planned
	IFTA Clearinghouse	IFTA, Inc.	Existing
	IRP Clearinghouse	IRP, Inc.	Existing
	Motor Carrier Management Information System	FMCSA	Existing
	SAFER	FMCSA	Existing
	SAFETYNET 2000	South Dakota Highway Patrol	Existing
	South Dakota Automated Permitting System Client	South Dakota Dept. of Transportation	Planned
	South Dakota Automated Permitting System Server	South Dakota Dept. of Transportation	Existing
	South Dakota State Treasury	South Dakota Dept. of Treasury	Existing
	SSRS, Interstate Exempt Reg.	South Dakota Public Utilities Commission	Existing
	State Radio Query Application	South Dakota Bureau of Information and Telecommunications	Existing
	Title/Registration	South Dakota Public Utilities Commission	Existing
	Unified Judicial System	South Dakota Unified Judicial System	Planned
	xCVIEW	South Dakota Dept. of Transportation	Planned
Commercial Vehicle Check	ASPEN	South Dakota Dept. of Transportation	Existing
Commercial Vehicle Check	Electronic Screening	South Dakota Dept. of Transportation	Planned

Entity	Element	Stakeholder	Status
	Roadside System Server	South Dakota Dept. of Transportation	Planned
Commercial Vehicle Driver	Commercial Vehicle Driver	Motor Carriers	Existing
Commercial Vehicle Subsystem	Automated Vehicle Identification	Motor Carriers	Existing
CVO Inspector	CVO Inspector	South Dakota Highway Patrol	Existing
Emergency Management	County Civil Defense or EOC	County Civil Defense or EOC	Planned
	County, Municipal and Tribal Public Safety Dispatch	County and Municipal Public Safety	Planned
	HazMat	South Dakota Dept. of Environment and Natural Resources	Planned
	Local and Municipal EOC	Local and Municipal EOCs	Existing
	Private Sector Service Provider EOC	Private Sector Service Provider	Planned
	SD Dept of GFP and National Parks Operations Centers	South Dakota Department of Game, Fish and Parks and National Parks	Existing
	SD Governors Office of Homeland Security	SD Governors Office	Existing
	SD LETS Teletype	State, County, Local Law Enforcement Agencies	Existing
	SD Office of Emergency Management EOC	SD Office of Emergency Management	Existing
	SDHP District Offices	SDHP	Existing
	State Radio Query Application	South Dakota Bureau of Information and Telecommunications	Existing
Emergency Telecommunications System	Emergency Telecommunications System	Emergency Telecommunications System	Existing
Emergency Vehicle Subsystem	County Sheriff and Municipal Police Vehicles	County and Municipal Public Safety	Planned
	County, Municipal and Tribal Fire Rescue Vehicles	County and Municipal Public Safety	Planned
	SD Dept of GFP and National Parks Emergency Vehicles	South Dakota Department of Game, Fish and Parks and National Parks	Planned
	SDHP Vehicles	SDHP	Planned
Enforcement Agency	Accident Reporting System Client	South Dakota Dept. of Transportation	Planned
	Accident Reporting System Server	South Dakota Dept. of Transportation	Planned
	CVO Inspector	South Dakota Highway Patrol	Existing
	Unified Judicial System	South Dakota Unified Judicial System	Planned
Equipment Repair Facility	County, Municipal and Tribal Equipment Repair Facility	County and Municipal Transportation Agency	Existing
	SDDOT Equipment Repair Facility	South Dakota Dept. of Transportation	Existing
Event Promoters	SD Department of Tourism Public Information Office	SD Department of Tourism	Existing

Entity	Element	Stakeholder	Status
Financial Institution	South Dakota State Treasury	South Dakota Dept. of Treasury	Existing
	Carrier Banks	Private Financial Institutions	Existing
Fleet and Freight Management	Motor Carrier System	Motor Carriers	Existing
Information Service Provider	Other Road and Weather Information Systems	Other States	Planned
	Private Sector Service Provider Information Operations Center	Private Sector Service Provider	Planned
	SD Dept of GFP and National Parks Web Site	South Dakota Department of Game, Fish and Parks and National Parks	Planned
	SD State Web Site	SD State Web Site Administrative Agency	Existing
	SDDOT 511 Traveler Information System	South Dakota Dept. of Transportation	Existing
	SDDOT Integrated Traveler Information Webpage	South Dakota Dept. of Transportation	Existing
	SDDOT Road and Weather Information System	South Dakota Dept. of Transportation	Planned
Maintenance and Construction Management	County, Municipal and Tribal Roadway Maintenance Dispatch	County and Municipal Transportation Agency	Existing
	County, Municipal and Tribal Traffic Operations and Communications Center	County and Municipal Transportation Agency	Existing
	SDDOT Office of Operations	South Dakota Dept. of Transportation	Planned
	SDDOT Region and Area Construction and Maintenance Office	South Dakota Dept. of Transportation	Planned
	SDDOT Road and Weather Information System	South Dakota Dept. of Transportation	Planned
Maintenance and Construction Vehicle	County, Municipal and Tribal Roadway Maintenance Vehicles	County and Municipal Transportation Agency	Planned
	SDDOT Maintenance Vehicles	South Dakota Dept. of Transportation	Planned
Media	Cable Public Access Channels	Cable Public Access Television Systems	Planned
Multimodal Transportation Service Provider	Local Taxi Operator Scheduling System	Local Taxi Operators	Planned
	Local Van Pool Operator Scheduling System	Local Van Pool Operators	Planned
Parking Management	SD Dept of GFP and National Parks Parking Management Systems	South Dakota Department of Game, Fish and Parks and National Parks	Planned
Personal Information Access	Private Travelers Personal Access Equipment	Private Travelers	Existing
	SDDOT Kiosks	South Dakota Dept. of Transportation	Existing
Rail Operations	Rail Operators	Rail Operators	Existing
Remote Traveler Support	SD Dept of GFP and National Parks Kiosks	South Dakota Department of Game, Fish and Parks and National Parks	Planned

Entity	Element	Stakeholder	Status
	SDDOT Kiosks	South Dakota Dept. of Transportation	Existing
	Transit Kiosks	Transit Operators	Planned
Roadway Subsystem	County, Municipal and Tribal Traffic Data Collection System	County and Municipal Transportation Agency	Planned
	Rest Area Operators CCTV	Rest Area Operators	Planned
	SDDOT CCTV	South Dakota Dept. of Transportation	Planned
	SDDOT DMS	South Dakota Dept. of Transportation	Existing
	SDDOT Fixed Anti-Icing Systems	South Dakota Dept. of Transportation	Planned
	SDDOT HAR	South Dakota Dept. of Transportation	Planned
	SDDOT Mobile Field Equipment	South Dakota Dept. of Transportation	Planned
	SDDOT Remote Controlled Snow Gates	South Dakota Dept. of Transportation	Planned
	SDDOT RWIS Stations	South Dakota Dept. of Transportation	Existing
	SDDOT Traffic Data Collection System	South Dakota Dept. of Transportation	Existing
	SDDOT Work Zone Field Sensors	South Dakota Dept. of Transportation	Planned
	State, County and Municipal Traffic Operations Field Equipment	County and Municipal Transportation Agency	Existing
Surface Transportation Weather Service	Meridian Maintenance Weather Forecast System	Private Weather Service Providers	Existing
	SDDOT Road and Weather Information System	South Dakota Dept. of Transportation	Planned
Traffic Management	County, Municipal and Tribal Traffic Operations and Communications Center	County and Municipal Transportation Agency	Existing
	SDDOT Mobile Traffic Management Center	South Dakota Dept. of Transportation	Planned
	SDDOT Office of Operations	South Dakota Dept. of Transportation	Planned
	SDDOT Region and Area Construction and Maintenance Office	South Dakota Dept. of Transportation	Planned
	SDDOT Road and Weather Information System	South Dakota Dept. of Transportation	Planned
	SDDOT Roadway Design Office	South Dakota Dept. of Transportation	Existing
Transit Management	Transit Operator Transit Management Systems	Transit Operators	Planned
Transit Vehicle Subsystem	Transit Vehicles	Transit Operators	Planned
Vehicle	Private Travelers Vehicles	Private Travelers	Existing
Wayside Equipment	Rail Operators Wayside Equipment	Rail Operators	Existing
Weather Service	National Weather Service	National Weather Service	Existing

5.6. Transportation Services

The ITS systems in the region currently provide a number of transportation services and that list will grow as more systems are developed or upgraded. The services are described by the set of market packages that are shown in Table 8. This table provides for each market package the status (is it currently provided or planned) and the primary elements associated with the market package.

Table 8: Statewide Market Packages

Market Package Key	Market Package Name	Element	Status
AD1	ITS Data Mart	Accident Reporting System Client	Planned
AD1	ITS Data Mart	Accident Reporting System Server	Planned
AD1	ITS Data Mart	County, Municipal and Tribal Infrastructure Inventory System	Planned
AD1	ITS Data Mart	County, Municipal and Tribal Public Safety Dispatch	Planned
AD1	ITS Data Mart	County, Municipal and Tribal Traffic Data Collection System	Planned
AD1	ITS Data Mart	County, Municipal and Tribal Traffic Operations and Communications Center	Planned
AD1	ITS Data Mart	MPO Operational Database	Planned
AD1	ITS Data Mart	SDDOT Infrastructure Inventory System	Planned
AD1	ITS Data Mart	SDDOT Office of Data Inventory	Planned
AD1	ITS Data Mart	SDDOT Office of Data Inventory Users	Planned
AD1	ITS Data Mart	SDDOT Region and Area Construction and Maintenance Office	Planned
AD1	ITS Data Mart	SDDOT Roadway Design Office	Planned
AD1	ITS Data Mart	SDDOT Statewide Signal Maintenance Archive	Planned
AD1	ITS Data Mart	SDDOT Statewide Signal Maintenance Archive Users	Planned
AD1	ITS Data Mart	SDDOT Traffic Data Collection System	Planned
AD1	ITS Data Mart	State Radio Query Application	Planned
AD1	ITS Data Mart	State, County, Municipal and Tribal Infrastructure Inventory System Users	Planned
APTS1	Transit Vehicle Tracking	Transit Operator Transit Management Systems	Planned
APTS1	Transit Vehicle Tracking	Transit Vehicles	Planned
APTS2	Transit Fixed-Route Operations	County, Municipal and Tribal Roadway Maintenance Dispatch	Planned
APTS2	Transit Fixed-Route Operations	County, Municipal and Tribal Traffic Operations and Communications Center	Planned
APTS2	Transit Fixed-Route Operations	Private Sector Service Provider Information Operations Center	Planned
APTS2	Transit Fixed-Route Operations	SDDOT Region and Area Construction and Maintenance Office	Planned
APTS2	Transit Fixed-Route Operations	SDDOT Road and Weather Information System	Planned
APTS2	Transit Fixed-Route	Transit Operator Transit Management Systems	Planned

Market Package Key	Market Package Name	Element	Status
	Operations		
APTS2	Transit Fixed-Route Operations	Transit Vehicles	Planned
APTS5	Transit Security	County, Municipal and Tribal Public Safety Dispatch	Planned
APTS5	Transit Security	State Radio Query Application	Planned
APTS5	Transit Security	Transit Kiosks	Planned
APTS5	Transit Security	Transit Operator Transit Management Systems	Planned
APTS5	Transit Security	Transit Vehicles	Planned
APTS8	Transit Traveler Information	Private Sector Service Provider Information Operations Center	Planned
APTS8	Transit Traveler Information	Private Travelers Personal Access Equipment	Planned
APTS8	Transit Traveler Information	Transit Kiosks	Planned
APTS8	Transit Traveler Information	Transit Operator Transit Management Systems	Planned
APTS8	Transit Traveler Information	Transit Vehicles	Planned
ATIS2	Interactive Traveler Information	Cable Public Access Channels	Planned
ATIS2	Interactive Traveler Information	County, Municipal and Tribal Public Safety Dispatch	Planned
ATIS2	Interactive Traveler Information	Other Road and Weather Information Systems	Planned
ATIS2	Interactive Traveler Information	Private Sector Service Provider Information Operations Center	Planned
ATIS2	Interactive Traveler Information	Private Travelers Personal Access Equipment	Planned
ATIS2	Interactive Traveler Information	Private Travelers Vehicles	Planned
ATIS2	Interactive Traveler Information	SD Dept of GFP and National Parks Kiosks	Planned
ATIS2	Interactive Traveler Information	SD Dept of GFP and National Parks Operations Centers	Planned
ATIS2	Interactive Traveler Information	SD Dept of GFP and National Parks Web Site	Planned
ATIS2	Interactive Traveler Information	SD State Web Site	Planned
ATIS2	Interactive Traveler Information	SDDOT 511 Traveler Information System	Planned
ATIS2	Interactive Traveler Information	SDDOT Integrated Traveler Information Webpage	Planned
ATIS2	Interactive Traveler Information	SDDOT Kiosks	Planned
ATIS2	Interactive Traveler Information	SDDOT Region and Area Construction and Maintenance Office	Planned
ATIS2	Interactive Traveler Information	SDDOT Road and Weather Information System	Planned
ATMS01	Network Surveillance	County, Municipal and Tribal Traffic Operations and Communications Center	Existing
ATMS01	Network Surveillance	Rest Area Operators CCTV	Existing
ATMS01	Network Surveillance	SDDOT CCTV	Existing
ATMS01	Network Surveillance	SDDOT DMS	Existing
ATMS01	Network Surveillance	SDDOT Mobile Field Equipment	Existing

Market Package Key	Market Package Name	Element	Status
ATMS01	Network Surveillance	SDDOT Mobile Traffic Management Center	Existing
ATMS01	Network Surveillance	SDDOT Office of Operations	Existing
ATMS01	Network Surveillance	SDDOT Region and Area Construction and Maintenance Office	Existing
ATMS01	Network Surveillance	SDDOT Road and Weather Information System	Existing
ATMS01	Network Surveillance	SDDOT Traffic Data Collection System	Existing
ATMS01	Network Surveillance	State, County and Municipal Traffic Operations Field Equipment	Existing
ATMS03	Surface Street Control	County, Municipal and Tribal Traffic Operations and Communications Center	Existing
ATMS03	Surface Street Control	SDDOT Office of Operations	Existing
ATMS03	Surface Street Control	SDDOT Region and Area Construction and Maintenance Office	Existing
ATMS03	Surface Street Control	SDDOT Roadway Design Office	Existing
ATMS03	Surface Street Control	State, County and Municipal Traffic Operations Field Equipment	Existing
ATMS06	Traffic Information Dissemination	Cable Public Access Channels	Existing
ATMS06	Traffic Information Dissemination	County Civil Defense or EOC	Existing
ATMS06	Traffic Information Dissemination	County, Municipal and Tribal Public Safety Dispatch	Existing
ATMS06	Traffic Information Dissemination	Local and Municipal EOC	Existing
ATMS06	Traffic Information Dissemination	Private Sector Service Provider EOC	Existing
ATMS06	Traffic Information Dissemination	SDDOT DMS	Existing
ATMS06	Traffic Information Dissemination	SDDOT HAR	Existing
ATMS06	Traffic Information Dissemination	SDDOT Mobile Field Equipment	Existing
ATMS06	Traffic Information Dissemination	SDDOT Mobile Traffic Management Center	Existing
ATMS06	Traffic Information Dissemination	SDDOT Region and Area Construction and Maintenance Office	Existing
ATMS06	Traffic Information Dissemination	SDDOT Road and Weather Information System	Existing
ATMS06	Traffic Information Dissemination	State Radio Query Application	Existing
ATMS06	Traffic Information Dissemination	Transit Operator Transit Management Systems	Existing
ATMS07	Regional Traffic Control	County, Municipal and Tribal Traffic Operations and Communications Center	Planned
ATMS07	Regional Traffic Control	SDDOT Mobile Traffic Management Center	Planned
ATMS07	Regional Traffic Control	SDDOT Office of Operations	Planned
ATMS07	Regional Traffic Control	SDDOT Region and Area Construction and Maintenance Office	Planned
ATMS07	Regional Traffic Control	SDDOT Road and Weather Information System	Planned
ATMS07	Regional Traffic Control	SDDOT Roadway Design Office	Planned
ATMS08	Incident Management	County Civil Defense or EOC	Planned

Market Package Key	Market Package Name	Element	Status
	System		
ATMS08	Incident Management System	County Sheriff and Municipal Police Vehicles	Planned
ATMS08	Incident Management System	County, Municipal and Tribal Fire Rescue Vehicles	Planned
ATMS08	Incident Management System	County, Municipal and Tribal Public Safety Dispatch	Planned
ATMS08	Incident Management System	County, Municipal and Tribal Roadway Maintenance Dispatch	Planned
ATMS08	Incident Management System	County, Municipal and Tribal Traffic Operations and Communications Center	Planned
ATMS08	Incident Management System	Local and Municipal EOC	Planned
ATMS08	Incident Management System	Private Sector Service Provider EOC	Planned
ATMS08	Incident Management System	SD Department of Tourism Public Information Office	Planned
ATMS08	Incident Management System	SD Dept of GFP and National Parks Emergency Vehicles	Planned
ATMS08	Incident Management System	SD Dept of GFP and National Parks Operations Centers	Planned
ATMS08	Incident Management System	SD LETS Teletype	Planned
ATMS08	Incident Management System	SDDOT Mobile Traffic Management Center	Planned
ATMS08	Incident Management System	SDDOT Office of Operations	Planned
ATMS08	Incident Management System	SDDOT Region and Area Construction and Maintenance Office	Planned
ATMS08	Incident Management System	SDDOT Road and Weather Information System	Planned
ATMS08	Incident Management System	SDDOT Roadway Design Office	Planned
ATMS08	Incident Management System	SDHP Vehicles	Planned
ATMS08	Incident Management System	State Radio Query Application	Planned
ATMS13	Standard Railroad Grade Crossing	County, Municipal and Tribal Traffic Operations and Communications Center	Planned
ATMS13	Standard Railroad Grade Crossing	Rail Operators	Planned
ATMS13	Standard Railroad Grade Crossing	Rail Operators Wayside Equipment	Planned
ATMS13	Standard Railroad Grade Crossing	State, County and Municipal Traffic Operations Field Equipment	Planned
ATMS15	Railroad Operations Coordination	County, Municipal and Tribal Traffic Operations and Communications Center	Planned
ATMS15	Railroad Operations Coordination	Rail Operators	Planned
ATMS16	Parking Facility Management	Private Sector Service Provider Information Operations Center	Planned

Market Package Key	Market Package Name	Element	Status
ATMS16	Parking Facility Management	SD Dept of GFP and National Parks Parking Management Systems	Planned
ATMS16	Parking Facility Management	SDDOT Road and Weather Information System	Planned
CVO03	Electronic Clearance	Accident Reporting System Client	Planned
CVO03	Electronic Clearance	Accident Reporting System Server	Planned
CVO03	Electronic Clearance	Automated Vehicle Identification	Planned
CVO03	Electronic Clearance	Commercial Vehicle	Planned
CVO03	Electronic Clearance	Commercial Vehicle Driver	Planned
CVO03	Electronic Clearance	COVERS	Planned
CVO03	Electronic Clearance	COVERS ft	Planned
CVO03	Electronic Clearance	CVO Inspector	Planned
CVO03	Electronic Clearance	Electronic Screening	Planned
CVO03	Electronic Clearance	HazMat	Planned
CVO03	Electronic Clearance	Roadside System Server	Planned
CVO03	Electronic Clearance	South Dakota Automated Permitting System Server	Planned
CVO03	Electronic Clearance	SSRS, Interstate Exempt Reg.	Planned
CVO03	Electronic Clearance	Title/Registration	Planned
CVO03	Electronic Clearance	xCVIEW	Planned
CVO04	CV Administrative Processes	Accident Reporting System Client	Existing
CVO04	CV Administrative Processes	Accident Reporting System Server	Existing
CVO04	CV Administrative Processes	CAPRI	Existing
CVO04	CV Administrative Processes	Carrier Banks	Existing
CVO04	CV Administrative Processes	CDL/DL	Existing
CVO04	CV Administrative Processes	COVERS	Existing
CVO04	CV Administrative Processes	COVERS ft	Existing
CVO04	CV Administrative Processes	COVERSnet	Existing
CVO04	CV Administrative Processes	CVO Inspector	Existing
CVO04	CV Administrative Processes	IFTA Clearinghouse	Existing
CVO04	CV Administrative Processes	IRP Clearinghouse	Existing
CVO04	CV Administrative Processes	Motor Carrier Management Information System	Existing
CVO04	CV Administrative Processes	Motor Carrier System	Existing
CVO04	CV Administrative Processes	SAFER	Existing
CVO04	CV Administrative Processes	SAFETYNET 2000	Existing
CVO04	CV Administrative Processes	South Dakota Automated Permitting System Client	Existing

Market Package Key	Market Package Name	Element	Status
CVO04	CV Administrative Processes	South Dakota Automated Permitting System Server	Existing
CVO04	CV Administrative Processes	South Dakota State Treasury	Existing
CVO04	CV Administrative Processes	SSRS, Interstate Exempt Reg.	Existing
CVO04	CV Administrative Processes	Title/Registration	Existing
CVO04	CV Administrative Processes	xCVIEW	Existing
CVO06	Weigh-In-Motion	Automated Vehicle Identification	Planned
CVO06	Weigh-In-Motion	Commercial Vehicle	Planned
CVO06	Weigh-In-Motion	Commercial Vehicle Driver	Planned
CVO06	Weigh-In-Motion	Electronic Screening	Planned
CVO06	Weigh-In-Motion	Roadside System Server	Planned
CVO07	Roadside CVO Safety	Accident Reporting System Client	Planned
CVO07	Roadside CVO Safety	Accident Reporting System Server	Planned
CVO07	Roadside CVO Safety	ASPEN	Planned
CVO07	Roadside CVO Safety	CAPRI	Planned
CVO07	Roadside CVO Safety	CDL/DL	Planned
CVO07	Roadside CVO Safety	Commercial Vehicle	Planned
CVO07	Roadside CVO Safety	Commercial Vehicle Driver	Planned
CVO07	Roadside CVO Safety	CVO Inspector	Planned
CVO07	Roadside CVO Safety	Electronic Screening	Planned
CVO07	Roadside CVO Safety	HazMat	Planned
CVO07	Roadside CVO Safety	Roadside System Server	Planned
CVO07	Roadside CVO Safety	SAFER	Planned
CVO07	Roadside CVO Safety	SAFETYNET 2000	Planned
CVO07	Roadside CVO Safety	State Radio Query Application	Planned
CVO07	Roadside CVO Safety	xCVIEW	Planned
CVO10	HAZMAT Management	Automated Vehicle Identification	Planned
CVO10	HAZMAT Management	Commercial Vehicle	Planned
CVO10	HAZMAT Management	HazMat	Planned
CVO10	HAZMAT Management	Motor Carrier System	Planned
EM1	Emergency Response	BIT Public Safety Incident and Mutual Aid Network	Planned
EM1	Emergency Response	Cable Public Access Channels	Planned
EM1	Emergency Response	County Civil Defense or EOC	Planned
EM1	Emergency Response	County, Municipal and Tribal Fire Rescue Vehicles	Planned
EM1	Emergency Response	County, Municipal and Tribal Public Safety Dispatch	Planned
EM1	Emergency Response	County, Municipal and Tribal Roadway Maintenance Dispatch	Planned
EM1	Emergency Response	County, Municipal and Tribal Traffic Operations and Communications Center	Planned
EM1	Emergency Response	Emergency Telecommunications System	Planned
EM1	Emergency Response	Local and Municipal EOC	Planned
EM1	Emergency Response	Private Sector Service Provider EOC	Planned
EM1	Emergency Response	SD Dept of GFP and National Parks Emergency Vehicles	Planned

Market Package Key	Market Package Name	Element	Status
EM1	Emergency Response	SD Dept of GFP and National Parks Operations Centers	Planned
EM1	Emergency Response	SD Governors Office of Homeland Security	Planned
EM1	Emergency Response	SD Office of Emergency Management EOC	Planned
EM1	Emergency Response	SDDOT Mobile Traffic Management Center	Planned
EM1	Emergency Response	SDDOT Region and Area Construction and Maintenance Office	Planned
EM1	Emergency Response	SDHP District Offices	Planned
EM1	Emergency Response	SDHP Vehicles	Planned
EM1	Emergency Response	State Radio Query Application	Planned
EM1	Emergency Response	Transit Operator Transit Management Systems	Planned
EM2	Emergency Routing	County Sheriff and Municipal Police Vehicles	Planned
EM2	Emergency Routing	County, Municipal and Tribal Fire Rescue Vehicles	Planned
EM2	Emergency Routing	County, Municipal and Tribal Public Safety Dispatch	Planned
EM2	Emergency Routing	County, Municipal and Tribal Roadway Maintenance Dispatch	Planned
EM2	Emergency Routing	County, Municipal and Tribal Traffic Operations and Communications Center	Planned
EM2	Emergency Routing	SDDOT Region and Area Construction and Maintenance Office	Planned
EM2	Emergency Routing	SDDOT Roadway Design Office	Planned
EM2	Emergency Routing	SDHP Vehicles	Planned
EM2	Emergency Routing	State, County and Municipal Traffic Operations Field Equipment	Planned
EM3	Mayday Support	BIT Public Safety Incident and Mutual Aid Network	Planned
EM3	Mayday Support	County, Municipal and Tribal Public Safety Dispatch	Planned
EM3	Mayday Support	Private Travelers Personal Access Equipment	Planned
EM3	Mayday Support	Private Travelers Vehicles	Planned
EM3	Mayday Support	SDDOT Kiosks	Planned
MC01	Maintenance and Construction Vehicle Tracking	County, Municipal and Tribal Roadway Maintenance Dispatch	Planned
MC01	Maintenance and Construction Vehicle Tracking	County, Municipal and Tribal Roadway Maintenance Vehicles	Planned
MC01	Maintenance and Construction Vehicle Tracking	SDDOT Maintenance Vehicles	Planned
MC01	Maintenance and Construction Vehicle Tracking	SDDOT Region and Area Construction and Maintenance Office	Planned
MC02	Maintenance and Construction Vehicle Maintenance	County, Municipal and Tribal Equipment Repair Facility	Planned
MC02	Maintenance and Construction Vehicle Maintenance	County, Municipal and Tribal Roadway Maintenance Dispatch	Planned

Market Package Key	Market Package Name	Element	Status
MC02	Maintenance and Construction Vehicle Maintenance	County, Municipal and Tribal Roadway Maintenance Vehicles	Planned
MC02	Maintenance and Construction Vehicle Maintenance	SDDOT Equipment Repair Facility	Planned
MC02	Maintenance and Construction Vehicle Maintenance	SDDOT Maintenance Vehicles	Planned
MC02	Maintenance and Construction Vehicle Maintenance	SDDOT Region and Area Construction and Maintenance Office	Planned
MC03	Road Weather Data Collection	Meridian Maintenance Weather Forecast System	Planned
MC03	Road Weather Data Collection	National Weather Service	Planned
MC03	Road Weather Data Collection	SDDOT Region and Area Construction and Maintenance Office	Planned
MC03	Road Weather Data Collection	SDDOT RWIS Stations	Planned
MC04	Weather Information Processing and Distribution	Cable Public Access Channels	Planned
MC04	Weather Information Processing and Distribution	County Civil Defense or EOC	Planned
MC04	Weather Information Processing and Distribution	County, Municipal and Tribal Public Safety Dispatch	Planned
MC04	Weather Information Processing and Distribution	County, Municipal and Tribal Roadway Maintenance Dispatch	Planned
MC04	Weather Information Processing and Distribution	County, Municipal and Tribal Traffic Operations and Communications Center	Planned
MC04	Weather Information Processing and Distribution	Local and Municipal EOC	Planned
MC04	Weather Information Processing and Distribution	Meridian Maintenance Weather Forecast System	Planned
MC04	Weather Information Processing and Distribution	National Weather Service	Planned
MC04	Weather Information Processing and Distribution	Private Sector Service Provider EOC	Planned
MC04	Weather Information Processing and Distribution	Rail Operators	Planned
MC04	Weather Information Processing and Distribution	SD Governors Office of Homeland Security	Planned
MC04	Weather Information Processing and Distribution	SD Office of Emergency Management EOC	Planned
MC04	Weather Information Processing and Distribution	SDDOT Region and Area Construction and Maintenance Office	Planned
MC04	Weather Information Processing and Distribution	SDDOT Road and Weather Information System	Planned
MC04	Weather Information Processing and Distribution	State Radio Query Application	Planned

Market Package Key	Market Package Name	Element	Status
MC04	Weather Information Processing and Distribution	Transit Operator Transit Management Systems	Planned
MC05	Roadway Automated Treatment	SDDOT Fixed Anti-Icing Systems	Planned
MC05	Roadway Automated Treatment	SDDOT Region and Area Construction and Maintenance Office	Planned
MC06	Winter Maintenance	County Civil Defense or EOC	Planned
MC06	Winter Maintenance	County, Municipal and Tribal Public Safety Dispatch	Planned
MC06	Winter Maintenance	County, Municipal and Tribal Roadway Maintenance Dispatch	Planned
MC06	Winter Maintenance	County, Municipal and Tribal Roadway Maintenance Vehicles	Planned
MC06	Winter Maintenance	County, Municipal and Tribal Traffic Operations and Communications Center	Planned
MC06	Winter Maintenance	Local and Municipal EOC	Planned
MC06	Winter Maintenance	Meridian Maintenance Weather Forecast System	Planned
MC06	Winter Maintenance	National Weather Service	Planned
MC06	Winter Maintenance	Private Sector Service Provider EOC	Planned
MC06	Winter Maintenance	SDDOT Maintenance Vehicles	Planned
MC06	Winter Maintenance	SDDOT Region and Area Construction and Maintenance Office	Planned
MC06	Winter Maintenance	SDDOT Road and Weather Information System	Planned
MC06	Winter Maintenance	SDDOT Roadway Design Office	Planned
MC06	Winter Maintenance	State Radio Query Application	Planned
MC06	Winter Maintenance	Transit Operator Transit Management Systems	Planned
MC07	Roadway Maintenance and Construction	County Civil Defense or EOC	Planned
MC07	Roadway Maintenance and Construction	County, Municipal and Tribal Public Safety Dispatch	Planned
MC07	Roadway Maintenance and Construction	County, Municipal and Tribal Roadway Maintenance Dispatch	Planned
MC07	Roadway Maintenance and Construction	County, Municipal and Tribal Roadway Maintenance Vehicles	Planned
MC07	Roadway Maintenance and Construction	County, Municipal and Tribal Traffic Operations and Communications Center	Planned
MC07	Roadway Maintenance and Construction	Local and Municipal EOC	Planned
MC07	Roadway Maintenance and Construction	SDDOT Maintenance Vehicles	Planned
MC07	Roadway Maintenance and Construction	SDDOT Region and Area Construction and Maintenance Office	Planned
MC07	Roadway Maintenance and Construction	State Radio Query Application	Planned
MC09	Work Zone Safety Monitoring	County, Municipal and Tribal Roadway Maintenance Dispatch	Planned
MC09	Work Zone Safety Monitoring	County, Municipal and Tribal Roadway Maintenance Vehicles	Planned
MC09	Work Zone Safety	SDDOT Maintenance Vehicles	Planned

Market Package Key	Market Package Name	Element	Status
	Monitoring		
MC09	Work Zone Safety Monitoring	SDDOT Region and Area Construction and Maintenance Office	Planned
MC09	Work Zone Safety Monitoring	SDDOT Work Zone Field Sensors	Planned
MC09	Work Zone Safety Monitoring	State, County and Municipal Traffic Operations Field Equipment	Planned

5.7. Interfaces and Information Exchanges

5.7.1. Top Level Regional System Interconnect Diagram

A system interconnect diagram, or sausage diagram, shows the systems and primary types of interconnections in the region. The National ITS Architecture interconnect diagram has been customized for South Dakota based on the information gathered from the stakeholders and the system inventory. Figure 3 on the following page summarizes the existing and planned ITS elements for the region in the context of physical interconnects. ITS elements identified for South Dakota ITS deployments (and their primary associated National ITS Architecture entity) are called out in the boxes surrounding the central interconnect diagram. In the center of the figure the rectangles represent the subsystems of the National ITS Architecture. The South Dakota Rural ITS architecture has elements that map to 18 of the 21 subsystems of the National ITS Architecture. In addition, the regional ITS architecture has elements that map to 13 terminators of the National ITS Architecture. These terminators are represented by the rightmost column of boxes on the diagram and include entities such as Event Promoters (which map to the *SD Department of Tourism Public Information Office*).

The diagram also identifies the three basic types of communications used to interconnect the elements of the ITS architecture. These communications types are defined as:

- Wireline Communications:
  A communications link serving stationary sources. It may be implemented using a variety of public or private communications networks that may physically include wireless (e.g., microwave) as well as wireline infrastructure. Both dedicated and shared communications resources may be used.

- Wide Area Wireless Communications:
  A communications link that provides communications via a wireless device between a user and an infrastructure-based system. Both broadcast (one-way) and interactive (two-way) communications services are grouped into wide-area wireless communications. These links support a range of services including real-time traveler information and various forms of fleet communications.

- Dedicated Short Range Communications:
  A wireless communications channel used for close-proximity communications between vehicles and the immediate infrastructure. It supports location-specific communications for

ITS capabilities such as toll collection, transit vehicle management, driver information, and automated commercial vehicle operations.

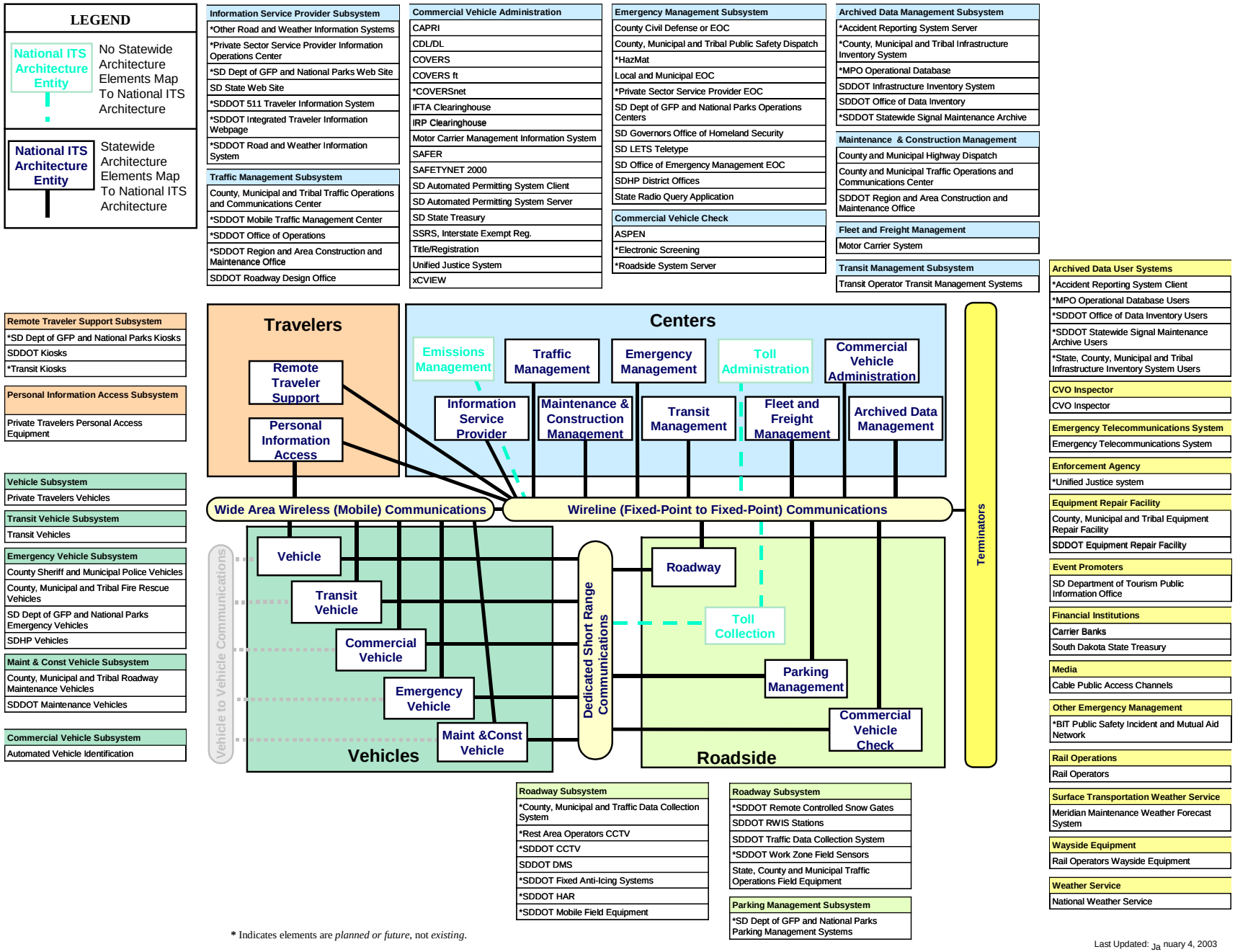


Figure 3: South Dakota Statewide and CVISN ITS Architecture System Interconnect Diagram

5.7.2. Customized Market Packages

The market packages of the National ITS Architecture were customized to reflect the unique systems and connections of South Dakota. Each market package is shown graphically with the market package name, and the Market Package elements (shown as boxes) identified by the entity from the National ITS Architecture that they represent and the specific instances of South Dakota ITS elements associated with the entity. In addition the market packages show the information flows (also known as Architecture Flows) that move between elements.

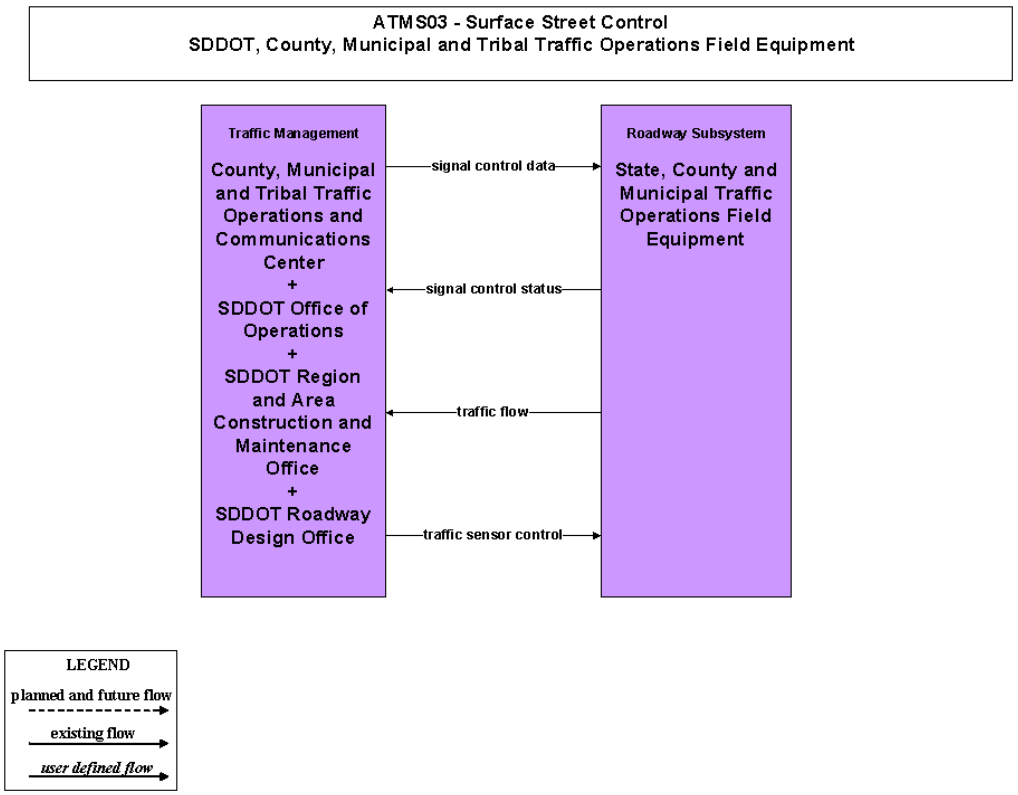


Figure 4: Example Customized Market Package

Figure 4 is an example of an ATMS (Advanced Traffic Management Systems) market package for *Surface Street Control* that has been customized for the South Dakota Statewide ITS Architecture. This market package shows the two subsystem entities, Traffic Management and Roadway, and the associated South Dakota ITS elements that are specific instances of these entities. Information flows (called "architecture flows" in the National ITS Architecture) between the subsystems indicate what information is being shared. The market packages that were customized for the South Dakota Statewide ITS Architecture are shown in Appendix B. These market packages can also be found on the South Dakota Statewide ITS Architecture web pages by selecting the "Market Packages" button. Market packages are grouped by functional areas (e.g. Traffic Management, Maintenance and Construction, and Public Transportation) and each set of customized market packages can be viewed by clicking on the Market Package Diagram icon under each area heading. Alternately, to access the diagrams for a specific market package, click on the underlined number in the Market Package column (e.g. ATMS03). It is

important to note that while the market package table on the web page shows all of the market packages from the National ITS Architecture, only those selected for the South Dakota Statewide architecture are included in the diagrams. The selected market packages on the web page are highlighted in the web page table with bold print and are indicated as existing or planned.

5.7.3. Regional Architecture Information Flows

While it is important to identify the various systems and stakeholders as part of a regional ITS architecture, a primary purpose of the ITS architecture is to identify the *connectivity* between transportation systems in the region. The interconnect diagram shown previously in Figure 3 showed the high level relationships of the elements in the region. The customized market packages represent services that can be deployed as an integrated capability, and the market package diagrams show the information flows between the subsystems and terminators that are most important to the operation of the market packages. How these systems interface with each other is an integral part of the overall architecture.

There are 101 different elements identified as part of the South Dakota Rural ITS Architecture. These elements include city, county and state traffic and maintenance centers, maintenance vehicles, transit centers, transit vehicles, public safety dispatch centers, media outlets, and others—essentially all of the existing and planned physical components that contribute to the statewide intelligent transportation system. Interfaces have been defined for each element in the architecture. For example, the *SDDOT Road and Weather Information System* has existing or planned interfaces with 27 other elements in the state ranging from field equipment to transit centers. Some of the interfaces are far less complex. For example the *SDDOT RWIS Sensors* has interfaces with only one other element in the ITS architecture.

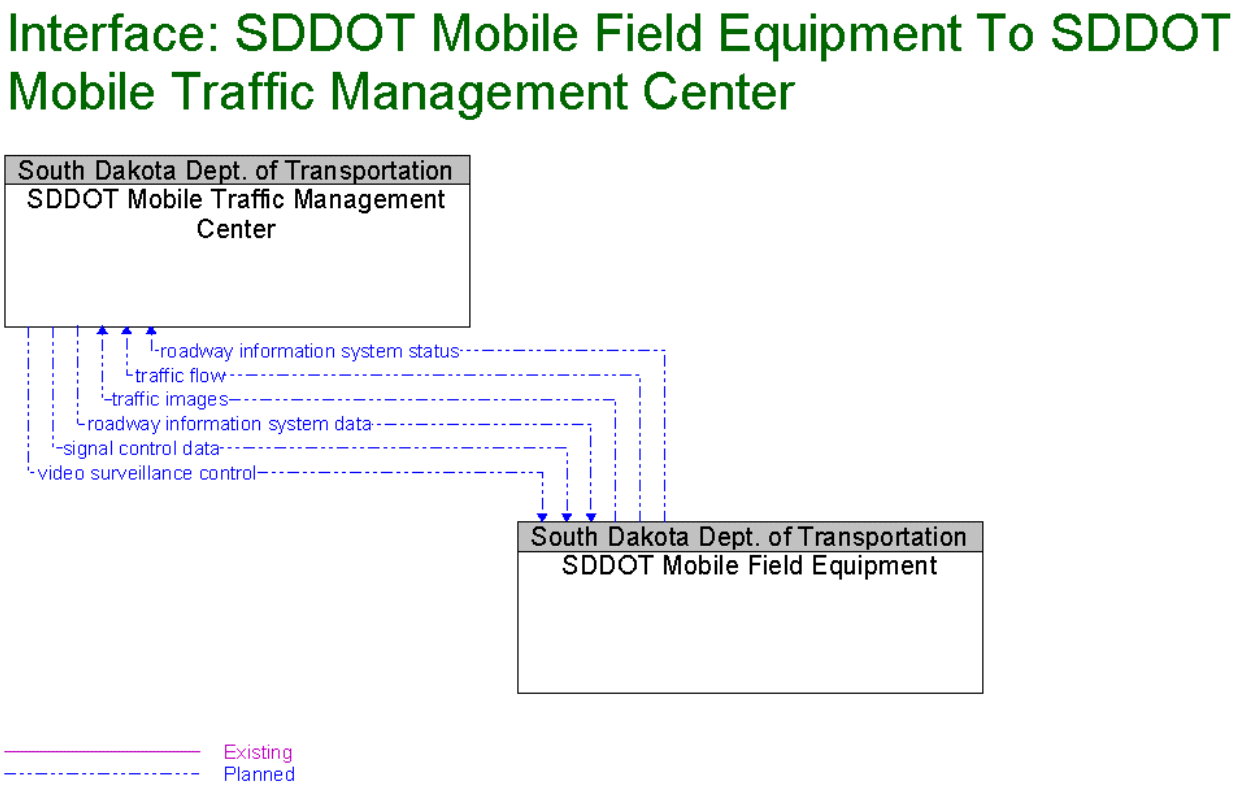
Each element and its defined interfaces are listed in tabular form in Appendix C. Elements and their interfaces are also accessible via the South Dakota Statewide ITS Architecture web page by clicking on the *Interfaces* button. On the web page elements are listed alphabetically in the column on the left, and each entry in the Interfacing Element column on the right is a link to more detailed information about the particular interface.

Architecture flows between the elements define specific information that is exchanged by the elements. Each architecture flow has a direction, name and definition. Most of the architecture flows match ones from the National ITS Architecture (the mapping of elements to National ITS Architecture entities allowed the developers to match the architecture flows to the appropriate interfaces.) In some cases new user defined flows have been created for interfaces or connectivities that are not expressed in the National ITS Architecture. These architecture flows define the interface requirements between the various elements in the regional ITS architecture.

An example of the architecture flows between two elements is shown in Figure 5. In this interface the flows that go between the planned element *SDDOT Mobile Traffic Management Center* and *SDDOT Mobile Field Equipment* (which might include portable dynamic message signs or CCTV). These elements are planned, so all the flows on this interface are shown as planned.

Each of the individual element interfaces can be accessed on the web page by clicking on the "Interfaces" button. Selecting any of the interfacing elements from the column on the right will display an interface diagram and architecture flows between two specific elements, similar to the diagram shown in Figure 5. Scrolling further down the web page each architecture flow is defined. In addition, if there are any ITS standards associated with that architecture flow there will be a standards icon next to the architecture flow name. Clicking on the icon will display another page identifying the applicable standards.

Figure 5: Example of Architecture Flows Between Elements.



5.8. Functional Requirements

Functional requirements are a description of the functions or activities that are currently performed by the ITS elements or that are planned to be performed in the future. For the South Dakota Statewide ITS Architecture, these functions have been developed by using the functional assignments underlying the National ITS Architecture and the mapping from transportation services to elements shown earlier in Table 8.

In the National ITS Architecture a market package is defined by subsystems, equipment packages, and architecture flows, all of which operate together to perform a particular transportation service. Equipment Packages represent pieces of a subsystem (i.e. *sub-subsystems*) that perform a single function. (Note there are no equipment packages defined for

the Terminators of the National ITS Architecture, since they represent systems on the boundary of the architecture and do not have functional descriptions within the architecture.) For example the Surface Street Control market package is composed of the two Traffic Management Subsystem equipment packages *TMC Signal Control* and *Traffic Maintenance* and the two Roadway Subsystem with its two equipment packages *Roadway Signal Control* and *Roadway Equipment Coordination*. The definitions of these four equipment packages, copied from version 4.0 of the National ITS Architecture are:

- TMC Signal Control-
  This Equipment package provides the capability for traffic managers to monitor and manage the traffic flow at signalized intersections. This capability includes analyzing and reducing the collected data from traffic surveillance equipment and developing and implementing control plans for signalized intersections. Control plans may be developed and implemented that coordinate signals at many intersections under the domain of a single traffic management subsystem. In advanced implementations, this package collects route planning information and integrates and uses this information in predicting future traffic conditions and optimizing the traffic control strategy for these conditions. These capabilities are achieved through real-time communication of logged routes from an Information Service Provider. The planned control strategies can be passed back to the Information Service Provider so that the intended strategies can be reflected in future route planning.
- Traffic Maintenance-
  This equipment package provides monitoring and remote diagnostics of field equipment to detect field equipment failures, issues problem reports, and tracks the repair or replacement of the failed equipment.
- Roadway Signal Controls-
  This equipment package provides the capabilities to control traffic signals at major intersections and on main highways for urban areas. This Equipment package is generally constrained to a single jurisdiction.
- Roadway Equipment Coordination-
  This equipment package coordinates field equipment that is distributed along the roadway by supporting direct communications between field equipment. This includes coordination between remote sensors and field devices (e.g., Dynamic Message Signs) and coordination between the field devices themselves (e.g., coordination between traffic controllers that are controlling adjacent intersections.).

The approach used in the South Dakota Statewide ITS architecture is to begin with the mapping of equipment packages to market packages to elements as an initial definition of the functions being performed by each element. Then this mapping is tailored to provide a more accurate picture of the functions performed by the element. In doing this mapping to equipment packages and then tailoring, the architecture has moved beyond the range of capabilities provided by the Turbo Architecture tool. Using additional codes the basic Turbo Architecture database was extended to include this customized equipment package information.

The details of this functional definition are provided on the hyperlinked web site version of the architecture. To access the functions for each element that has been mapped to a subsystem

entity (eg. traffic management subsystem) the user must click on the Functionality Details icon. This will provide a listing of the equipment packages, along with their definitions that have been assigned to the element.

For example, the SDDOT Mobile Traffic Management Center element has the following equipment packages (i.e. functions) assigned to it:

- Collect Traffic Surveillance
- TMC Incident Detection
- TMC Incident Dispatch Coordination/Communication
- TMC Regional Traffic Control
- TMC Traffic Information Dissemination
- Traffic Maintenance

This represents a first level of detail that can be obtained in the hyperlinked web site in connection with functionality. For each of the equipment packages shown, there is another "Details" icon. Selecting this link will take the user to additional levels of detail about the function. The hyperlinked web site uses the relationships inherent in the National ITS Architecture (equipment packages are mapped to process specifications which are mapped to user service requirements) to provide the additional levels of detail.

The assignment of equipment packages to elements (the first level of detail discussed above) is provided in this document in Appendix D. For additional details of functionality, refer to the web site as described above.

5.9. Standards

Discussion of key standards in the region

ITS standards establish a common way in which devices connect and communicate with one another. This allows transportation agencies to implement systems that cost-effectively exchange pertinent data and accommodate equipment replacement, system upgrades, and system expansion. Standards benefit the traveling public by providing products that will function consistently and reliably throughout the region. ITS standards contribute to a safer and more efficient transportation system, facilitate regional interoperability, and promote an innovative and competitive market for transportation products and services.

Use of ITS standards will be very important to project development in South Dakota. Table 9 identifies the ITS standards that are potentially applicable to the state. This table was created by taking the standards information available in the Turbo Architecture database (which identifies standards applicable to each architecture flow) and taking the total set of standards that result from all of the selected flows. The table provides the status of the standards effort as of November 2002 (the most recent update of the information). The status is defined by the following entries:

- Published Standard:
  Available for purchase from the SDO listed.

- Approved Standard:
  The standard has passed balloting process, but has not yet been released for publication
- Balloting Process Initiated:
  An initial version of the standard is under review by the community for possible approval
- Under Development:
  An initial version of the standard is being developed, but has not yet reached the balloting phase.

The following section explains how to identify the specific applicable standards for an individual interface. The table lists the name of the standard in the first column and the Standards Development Organization (SDO) and number of the standard in the second column.

Table 9: Applicable ITS Standards

Standard Title	Standard ID	Status
Commercial Vehicle Safety Reports	ANSI TS284	Published Standard
Commercial Vehicle Safety and Credentials Information Exchange	ANSI TS285	Published Standard
Commercial Vehicle Credentials	ANSI TS286	Published Standard
Standard Specification for Telecommunication and Information exchange between roadside and vehicle systems: 5.9 GHz DSRC	ASTM E2213-02	Published Standard
Specification for Dedicated Short Range Communication (DSRC) Data Link Layer: Medium Access and Logical Link Control	ASTM PS 105-99	Published Standard
ADMS Data Dictionary Specifications	ASTM DD 17.54.00.2	Under Development
Specification for Dedicated Short Range Communication (DSRC) Data Link Layer: Medium Access and Logical Link Control	ASTM PS 105-99	Published Standard
Specification for Dedicated Short Range Communication (DSRC) Physical Layer using Microwave in the 902-928 MHz	ASTM PS 111-98	Published Standard
Standard for Traffic Incident Management Message Sets for Use by EMCs	IEEE P1512.1	Under Development
Standard for Public Safety IMMS for use by EMCs	IEEE P1512.2	Under Development
Standard for Hazardous Material IMMS for use by EMCs	IEEE P1512.3	Published Standard
Standard for Emergency Management Data Dictionary	IEEE P1512.a	Under Development
Standard for Common Incident Management Message Sets (IMMS) for use by EMCs	IEEE P1512-2000	Published Standard
Security/Privacy of Vehicle/RS Communications including Smart Card Communications	IEEE P1556	Under Development

Standard Title	Standard ID	Status
Standard for Interface Between the Rail Subsystem and the Highway Subsystem at a Highway Rail Intersection	IEEE P1570	Published Standard
Standard for Message Sets for Vehicle/Roadside Communications	IEEE Std 1455-1999	Published Standard
Standard for Functional Level Traffic Management Data Dictionary (TMDD)	ITE TM 1.03	Approved Standard
Message Sets for External TMC Communication (MS/ETMCC)	ITE TM 2.01	Approved Standard
Simple Transportation Management Framework (STMF)	NTCIP 1101	Published Standard
Base Standard: Octet Encoding Rules (OER)	NTCIP 1102	Approved Standard
Simple Transportation Management Protocol (STMP)	NTCIP 1103	Under Development
CORBA Naming Convention	NTCIP 1104	Under Development
CORBA Security Service	NTCIP 1105	Under Development
CORBA Near-Real Time Data Service	NTCIP 1106	Under Development
Global Object Definitions	NTCIP 1201	Published Standard
Object Definitions for Actuated Traffic Signal Controller Units	NTCIP 1202	Published Standard
Object Definitions for Dynamic Message Signs	NTCIP 1203	Published Standard
Object Definitions for Environmental Sensor Stations & Roadside Weather Information System	NTCIP 1204	Published Standard
Data Dictionary for Closed Circuit Television (CCTV)	NTCIP 1205	Approved Standard
Object Definitions for Video Switches	NTCIP 1208	Under Development
Transportation System Sensor Objects	NTCIP 1209	Balloting Process Initiated
Objects for Signal Systems Master	NTCIP 1210	Under Development
Objects for Signal Control Priority	NTCIP 1211	Under Development
Message Set for Weather Reports	NTCIP 1301	Under Development
TCIP - Common Public Transportation (CPT) Business Area Standard	NTCIP 1401	Published Standard
TCIP - Incident Management (IM) Business Area Standard	NTCIP 1402	Published Standard
TCIP - Passenger Information (PI) Business Area Standard	NTCIP 1403	Published Standard
TCIP - Scheduling/Runcutting (SCH) Business Area Standard	NTCIP 1404	Published Standard
TCIP - Spatial Representation (SP) Business Area Standard	NTCIP 1405	Published Standard
TCIP - Onboard (OB) Business Area Standard	NTCIP 1406	Published Standard
TCIP - Control Center (CC) Business Area Standard	NTCIP 1407	Published Standard
Class B Profile	NTCIP 2001	Published Standard

Standard Title	Standard ID	Status
Point to Multi-Point Protocol Using RS-232 Subnetwork Profile	NTCIP 2101	Published Standard
Subnet Profile for PMPP Over FSK modems	NTCIP 2102	Balloting Process Initiated
Subnet Profile for Point-to-Point Protocol using RS 232	NTCIP 2103	Balloting Process Initiated
Subnet Profile for Ethernet	NTCIP 2104	Balloting Process Initiated
Transportation Transport Profile	NTCIP 2201	Balloting Process Initiated
Internet (TCP/IP and UDP/IP) Transport Profile	NTCIP 2202	Approved Standard
Application Profile for Simple Transportation Management Framework (STMF)	NTCIP 2301	Published Standard
Application Profile for Trivial File Transfer Protocol	NTCIP 2302	Published Standard
Application Profile for File Transfer Protocol (FTP)	NTCIP 2303	Published Standard
Application Profile for Data Exchange ASN.1 (DATEX)	NTCIP 2304	Approved Standard
Application Profile for Common Object Request Broker Architecture (CORBA)	NTCIP 2305	Under Development
Information Profile for DATEX	NTCIP 2501	Under Development
Information Profile for CORBA	NTCIP 2502	Under Development
ISP-Vehicle Location Referencing Standard	SAE J1746	Published Standard
On-Board Land Vehicle Mayday Reporting Interface	SAE J2313	Published Standard
Data Dictionary for Advanced Traveler Information System (ATIS)	SAE J2353	Published Standard
Message Set for Advanced Traveler Information System (ATIS)	SAE J2354	Published Standard
Standard for ATIS Message Sets Delivered Over Bandwidth Restricted Media	SAE J2369	Published Standard
Rules for Standardizing Street Names and Route IDs	SAE J2529	Approved Standard
Messages for Handling Strings and Look-Up Tables in ATIS Standards	SAE J2540	Published Standard

Regular updates of SDO activities will help ensure that the latest standards are utilized. The SDOs listed above include:

- American Association of State Highway and Transportation Officials (AASHTO)
- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)

- Electronic Industries Alliance/Consumer Electronic Association (EIA/CEA)
- Institute of Electrical and Electronics Engineers (IEEE)
- Institute of Transportation Engineers (ITE)
- Society of Automotive Engineers (SAE)

Reference to the detailed standards information on the Web Site

The previous section provides a general discussion of the standards applicable to statewide projects. However the architecture does contain a far more detailed standards view, one that maps applicable standards to the individual information flows that go from one element to another. This detailed information is contained in the hyperlinked web site and can be accessed in two different ways. Each element description page has a set of links that describe the information flowing to and from the element to other elements of the architecture. Selecting any of these interface links brings the user an interface page. For example, the interface between the *SDDOT RWIS Stations* and the *SDDOT Region and Area Construction and Maintenance Office* is shown in Figure 6. The two information flows in the diagram are defined at the bottom of the page and have standards icons following the definitions. Selecting the standards icon will provide the applicable standards for the flow. An example, for the environmental conditions data flow, is shown in Figure 7 . A second way to access standards information on the web site is to select the Standards button on the left side of the page. The standards web page has a list of standards organized by SDO, with each of the standards title a hot link to a detail page. Figure 6 shows an example of the web page the user sees when they select the standard Object Definitions for *Environmental Sensor Stations & Roadside Weather Information System*.

Figure 6: Example of Interface

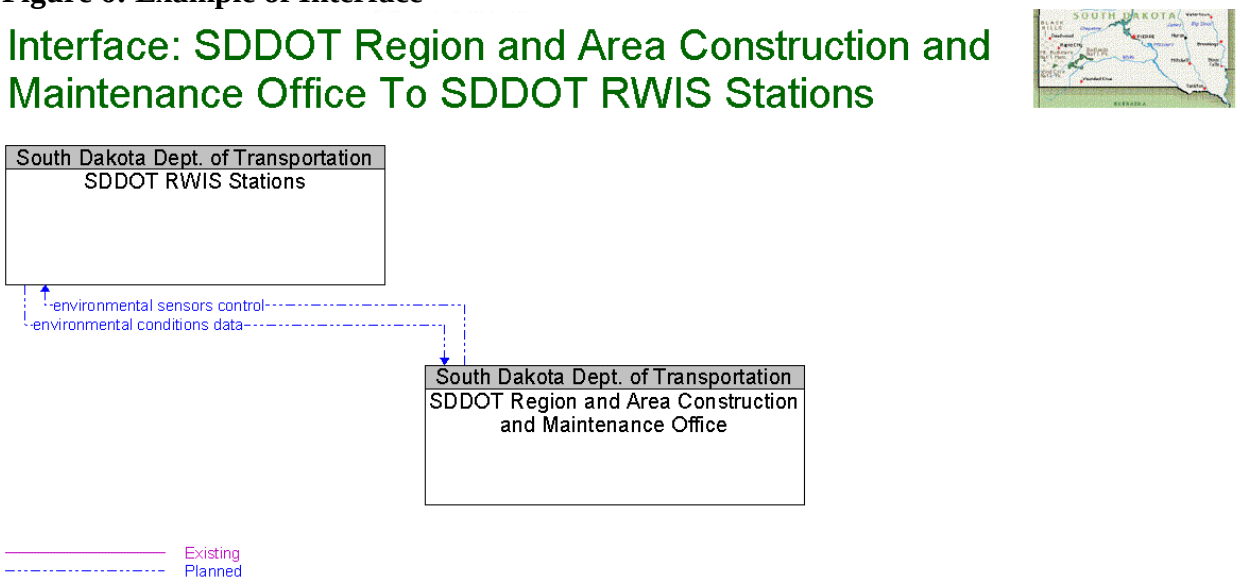


Figure 7 : Example of standards mapping page

Type	SDO	Title	Document ID
Message Sets	AASHTO/ITE/NEMA	Object Definitions for Environmental Sensor Stations & Roadside Weather Information System	NTCIP 1204
	AASHTO/ITE/NEMA	Global Object Definitions	NTCIP 1201
Data Elements	AASHTO/ITE/NEMA	Object Definitions for Environmental Sensor Stations & Roadside Weather Information System	NTCIP 1204
	AASHTO/ITE/NEMA	Global Object Definitions	NTCIP 1201
Communications	AASHTO/ITE/NEMA	NTCIP Center-to-Field Standards Group	View List

Figure 8: Example of Standards Mapping

South Dakota Statewide ITS Architecture

South Dakota DOT Department of Transportation

NTCIP 1204: Object Definitions for Environmental Sensor Stations & Roadside Weather Information System

Source Element	Destination Element	Flow
SDDOT Region and Area Construction and Maintenance Office	SDDOT RWIS Stations	environmental conditions data
SDDOT RWIS Stations	SDDOT Region and Area Construction and Maintenance Office	environmental sensors control

5.10. Project Sequencing

The identification of projects and their sequencing involved first identifying candidate projects from the existing documentation. The following documents and webpages were the primary sources of project information:

4. South Dakota Rural ITS Deployment Plan
5. South Dakota Office of Research Project Webpages
6. Intelligent Transportation Systems (ITS) Strategy- Phase 2, Sioux Falls, South Dakota, SEH No. A-SIOUX0103.01, December 16, 2002

The second step involved the review of the Statewide ITS Architecture to identify interfaces between elements that were not included in the project scopes already identified. The third step involved the creation of conceptual projects that could address the implementation of the parts of the architecture that were not covered by other projects.

There are many different ways to describe how architecture interfaces are grouped into various project concepts. Projects and their scopes are typically developed based on the priorities of the leading agency and funding. The sequence of projects is also dictated by factors such as these. The sequence of projects is influenced by the relationship to other projects (e.g., building upon elements of an earlier project), although project scopes can be flexible to accommodate variations in project sequence. For example, if an agency is initiating the construction of a facility that is to interface with a planned element, the facility can include receiving ports for the planned element to be used when it is implemented at a later date.

Although there can be variations in project scopes and sequencing, general guidance can be provided based on project types and the interrelationships among some projects. Where a project can utilize the functions provided by another project, an effort should be made to implement the projects in the corresponding order. Due to the strong emphasis on safety and security, projects that involve coordinated emergency response could be initiated early. Likewise, projects

involving commercial vehicle operations (particularly hazardous materials) could also be given early consideration. A broad, second level sequence could include projects involving traffic management and traveler information dissemination. Finally, a third sequence level could include projects related to data archiving or independent operational improvements. Table 10 provides a list of projects identified in existing documentation along with additional key project concepts. Table 11 provides a mapping from the projects to elements of the Statewide Architecture.

Table 10. Project List

ProjectName	ProjectDescription	Status	Start Date	Completion Date	Institutional Issues	Technical Issues
Advanced Traveler and Weather Information System	On-line and telephone access to winter road conditions, weather information, road construction maps, water problems on State Highways, trucker information and travel tip, called "#SAFE". This project is replaced by the 511 Travel Information Service.	Existing	10/1/1996	10/22/2003	Agency responsibilities for maintenance, control and command	1. Improved data collection for both road conditions as reported and remotely sensed. 2. Multiple database integration for trucker information and travel tips.
Performance and Registration Information Systems Management (PRISM)	Performance and Registration Information Systems Management (PRISM) ties vehicle registration to motor carriers' safety performance. PRISM contains three primary elements: Uniform registration of motor vehicles through the International Registration Plan; Possible denial, suspension, or revocation of vehicle registration, dependent on the motor carrier's demonstrated safety performance; and Improving the safety performance of high-risk carriers through the Motor Carrier Safety Improvement Process (MCSIP).	Existing	4/1/2001	9/30/2003		Coordination of data collection across governmental agencies
Interstate Dynamic Message Signs	Deploy 6-8 dynamic message signs on South Dakota's interstates along I-90 / I- 29.	Existing	6/1/2001	2/1/2002	Agency responsibilities for maintenance, control and command	Power and Telecommunication access.

ProjectName	ProjectDescription	Status	Start Date	Completion Date	Institutional Issues	Technical Issues
Automated Commercial Vehicle Permitting System Project	The Automated Commercial Vehicle Permitting System will be designed to electronically issue temporary and seasonal permits to motor carriers via Internet, ports of entry, and other law enforcement contacts. As proposed, the system will automatically identify potential routes for oversize or overweight vehicles and analyze roadways and bridges to ensure they are capable of accommodating the permitted vehicle. Finally, the system will provide information regarding permit applications and issues to other state and national information systems. Project SD2001-09	Existing	6/1/2001	4/30/2003		
Improved Road Condition Reporting	Identify and develop better methods for reporting, managing, summarizing, and disseminating road condition information. Project SD2001-15	Existing	10/1/2001	5/31/2003		Telecommunication for on-site road condition collection.
Statewide 5-1-1 Traveler Information Number	This project proposes the designation of a dedicated 3-digit number (5-1-1) for traveler information, similar to the allocation of 9-1-1 for emergency response. Federal legislation was passed in the summer of 2000 to allow states the authority to pursue this initiative. Project SD2002-05	Existing	1/1/2002	11/22/2002		

ProjectName	ProjectDescription	Status	Start Date	Completion Date	Institutional Issues	Technical Issues
Expansion of ATWIS	This project consists of expanding the ATWIS efforts already underway. Five subprojects are proposed including: 1. providing land-line access to the cellularbased system; 2. implementing an interactive voice recognition system; 3. providing Internet enhancements; 4. consolidating weather information numbers; and 5. improving road condition information.	Existing	6/1/2002			ASR recognizes background noise as input, DTMF should remain as optional backup.
Unified Reporting of Commercial and Non-Commercial Traffic Accidents-Phase 2	The Commercial Accident Reporting project is designed to improve accident reporting in two ways. First accident report forms will be combined to encourage more reliable collection of commercial vehicle accident information by state and local officials. Furthermore, the state's accident records database will be modified to allow commercial and non-commercial traffic accident information to be stored along with other accident information, significantly reducing duplication in data entry and validation. Software will also be developed to export commercial vehicle accident information to MCMIS. Accident reporting procedures will be automated to enable officers to enter accident information directly into mobile computers.	Existing	8/1/2002	1/31/2004		

ProjectName	ProjectDescription	Status	Start Date	Completion Date	Institutional Issues	Technical Issues
Automated Road Closure Gate Needs Assessment and I-90, Exit 67 Electric Actuator Project	A needs assessment is required to determine the appropriate gate configurations and level of sophistication at the various road closure sites around the state and to what extent automation is warranted at the various sites. A project testing the mechanical and operational reliability of electrically actuated drop-arm style closure gates is needed to determine if this type of gate would be a superior design when compared to the existing manual swing style gates. ThomTech Designs, Inc. has an actuator system that is used to retrofit drop-arm style gates. The system attaches to the existing gate assembly and replaces the manual hand winch used to raise and lower the arm with an electric linear actuator. The system also includes a wireless switch kit to activate advanced warning flashing lights and a handheld remote control device programmed to operate the individual gates and the advanced warning light system. It is proposed to install actuators on the gates that will be installed on the eastbound gates of Interstate 90, Exit 67, Project IM-P-90-2(71)66. The needs assessment portion of the research project will focus on determining the appropriate configuration for a gate system at the existing sites statewide. While reviewing the site configuration, the benefit of automation will be evaluated.	Existing	9/27/2002	5/31/2003		

ProjectName	ProjectDescription	Status	Start Date	Completion Date	Institutional Issues	Technical Issues
Jefferson Port of Entry	The Jefferson Port of Entry facility will use mainline and ramp sorting to enable motor carrier enforcement personnel to focus on high-risk carriers, while reducing queue lengths and reducing delays for motor carriers. Electronic screening and WIM will reduce the time, fuel consumption, and expense resulting from every truck stopping to weigh statically. Reducing the amount of time spent weighing trucks will enable enforcement personnel to focus more on vehicle inspection and related activities to improve commercial vehicle safety.	Planned	10/1/2002	11/1/2003		
Automatic Anti-Icing System	Use of a spray system that is automatically activated by a computerized control system in anticipation of frost or icy road conditions. The automatic anti-icing system will detect or predict ice formation and treat the roadway before it becomes a hazard to drivers. Sites prone to icy conditions include bridge decks and shady spots. The system consists of embedded pavement sensors, a processor to determine when conditions require anti-icing, and spray nozzles for anti-icing agents.	Planned	6/1/2003			- Power and telecommunication. - Determination of thresholds for system activation and cut-off.
Expansion of Dynamic Message Signs	Expansion of the dynamic message sign network scheduled for deployment in 2001. The expansion will provide greater coverage and opportunities for travelers en route to receive information regarding weather, road conditions, closures, and construction information, for example.	Planned	6/1/2003	11/30/2003	Agency responsibility for control and maintenance.	Power and telecommunication access for control and data transmission.

ProjectName	ProjectDescription	Status	Start Date	Completion Date	Institutional Issues	Technical Issues
Integrated Traveler Information System	Enhancement of the current traveler information available. A "one-stop shop" for integrated traveler information to include camera images, information for other modes of transportation (such as transit and airport information), real-time road condition / traffic condition information, mileage calculator, rest areas, and links to tourism information, for example.	Planned	6/1/2003		Inter-agency agreements.	Multiple database integration, format and access
Development of Maintenance Decision Support System	Define and develop a Maintenance Decision Support System.	Existing	11/1/2002	1/1/2005	Inter-agency agreements. Information accessibility across inter-agency networks.	Telecommunication and power access.
Road Condition Via CCTV	Installation of cameras on the roadway for viewing current road conditions and traffic condition, for example.	Planned	6/1/2003			Power and bandwidth availability.
Rural Addressing and GIS	The SDDOT has performed most of the fieldwork required in collecting GIS and rural addressing data. This project proposes to fund the effort necessary to complete the link between the GIS and rural addressing data. This would provide a statewide database of information that can be used by various state and local agencies to improve emergency service response, for land use planning, and for property data management, for example.	Planned	6/1/2003		Inter-agency agreements.	Maintaining accurate current database reflecting latest changes in addresses for a mobile population.

ProjectName	ProjectDescription	Status	Start Date	Completion Date	Institutional Issues	Technical Issues
Sioux Falls changeable message signs and video detectors	It has already been recommended by the 41st Street Corridor Study that a system with changeable message signs and video detectors is used to ease traffic access between I-29 and the Empire Mall during peak shopping days.	Planned	1/1/2004			
Sioux Falls Interconnected Traffic Signals	At the present time, there are three independent signal systems in the City's Central Business District. To optimize their operation, it is important that all three of them are combined into one seamless system that will operate under a single optimization application.	Planned	1/1/2004			
Automatic Vehicle Location for Agency	This project seeks to use automatic vehicle location (AVL) technology for improved dispatching, scheduling, operations, and efficiency of Highway Patrol, DOT maintenance services, and transit. The suggested project is an investigation into the limited deployment, test and evaluation of 15 AVL units. The project suggestion is for funding a fleet of approximately 15 fleet vehicles.	Planned	6/1/2004			Telecommunication coverage.
Mobile HAR	HAR systems use recorded information on traffic conditions and tourist-related activities to reach users in a limited geographical area over AM and FM frequency; new recordings are made when conditions change sufficiently. Some systems provide the capability to remotely switch between alternative messages.	Planned	6/1/2004			Telecommunication and power access.

ProjectName	ProjectDescription	Status	Start Date	Completion Date	Institutional Issues	Technical Issues
Portable Traffic Management System	The development of a multi-purpose, self-contained trailer combining various technologies such as: variable message signs, portable traffic signal, weather sensors, radar speed detection, video surveillance, wireless communications, highway advisory radio and floodlights. The system can be used for special event management, incident management, natural disaster management and traffic data collection.	Planned	6/1/2004		- Command and control responsibilities for various components. - Inter-agency agreements.	Wireless coverage and power at location
Sioux Falls Web Site/ Cable TV Channel Upgrade	Upgrade of existing city web site to include transportation information such as: - A map of the Sioux Falls metropolitan area that displays video camera locations, crashes, or other congestion causing events, - Level of service with color-coded highway segments, closed highways, etc. - Weather and pavement conditions. Pavement sensors will be installed in 2003 on Marion on Road and on Sycamore Avenue. Once these sensors detect icing, snow or frost conditions they will be able to transmit electronic messages that, in turn, will be translated to advisories that can be posted on the web site and Channel 16. Depending on the vendor and system installed, this information could also be accessible by the SDDOT system via a web link. Similarly, Sioux Falls web users could access the SDDOT system via a web link to the	Planned	6/1/2004			Multiple database integration, management and AVL for Transit vehicles.

ProjectName	ProjectDescription	Status	Start Date	Completion Date	Institutional Issues	Technical Issues
	SDDOT's site. A special segment of Channel 16 could also transmit this information for Sioux Falls and state wide. The sensors will also be used by Street Maintenance personnel for determining the appropriate chemical application during snowstorms. - Graphic, real-time bus locations with numerical expected arrival times at various transit stops. - Real-time video images from video cameras. - Calculated shortest path trip based on real-time travel times based on detector (magnetic or video) input. - Downtown parking information. This information could be static, periodically updated, or real-time when parking ramps are equipped with sensors that keep track of incoming and exiting vehicles and provide space availability information not only onsite, but also remotely to a central location that can, in turn, transmit this information to the web site and Channel 16. Information could include availability of spaces, and in case of special events or peak usage, alternative parking available in the vicinity. Information displays on small CMS near the facilities would also be needed. - Bike paths. Display of maps with characteristics such as pavement condition, length of route, interference with automobile traffic etc - Special events schedule with					

ProjectName	ProjectDescription	Status	Start Date	Completion Date	Institutional Issues	Technical Issues
	alternate routes and parking/ shuttle options to help alleviate congestion.					
Infrastructure Inventory and Condition Monitoring System	This involves the development of a centralized condition reporting system. The system allows DOT personnel to manually input and report critical roadway situations (for example, real-time road construction updates, incident, advisories, and road condition information) via an Internet based system for up-to-the-minute access by other DOT personnel and travelers.	Planned	1/1/2005		Standardized data entry and management policies and procedures. Incident advisories include inter-agency agreements.	User Web Interface and database structure.
Multi-Jurisdictional Transit Coordination	This project proposes to provide such information as routes, schedules, pick-up drop-off time estimates, type of service provided (e.g., fixed or demand response), coverage area of service, hours of operation, cost, and assistance in planning trips across multiple towns. The information can be provided through an interactive voice response (IVR), dial-up telephone system and/or on the Internet. The Internet site could potentially be incorporated into the integrated traveler information system, or be a stand-alone system.	Planned	1/1/2005		Multi-Jurisdictional policy and procedure differences	Database access to multiple Transit systems. Database format.
Rural Traffic Operations and Communications System	This project proposes to establish an integrated traffic operations and communications center initially serving a selected small urban area of South Dakota. The center would assist in gathering and disseminating transportation information, incorporating multiple agencies operations and stimulating mutual cooperation.	Planned	4/1/2005		- Inter-agency agreements - Agency Responsibility. -Command and Control policies and procedures.	Multiple database integration and display.

ProjectName	ProjectDescription	Status	Start Date	Completion Date	Institutional Issues	Technical Issues
Highway Railroad Intersection Safety	This project consists of implementing a community-friendly warning horn system to alert vehicles at train crossings of on-coming train traffic. The system requires the deployment of two stationary horns mounted at the crossing. Each horn directs its sound at the roadway. The horn is activated using the same track signal circuitry as the gate arms and bells located at the crossing. A strobe light informs the locomotive engineer that the system is working.	Planned	6/1/2005	-	Coordination with Public/Private Railroads. - Maintenance Responsibilities	
Intersection Collision Countermeasure	This project involves the use of embedded traffic sensors to detect on-coming traffic at uncontrolled rural intersections. The sensors are integrated with flashing warning signs to warn drivers to proceed with caution.	Planned	1/1/2006		Maintenance responsibilities.	Power
Multi-Jurisdictional Emergency Services Coordination	This project recommends the use of a centralized dispatching database to improve the emergency response services within a county or multiple jurisdictions by providing incident data and other information to emergency vehicles (such as fire trucks and ambulances) arriving at the scene of a crash.	Planned	1/1/2006		- Policies and Procedures on command and control coordination, responsibility. - Inter-Agency data management issues.	Telecommunication coverage, AVL/MDU systems, and database integration
Hand-held Devices for Reporting Accident Data	This project proposes the use of hand-held devices (e.g., Palm Pilot, Visor) for communicating important on-site crash information to emergency dispatchers, and automating data collection.	Planned	3/1/2006		Administrative rules/procedures Agency Control.	- Telecommunication Coverage, - Central database design, - Hand-held interface design.

ProjectName	ProjectDescription	Status	Start Date	Completion Date	Institutional Issues	Technical Issues
Information Exchange Network	This project is intended to facilitate the communications and information sharing among member agencies. This shared information supports coordinated transportation management and traveler information on a regional and corridor-wide basis. The I-95 corridor along the East Coast is a good example of such an effort.	Planned	6/1/2006		- Inter-agency data sharing. Date privacy issues - Agency administrative rule and procedure data protection.	- Database differences. - Network compatibility. - Data transmission formats.
Emergency Warning System	This project proposes the use of solar-powered flashers to give drivers early warning of flooded routes, or other warning situations. A real world example of this technology is the implementation of the Early Flood Warning System deployed in the City of Scottsdale, AZ.	Planned	1/1/2007			- Reliability of solar powered devices during periods of extended low sunlight. - Security of solar-panels from vandalism
Roadway Geometrics Alert System	This project suggests coupling radar technologies with flashing warning signs to alert drivers of geometric hazards such as dangerous curves or blind intersections.	Planned	3/1/2007		- Right-of-Way issues .	- Power. - Remote Access Control, If desired
Breathalyzer Ignition Interlock System	This project suggests the support of devices to prevent ignition of a vehicle when the alcohol level in a breath sample is above the threshold percent concentration. Support for similar programs can be found in 32 states.	Planned	6/1/2007		- Pending State Law - Agency Responsibility	- Vehicle Access Monitoring system telecommunications
Broadcast Traveler Information	This project investigates the use of an AM subcarrier as a reliable, low-cost medium for transmitting traffic messages over wide geographic areas.	Planned	6/1/2007		- Installation of Subcarrier receivers in private vehicle. - The installation of subcarrier transmitters at all AM radio stations.	Data transmission to subcarrier stations

ProjectName	ProjectDescription	Status	Start Date	Completion Date	Institutional Issues	Technical Issues
Portable ITS and Traveler Information Technologies in Work Zones	This project proposes the use of highway advisory radio, changeable message signs, and video for real-time work zone information dissemination and traffic management.	Planned	6/1/2007		Agency Responsibility for Maintenance, deployment and command and control during deployment.	- Power/ communications - Frequency Broadband management for both advisory radio and video. - Data transmission for video.
On-board Snow Plow Driver Assistance	This project examines the use of magnetic tape and nails for maintenance vehicle guidance, specifically in low-visibility conditions.	Planned	3/1/2008		- Equipment cost/installation - Installation and Maintenance of tape/nails responsibility	
CAD / AVL / MDT for Rural Transit	This project proposes the deployment of computer aided dispatching, automatic vehicle location and mobile data terminals for improved transit operations and service.	Planned	6/1/2008		Agency Responsibility for Public/ Private Transit Systems.	- Telecommunication Coverage for transmit/reception of AVL data.
Mayday Infrastructure	This project looks at the use of in-vehicle global positioning systems (GPS) combined with cellular / satellite communications for transmission of automatic crash notification to public safety emergency response centers.	Planned	6/1/2008		Agency Responsibility Privacy Issues	- Vehicle Installation -Telecommunication Coverage (Cellular/ Satellite. -Equipment upgrade at PSERC.
Web-Enabled Transit Route Planning / Smart Pass	This project proposes the use of a Web site for planning transit (e.g., route selection, determining use of numerous agencies to get from point A to B, automatic fare calculator, electronic fare payment) and other modes of travel. The use of a "smart pass" allows travelers to use multiple types of transportation across various jurisdictions.	Planned	1/1/2009		- Transit Information Collection Responsibility. - Public/Private transit operator fare system	- E-Fare collection system, disbursement. - Multiple Database integration

Table 11: Architecture Elements associated with Projects

Project Name	Element Name
Advanced Traveler and Weather Information System	SDDOT Road and Weather Information System
Automatic Anti-Icing System	SDDOT Fixed Anti-Icing Systems
Automatic Vehicle Location for Agency	SDDOT Maintenance Vehicles
Automatic Vehicle Location for Agency	SDHP Vehicles
Automatic Vehicle Location for Agency	Transit Vehicles
Breathalyzer Ignition Interlock System	Private Travelers Vehicles
Broadcast Traveler Information	
CAD / AVL / MDT for Rural Transit	Transit Operator Transit Management Systems
Emergency Warning System	State, County and Municipal Traffic Operations Field Equipment
Expansion of ATWIS	SDDOT Road and Weather Information System
Expansion of Dynamic Message Signs	SDDOT DMS
Hand-held Devices for Reporting Accident Data	Emergency Services Hand Held Reporting Devices
Highway Railroad Intersection Safety	Rail Operators Wayside Equipment
Improved Road Condition Reporting	SDDOT Road and Weather Information System
Information Exchange Network	
Infrastructure Inventory and Condition Monitoring System	SDDOT Office of Operations
Integrated Traveler Information System	SDDOT Integrated Traveler Information Webpage
Intersection Collision Countermeasure	State, County and Municipal Traffic Operations Field Equipment
Interstate Dynamic Message Signs	SDDOT DMS
Mayday Infrastructure	County, Municipal and Tribal Public Safety Dispatch
Mayday Infrastructure	SDHP District Offices
Mobile HAR	SDDOT HAR
On-board Snow Plow Driver Assistance	SDDOT Maintenance Vehicles
Performance and Registration Information Systems Management (PRISM)	COVERS
Portable ITS and Traveler Information Technologies in Work Zones	SDDOT Mobile Field Equipment
Portable ITS and Traveler Information Technologies in Work Zones	SDDOT Work Zone Field Sensors
Portable Traffic Management System	SDDOT Mobile Traffic Management Center
Remote-Controlled Snow Gate Closure System	SDDOT Remote Controlled Snow Gates
Remote-Controlled Snow Gate Closure System	SDDOT Remote Controlled Snow Gates
Roadway Geometrics Alert System	State, County and Municipal Traffic Operations Field Equipment
Sioux Falls changeable message signs and video detectors	State, County and Municipal Traffic Operations Field Equipment
Statewide 5-1-1 Traveler Information	SDDOT 511 Traveler Information System

Project Name	Element Name
Number	
Web-Enabled Transit Route Planning / Smart Pass	SDDOT Integrated Traveler Information Webpage
Web-Enabled Transit Route Planning / Smart Pass	Transit Operator Transit Management Systems
Automated Commercial Vehicle Permitting System	South Dakota Automated Permitting System Client
Automated Commercial Vehicle Permitting System	South Dakota Automated Permitting System Server
Automated Road Closure Gate Needs Assessment and I-90, Exit 67 Electric Actuator Project	SDDOT Remote Controlled Snow Gates
Development of Maintenance Decision Support System	SDDOT Road and Weather Information System
Jefferson Port of Entry	Electronic Screening
Jefferson Port of Entry	Roadside System Server
Multi-Jurisdictional Emergency Services Coordination	County, Municipal and Tribal Public Safety Dispatch
Multi-Jurisdictional Emergency Services Coordination	SDHP District Offices
Multi-Jurisdictional Transit Coordination	Transit Operator Transit Management Systems
Road Condition Via CCTV	SDDOT CCTV
Rural Addressing and GIS	
Rural Traffic Operations and Communications System	County, Municipal and Tribal Traffic Operations and Communications Center
Sioux Falls Interconnected Traffic Signals	County, Municipal and Tribal Traffic Operations and Communications Center
Sioux Falls Interconnected Traffic Signals	State, County and Municipal Traffic Operations Field Equipment
Sioux Falls Web Site/ Cable TV Channel Upgrade	Cable Public Access Channels
Unified Reporting of Commercial and Non-Commercial Traffic Accidents-Phase 2	Accident Reporting System Client
Unified Reporting of Commercial and Non-Commercial Traffic Accidents-Phase 2	Accident Reporting System Server

5.11. Agreements

There are several types of arrangements associated with the interfaces included with the projects discussed previously. Data exchanges between systems require agreements on the transmission protocol and data formats to ensure compatibility. Coordinating field device operations owned by different agencies requires defined procedures for submitting message requests and rules governing when such requests can be honored. Such coordination can be done with informal arrangements such as a Memorandum of Understanding (MOU). Sharing control of field devices operated by different agencies involves more liability issues, which requires more formal agreements. Coordinated incident response may also require formal agreements, but also requires group training of personnel from various agencies. While all interfaces involve

agreements for data compatibility, agreements for procedure and operation as well as training can also be critical elements to optimizing the benefits of the architecture.

6. Implementation Recommendations

The following section provides a set of recommendations for actions that should be performed following the development of the Statewide ITS Architecture. These actions fall within the general areas of Using the Statewide ITS Architecture and Maintaining the Statewide ITS Architecture. The specific recommendations are numbered within the following section, followed by explanation of the action.

6.1. Using the Statewide ITS Architecture

Once a regional ITS architecture has been created, it's important that it be used as a key reference in the transportation planning process. This will ensure all proposed ITS projects are consistent with the regional ITS architecture and additional integration opportunities are considered, leading to more efficient implementations.

1. **Update the Recommended Projects portion of the South Dakota Rural ITS Deployment Plan using the information developed for the Architecture.**

At the state level the primary planning document from an ITS standpoint is the South Dakota Rural ITS Deployment Plan, which was published in January 2001. The original Deployment Plan provided a blueprint for the integrated deployment of Intelligent Transportation Systems (ITS) in the state, and has been used to support the integration of ITS actions underway and to insure that future projects contribute to the effective use of transportation technologies. The Deployment Plan included a list of recommended projects and identified the funding needed to implement this plan. As a part of this original plan, the need to create a Statewide ITS Architecture was identified. A Statewide ITS architecture would provide in some level of detail the ITS systems and integration opportunities in the region.

With the completion of the initial version of the South Dakota Statewide ITS Architecture, it is recommended that the Recommended Projects portion of the Deployment Plan be revisited and updated

2. **Use the updated Project Information as input to the Statewide Intermodal Long Range Plan.**

The update of the project information can then serve as a key input to the Statewide Intermodal Long Range Plan, which was last updated in 1999. It is the long-range guide for major investments in the State's ground transportation system.

3. Use the Statewide architecture to support the next updates of the regional Long Range Plans (e.g. Sioux Falls Metropolitan Area Long-Range Transportation Plan.

The Statewide ITS Architecture should also be considered a key reference in the MPO planning process. Its suggested transportation system integration should be considered in the next updates of the regional Long Range Plans (e.g. Sioux Falls Metropolitan Area Long-Range Transportation Plan).

The statewide ITS architecture should also be considered for support in ITS project development cycle. This begins with project definition, followed by procurement, leading to implementation. Information in the regional ITS architecture can assist in all three of these areas of project development.

4. Consider use of the Statewide Architecture in the development of individual Research Plans.

Project Definition may occur at several levels of detail. Early in the planning process a project may be defined only in terms of the transportation services it will provide, or by the major system pieces it contains. At some point prior to the beginning of implementation the details of the project must be developed. This could include further system definition and interface definition including exactly what systems or parts of systems will make up the project, what interconnections the project entails, and what information needs to flow across the system interconnections. Requirements definition may go through similar levels of detail, starting with very high level description of project functions and moving toward system specifications. By identifying the portions of the statewide ITS architecture that define the project, the statewide ITS architecture outputs can be used to create key aspects of the project definition.

The areas that the statewide ITS architecture can assist in project definition are:

- The identification of agency roles and responsibilities (including any inter-agency cooperation) can come from the operational concept developed as part of the regional ITS architecture. This operational concept can either serve as a starting point for a more detailed definition, or possibly provide all the needed information.
- Requirements definition can be completely or partly defined by using the regional ITS architecture functional requirements applicable to the project.
- The ITS architecture includes a map to ITS standards and the project mapping to the regional ITS architecture can extract the applicable ITS standards for the project.

Once a project is defined, and funding for it is committed, the implementation process can commence with the generation of a Request For Proposal (RFP), which is the common governmental practice for initiating a contract with the private sector to implement the project. Once a contract is in place, project implementation begins and moves through design, development, integration, and testing.

The statewide ITS architecture, and the products produced during its development, can support this RFP generation. First the project definition described above forms the basis for what is being procured.

5. Map each ITS project to the Statewide Architecture.

Mapping the project to the regional ITS architecture allows bidders to have a clear understanding of the scope of the project and of the interfaces that need to be developed. The functional requirements created as part of the regional ITS architecture can be used to describe the functional requirements for the project. In addition a subset of the ITS Standards identified as part of the regional ITS architecture development can be specified in the RFP.

6. Use the outputs of the Statewide architecture to meet the system engineering requirements levied upon ITS projects that utilize Federal funds.

Because ITS projects involve systems and their interconnections, it is very important to follow a system engineering approach to designing and implementing the project. While the exact process followed is at the discretion of the local agency, the ITS Architecture and Standards Rule/Policy lay out a set of required system engineering analyses for ITS projects funded through the highway trust fund.

The required system engineering analysis steps are:

- Identification of portions of the regional (or in this case statewide) ITS architecture being implemented (or if a regional ITS architecture does not exist, the applicable portions of the *National ITS Architecture*);
- Identification of participating agencies' roles and responsibilities;
- Requirements definitions;
- Analysis of alternative system configurations and technology options to meet requirements;
- Procurement options;
- Identification of applicable ITS standards and testing procedures; and
- Procedures and resources necessary for operations and management of the system.

The regional ITS architecture can provide inputs to a number of these steps as shown in Table 12

Table 12: System Engineering Requirements supported by Statewide ITS Architecture

System Engineering Requirements	Statewide ITS Architecture output
Identification of portions of the regional ITS architecture being implemented	Mapping project to the elements and interfaces of the statewide ITS architecture
Identification of participating agencies' roles and responsibilities	Use Operational Concept as a starting point
Requirements definitions	Use Functional Requirements as a starting point.
Identification of applicable ITS standards and testing procedures	Use regional architecture standards outputs as a starting point for the standards definition.

In summary, the regional ITS architecture represents a detailed plan for the evolution of the ITS systems in the region and can be used to support regional transportation planning efforts and project development efforts.

6.2. Maintaining the Statewide ITS Architecture

The South Dakota Statewide ITS Architecture is not a static set of outputs. It must change as plans change, ITS projects are implemented, and the ITS needs and services evolve in the region. This section describes a proposed plan for the maintenance of the architecture. The plan covers the following three key areas:

- Who will maintain the architecture?
- What will be maintained?
- How it will be maintained (i.e. what configuration control process will be used)?

The statewide ITS architecture is created as a consensus view of what ITS systems the stakeholders in the region have currently implemented and what systems they plan to implement in the future. The statewide ITS architecture will need to be updated to reflect changes resulting from project implementation or resulting from the planning process itself.

- Changes for Project Definition.
  When actually defined, a project may add, subtract or modify elements, interfaces, or information flows from the regional ITS architecture. Because the regional ITS architecture is meant to describe the current (as well as future) regional implementation of ITS, it must be updated to correctly reflect how the developed projects integrate into the region.
- Changes for Project Addition/Deletion.
  Occasionally a project will be added or deleted through the planning process and some aspects of the regional ITS architecture that are associated with the project may be expanded, changed or removed.
- Changes in Project Priority.
  Due to funding constraints, or other considerations, the planned project sequencing may change. Delaying a project may have a ripple effect on other projects that depend on it. Raising the priority for a project's implementation may impact the priority of other projects that are dependent upon it.
- Changes in Regional Needs.
  Transportation planning is done to address regional needs. Over time these needs can change and the corresponding aspects of the regional ITS architecture that addresses these needs may need to be updated.

In addition, new stakeholders may come to the table and the statewide ITS architecture should be updated to reflect their place in the regional view of ITS elements, interfaces, and information flows.

Finally, the National ITS Architecture may be expanded and updated from time to time to include new user services or better define how existing elements satisfy the user services. These

changes should also be considered as the regional ITS architecture is updated. The National ITS Architecture may have expanded to include a user service that has been discussed in a region, but not been included in the statewide ITS architecture, or been included in only a very cursory manner.

6.2.1. Maintenance Responsibility

7. Determine who will maintain the architecture and what group will act as an Institutional Framework for the maintenance of the architecture.

Responsibility for maintenance of the South Dakota Statewide ITS Architecture should lie with SDDOT. This organization was responsible for the original development effort and will be one of the primary users of the ITS architecture. While it is recommended that SDDOT assume responsibility for maintenance, it is further recommended that a group of core stakeholders act as an "institutional framework" to review proposed changes to the ITS architecture. The regional ITS architecture is a consensus framework for integrating ITS systems in the state. As it was a consensus driven product in its initial creation, so it should remain a consensus driven product as it is maintained.

6.2.2. Architecture Baseline

8. Define the Architecture Baseline that will be maintained.

Establishing an ITS architecture baseline requires clear identification of the architecture products that will be maintained, including specific format and version information. For the South Dakota Statewide ITS Architecture the following outputs are recommended as the architecture baseline:

- Architecture Document (this document)
- Turbo Architecture Database
- Statewide ITS Architecture Web pages

Regarding the Architecture document, it is recommended that the source document, in Microsoft Word format, be held by SDDOT, while a PDF version of the document is created for general distribution.

Regarding the Turbo Architecture Database, it is recommended that SDDOT maintain a zipped version of the final delivered South Dakota Statewide Architecture database. The name, date, and size of the database file inside the zipped file should be entered into an architecture log as version 1.0 of the architecture.

Regarding the web site, a CD-ROM version of the final web site should be maintained by SDDOT. It is further recommended that the version number of the architecture be entered somewhere on the home page of the web site so that the version being viewed is immediately identifiable.

6.2.3. Configuration Control

9. Define the configuration control process that will be used to maintain the architecture and develop specific procedures for configuration control.

Once the baseline is defined, the process for making changes to this baseline must be established. The change management process specifies how changes are identified, how often they will be made, and how the changes will be reviewed, implemented, and released.

How Changes are Identified

This involves two issues-

- who can identify a change to the architecture and
- how will the change request be documented

For an architecture that covers an entire state, the question of who can make change requests is an important one. If literally anyone can input requests the region runs the risk of being overrun by requests that will tax scarce resources to review and decide upon. On the other end of the spectrum, if too much formality or paperwork is added to the process then many valid or needed changes may go unexpressed. The recommendation is that only members of the "core stakeholders" who make up the institutional framework be allowed to identify potential changes. This effectively means that any change suggested has the approval of a member of the core group. This has the added benefit of spreading the resources needed to generate or evaluate changes among the group.

As to how the change request should be documented—it is recommended that a simple change request form be created that contains at least the following information:

12. Name of change
13. Description of change
14. Part of baseline affected (could be check boxes for document, database, web site, and not known)
15. Rationale for change
16. Originator name or agency
17. Date of origination

This information will ultimately be added to a change database (recommended to be maintained by SDDOT personnel) that will add the following additional fields of information:

18. Change number (some unique identifier)
19. Change disposition (accepted, rejected, deferred)
20. Change type (minor or significant)
21. Disposition comment
22. Disposition date

How often Changes are Made

It is recommended that the first update to the architecture baseline be made approximately a year after completion of the initial version. Depending upon the amount of change requests submitted, this could be anything from a minor update to correct errors found to a more significant update to include changes in stakeholders, elements, and connections. Also some changes could be deferred until the next major update of the architecture. It is recommended that a major review and update of the architecture (including possibly additional stakeholder meetings) be tied to the update of a major planning document such as the Statewide Intermodal Long Range Plan. This will allow an updated version of the architecture to be used as the basis for the Plan update. Additional minor revisions of the baseline could be considered on a yearly basis.

Change Review, Implementation, and Release.

The general steps in the change review process are:

6. Define changes per the recommendations given above.
7. Assess the impact of the change. Someone needs to evaluate the change and determine what impact it has upon the architecture baseline. There are three options for who performs this evaluation
    a. the person proposing the change (i.e. the member of the core group that brings it forward)
    b. a staff member of SDDOT (the agency responsible for architecture maintenance) or
    c. a contractor through some architecture support contract.

    Each of these options has positive and negative implications. The first option will work well for minor changes (e.g. changes in status, connections, or descriptions). However, it does require each submitting person to have sufficient knowledge of the architecture to suggest appropriate solutions. The second option requires the architecture knowledge to be available through SDDOT personnel. Their long-term availability to perform the work is a possible risk. The third implies contracting for the necessary expertise, so has the negative of additional cost associated with it.
8. Provide a recommendation to the Change Control Group. For proper change control some group should be assigned responsibility for reviewing and approving changes to the baseline. The recommendation is that a subgroup of the core stakeholders be appointed for this purpose. This Change Control Group (sometimes referred to as a Configuration Control Board) should be lead by the individual responsible for maintaining the architecture (or by one of the individuals if it is a group activity). The job of the Group is to decide what changes go into the architecture baseline. This could be done through periodic meetings (say quarterly), through electronic correspondence, or a combination of both. A recommendation is that minor changes be handled through monthly email distribution and approval, while major changes or areas of disagreement are handled at the periodic face to face meetings. It is important to maintain the consensus nature of the architecture by having a group of core stakeholders agree on changes.

9. The Change Control Group makes a decision. Either it accepts the change, rejects it, or asks for additional evaluation.
10. The decision is implemented. If the decision is to accept the change, then the appropriate portions of the architecture baseline are updated (per the schedule discussed above) and an updated architecture baseline is defined.

The time required to perform this configuration control process will be a direct function of the number of changes suggested to the architecture, which will be driven by how much the architecture is being used. It is suggested that the process be reviewed within the first year and fine-tuned to most appropriately address the level of change that has occurred.

10. Implement the configuration control process and maintain the architecture

6.3. Recommendations Summary

The following are the recommended actions as a result of the development of the South Dakota Statewide ITS Architecture. These actions fall into three general areas:

Use the Architecture to support transportation planning at the State and regional level

1. Update the Recommended Projects portion of the South Dakota Rural ITS Deployment Plan using the information developed for the Architecture
2. Use the updated Project Information as input to the Statewide Intermodal Long Range Plan
3. Use the Statewide architecture to support the next updates of the regional Long Range Plans (e.g. Sioux Falls Metropolitan Area Long-Range Transportation Plan

Use the Architecture to support ITS Project Development

4. Consider use of the Statewide Architecture in the development of individual Research Plans.
5. Map each ITS project to the Statewide Architecture
6. Use the outputs of the Statewide architecture to meet the system engineering requirements levied upon ITS projects that utilize Federal funds.

Maintain the Architecture

7. Determine who will maintain the architecture and what group will act as an Institutional Framework for the maintenance of the architecture
8. Define the Architecture Baseline that will be maintained
9. Define the configuration control process that will be used to maintain the architecture and develop specific procedures for configuration control.
10. Implement the configuration control process and maintain the architecture

7. ITS Architecture Literature Search

One of the first efforts asociated with the outline and construction of the South Dakota Statewide ITS Architecture included investigation and review of current and future ITS architecture elements and plans within South Dakota. This was followed by an investigation of other state ITS architectures for innovative elements, stakeholders and approaches to projects that may

provide additional insight into ITS architecture application that may be included or desirable across South Dakota.

Current ITS architectures, both project and regional were sought across South Dakota. Key data were believed to be in city ITS plans in both Sioux Falls and Rapid City, as well as a multi-state ITS architecture planning meeting held in Rapid City which included the South Dakota Department of Transportation. Each of these intra-state activities held the promise of timesaving research for identifying both current and future projects as well as some of the local stakeholders.

While Rapid City was in the early stages or just beginning its ITS plans and could provide no additional information or documents outside the existing information that was currently available, the Sioux Falls phase I report on local ITS project elements provided a small amount of information on possible ITS infrastructure. Copies of South Dakota internal Commercial Vehicle Operations (CVO) research plans were reviewed and included in the literature review. A copy of the multi-state ITS architecture-planning meeting minutes provided information on current ITS elements within the state of South Dakota as well as those elements currently in some of the surrounding states including Montana, Wyoming, Nebraska and North Dakota.

Other state plans reviewed included Greater Yellowstone Rural ITS Priority Corridor Project in Montana, Kansas Statewide Intelligent Transportation Plan, Oregon ITS Strategic Plan 1997-2017, Minnesota Guidestar ITS plan and the Castle Rock Consultants report SD1999-11. The surrounding states sharing boarders with South Dakota were in the process of developing their own ITS architecture plans and could not provide additional information or did not wish to share draft components of their work to date.

Research was conducted across the US to determine the current status of statewide ITS architecture plans. While two ITS project plans were included in this review, Minnesota Guidestar and Greater Yellowstone Rural ITS Priority Corridor of Montana, these project plans were only reviewed because they were projects in adjoining states. The remainder of the search outside the region included only statewide ITS plans. A large number of states were in the process of creating their own statewide ITS architectures, however did not wish to release drafts of work done to date. Missouri stated they were merely copying Kansas statewide plans based on its award status.

The following chart outlines some of the more interesting or innovative parts of the above mentioned plans or projects that were included in this review and that may provide assistance in the development of a statewide ITS architecture.

Table 13: Documents Reviewed for Literature Seach

Plan or Project	Type	Includes	Comments
Greater Yellowstone Rural ITS Priority Corridor of Montana	Project - Regional – Multi-state	1. Key stakeholders within Montana and region of the project. 2. Provided a list of Market Packages for this project. 3. Systems inventory and Architecture mapping for this project. 4. Interconnect of systems within these Market Packages 5. Provides application of ITS Architecture in a rural view.	This plan document, while regional and project oriented, provided a rural view of ITS Architecture application. Allows for the consideration of functions and interconnect applications of ITS technology that could be overlooked. Additionally, provides alternative definition of system and ITS elements and their interconnects.
Minnesota Guidestar	Project - Statewide	Statewide ITS strategic plan. Discusses past work and future planned project very generally.	Very little useful information. Discusses past projects and a general description of future projects. Contains some elements of a strategic plan.
Oregon ITS Strategic Plan 1997-2017	Statewide	1. Provides an outline for a strategic plan. 2. List stakeholders common to the systems, elements and market packages with application within Oregon.	This plan after complete review offered very little aside from a list of stakeholders to use as a review to ensure key South Dakota stakeholders were included in the process.

Plan or Project	Type	Includes	Comments
Kansas Statewide Intelligent Transportation Plan	Statewide	1. National recognition as an award winning ITS Architecture plan. 2. Included Kansas goals and objectives. 3. Outline project development and state to state coordination. 4. Provide strategic planning model for projects over time. 5. Included a step by step needs assessment to use for each project. 6. The plan includes interviews with key personnel just below stakeholders' level. 7. Public Surveys for need assessment. 8. Discuss benefits and benefit/cost ratios as well as operating costs. 9. Statewide communication systems available and needed.	This plan differed from the other samples listed in this report. It contained an outline of a very inclusive planning document. Vision, goals, objective, needs, methods, inputs, ITS elements, programs (existing and needed), telecommunications infrastructure both present and future, stakeholders and methodology for a number of approaches to implementation. A key addition in this plan was the focus on state to state coordination.

Plan or Project	Type	Includes	Comments
Castle Rock Consultants report SD1999-11	Statewide – Project Specific	1. Provides insight into the major projects determined earlier by SDDOT. 2. Provides estimated costs, goals and objectives necessary to achieve successful completion of each project. 3. Provides public input into the key project as viewed by the public through survey. 4. Wireless communication mapping of the state is included. 5. Includes a description of the Fiber network across South Dakota. 6. Project specific outlines providing insight into the objective each project is set to accomplish.	This report provides public survey results, SDDOT focus, goals and objectives on a project specific basis. The communications information is very detailed but should be taken as general reference only as both conditions have changed since this report was compiled and wireless information contained within this report was incorrect at the time it was published.
Multi-state ITS architecture-planning meeting	Statewide	1. Simple inventory of South Dakota ITS elements, infrastructure, and surrounding states elements and infrastructure. 2. Simple inventory of stakeholders by ITS element and infrastructure.	This report compiles a simple list of ITS elements, infrastructure and stakeholders and should assist in determining the key stakeholders necessary to participate in a planning session for a statewide ITS Architecture development Plan.
Sioux Falls	Metro	1. Unfinished, however does include some insight into Metro ITS elements within Sioux Falls.	None. However should include as stakeholders for metro interface to statewide Architecture.

The multi-state ITS architecture planning meeting, Kansas Statewide ITS Strategic Plan and the Castle Rock Consultants report SD1999-11 contain the most useful and valuable information currently available with regards to South Dakota. The Kansas Statewide ITS Strategic Plan provides a very complete view of a strategic plan and its process, the multi-state ITS architecture planning meeting and the Castle Rock Consultants report SD1999-11 provides infrastructure information that is direct to the subject of the South Dakota ITS Architecture. These latter two documents list projects, stakeholders and elements that must be considered during the development of the South Dakota Statewide ITS Architecture.

Appendix A: Comments and Disposition

Includes e-mail comments received on first Draft Architecture (pre 1-day workshop). Appended letter (e) next to comment number.

No.	Comment	Comment From/Subject	Date Logged/Updated	Disposition of Comment/ Rationale
1(e)	Under Stakeholders, I suggest listing the SDDOT - Office of Operations. They are heavily involved in basically everything we do.	Doug.Sherman@state.sd.us South Dakota - Inventory by Stakeholder	9/10/02 12/3/02	Added element SDDOT Office of Operations.
2(e)	Have an arrow pointing towards Tourism in which DOT Provides Construction Information. I think this is partially existing already. Show as a dashed line as what is currently done could be greatly improved.	Doug.Sherman@state.sd.us South Dakota - Interface: SD Department of Tourism Public Information Office To SDDOT Region and Area Construction and Maintenance	9/10/02 12/3/02	Updated MP ATMS08. Added custom flow "road network conditions_ud" between SDDOT Road and Weather Information Systems and SD Dept of Tourism PIO
3(e)	Comments as to how the National Parks in South Dakota might tie into the system at some future date. 1. The national park units in South Dakota are Badlands National Park, Wind Cave National Park, Jewel Cave National Monument, and Mount Rushmore National Memorial. 2. The National Park Service (NPS) is beginning to look at installing ITS systems in some of our parks. At this time none of these are in South Dakota. I believe that both the Western Transportation Institute and the Volpe Center are working on (or have worked on) planning/design of such systems. 3. Your ITS sausage diagram shows state and national parks involved with parking management systems. I think these parks can have a broader involvement than parking management. In the future (sometime in the next 10 years) I see the South Dakota national park units connecting to your system, with kiosks in the visitor centers providing road and weather information. The parks should also be able to transmit information to the South Dakota system (and Nebraska, Wyoming, North Dakota, etc.) concerning road and weather conditions and	Wayne_Vander_Tuin@nps.gov SD Statewide ITS Architecture Wayne Vander Tuin, P.E. Federal Lands Highway Program Coordinator National Park Service Midwest Regional Office 1709 Jackson St. Omaha, NE 68102 wayne_vander_tuin@nps.gov phone: 402-221-3491	9/25/02 12/6/02	Updated Stakeholder Definition to reflect national park units in SD. Also added description of SD GF&P based on web site info.

No.	Comment	Comment From/Subject	Date Logged/Updated	Disposition of Comment/ Rationale
	parking availability in the parks and should be able to receive road and weather information from you.			
4 (e)	I don't see the SD State Park Division listed under the Emergency Management section. We have Park Rangers, Conservation Officers and Park Managers who help handle emergencies. They need to be included. Thanks!	Sandness, Linda Statewide South Dakota ITS Architecture Web Site	9/27/02 12/5/02	Added ITS Elements for SD Dept of Game, Fish and Parks and National Parks Law Enforcement, and complement vehicle ITS Element.
5	SDDOT Integrated Traveler Info Web Page needs to be converted to SDDOT Kiosk in Turbo (MP ATIS2)	1-day Review Workshop Participants	10/4/02 12/3/02	Completed.
6	Add CCTV for Highway Patrol at Rest Areas (future) for security. Traffic images go to (H.P. District Offices) ← New Element, SDDOT Operations (New Element), Region Offices, State Radio, County and Municipal Public Safety Dispatch.	1-day Review Workshop Participants	10/4/02	Added new element SDHP District Offices. Added new element Rest Area Operators CCTV assigned to new stakeholder Rest Area Operators (whether DOT, County, Parks, etc.) Added new ATMS01 Market Package.
7	Tell MMA: SD Automated Permitting System Server needs to be connections to get road parameters, new links, etc. from various sources. - Should connect to SDDOT Infrastructure and Inventory System - Get temporary restrictions information from the SDDOT Road and Weather Information System (future) - Other Requirements/Connections? MMA to work out with SDDOT.	1-day Review Workshop Participants	10/4/02	
8	Major changes to ATMS3 (added to subsystems).	1-day Review Workshop Participants	10/4/02	Done. Market Package was updated at workshop.
9	Split ATMS7 into a) information coordination and b) control coordination	1-day Review Workshop Participants	10/4/02 12/5/02	Done.
10	EMPTY/FILLER	1-day Review Workshop Participants	10/4/02	Done.

No.	Comment	Comment From/Subject	Date Logged/Updated	Disposition of Comment/ Rationale
11	Cellular Telephone Service Provider. Update of comment.	1-day Review Workshop Participants	10/4/02	
12	SDDOT Kiosk is not connected and should be integrated into Travel Web Page	1-day Review Workshop Participants	10/4/02 12/5/02	Done.
13	13 a) Change name of 'County, Municipal…' 13 b) Remove 'maint and constr vehicle system control' flow between County, Municipal, and Tribal Maint Vehicles ←→ Count and Municipal Highway Dispatch.	1-day Review Workshop Participants	10/4/02	Done.
14	14 a) Add 'traffic images' flow between County TOC and County Civil Defense EOC. 14 b) Add 'traffic images' flow between County TOC and Local Municipality EOC.	1-day Review Workshop Participants	10/4/02 12/6/02	Done.
15	Look for all un-matching 'remote surveillance control' and the returning 'traffic images' flow and fix.	1-day Review Workshop Participants	10/4/02	RECHECK INTERCONNECTS.
16	Need to add a flow between 'Private Sector Information Providers' (ISP) → 'County & Municipal Public Safety Dispatch' (EM)	1-day Review Workshop Participants	10/4/02 12/5/02	Updated ATIS2. Added incident request and incident flows.
17	Need an MP to show the following: a) 'SDDOT Road and Weather Information System' → road conditions → 'SD Dept of Game, Fish, and Parks and National Parks Operations Center' b) 'SD Dept of GFP and National Parks OC' → road conditions → SD Dept of GFP and National Parks Travelers Web Site' c) 'SD Dept of GFP and National Parks OC' → road conditions → Private Sector ISP d) County and Municipal Public Safety Dispatch →?? → SD Dept of GFP & National Parks Vehicles -- Conservation Officers are dispatched from C&M PS Dispatch e) A comment that says that information (need flow for EVS → EM type info) is collected from Vehicles and entered manually. This vehicle data through MDT in future will be	1-day Review Workshop Participants	10/4/02 12/5/02	Added and Updated Market Package to ATIS2 to address items a, b, c. Updated ATMS8, EM1 and EM2 to address item d.

No.	Comment	Comment From/Subject	Date Logged/Updated	Disposition of Comment/ Rationale
	sent to the Parks OC and Public Safety.			
18	Change description of SD State Parks to SD Dept of Game, Fish, and Parks to include Conservation Officers	1-day Review Workshop Participants	10/4/02 12/5/02	Updated definition of stakeholder and Operations Center definition
19	Make all EM Vehicles the same. Different names OK, but ability to support same interfaces from Dispatch.	1-day Review Workshop Participants	10/4/02	Done.
20	EOCs → should not have the 'emergency response status' flow	1-day Review Workshop Participants	10/4/02	Done.
21	Wherever there is a 'traffic control' flow, there should also be a 'traffic information flow' flow. E.g., SDDOT Mobile Command Center ←traffic information & control → County TOC	1-day Review Workshop Participants	10/4/02	Done.
22	Change Other "States" Road and Weather Information System. Take out "States", change definition to include "States, Cities, County, Private, etc."	1-day Review Workshop Participants	10/4/02 12/6/02	Done.
23	23 a) Remove 'remote surveillance control' flow from State Radio → County TOC. 23 b) Connect HW Patrol Division Office → State Radio 23 c) Police MDT (Vehicles) → maintenance request → State Radio → County Maintenance 23 d) Same as 23 c) for TOC style request	1-day Review Workshop Participants	10/4/02	a) Done. b) Done. c) and d) added UD flows for maint and construction (MCM) and resource requests (for TM) between the police vehicles and State Radio
24	Why is 'Local Data Collection' connected to 'Signal Maintenance Archive'. Remove this connection.	1-day Review Workshop Participants	10/4/02 12/5/02	Done.
25	Connect 'Roadway Design' + 'Region and Area' → 'Local Data Collection'	1-day Review Workshop Participants	10/4/02	Updated MP AD1. Connected Data collection system to Region and Area and Roadway Design, and Roadway Design to MPO Operational Database Archive
26	Remove interconnects between SD from non-State Agencies. VERIFY.	1-day Review Workshop Participants	10/4/02 12/5/02	Done.
27	Logo should read 'Statewide ITS Architecture' and not 'Regional ITS Architecture' OR SHOULD IT.	1-day Review Workshop Participants	10/4/02 12/5/02	For consistency use Statewide.

No.	Comment	Comment From/Subject	Date Logged/Updated	Disposition of Comment/ Rationale
28	Change 'County…Highway Maintenance Vehicles' to 'County, Municipal, Tribal Roadway Maintenance Vehicles'	1-day Review Workshop Participants	10/4/02 12/5/02	Done.
29	MPO Operational Database: Add 'archive coord' flow with 'SDDOT Office of Inventory Data..' AND ALSO 'Statewide Signal Maintenance Archive'	1-day Review Workshop Participants	10/4/02 12/5/02	Done.
30	MPO Operational Database: Remove interconnect with SD Road and Weather Info System. Add a new ITS Element: County Traffic Data Archive with the following connections: a) CTDArchive ← Local Data Collection b) CTDArchive ←→ MPO Op DB c) MPO Op Db ←→ SDDOT Archives (all) d) State Archvies ←→ SDDOT Archives (all)	1-day Review Workshop Participants	10/4/02 12/5/02	Done. Need to recheck removal of MPO Ops from Road and Weather
31	Remove Parking Instructions between SD State and Parks Parking System and SDDOT Road and Weather Info System	1-day Review Workshop Participants	10/4/02	Changed flow to parking information.
32	Add flows both ways for an EM to EM interconnect between 'SD Dept of GFP Ops Center' and 'BIT Public Safety Mutual Aid Network'	1-day Review Workshop Participants	10/4/02 12/5/02	Done.
33	There are 4 regions and 12 areas. Regions and areas control CCTV (rural) and Operations controls CCTV (non rural)	1-day Review Workshop Participants	10/4/02	Done.
34	HAR is future. Operations controls HAR.	1-day Review Workshop Participants	10/4/02	Done.
35	Connect both ways SDDOT Kiosks and South Dakota State Web Site (see MP Diagram ATIS2). Connect SDDOT Kiosk to and Element below call SD State Web Site. Add note that Kiosks receive information via an internet connecto to the SD State Web Site.		10/4/02 12/6/02	Added ISP Elements SD State Web Site. Updated ATIS2 MP.
36	SDDOT Regions and Areas → road and weather info' → Weather Service should be existing.	1-day Review Workshop Participants	10/4/02	Done.
37	Remove 'current asset restrictions' between SDDOT Regions and Areas → State Radio	1-day Review Workshop Participants	10/4/02	Done.

No.	Comment	Comment From/Subject	Date Logged/Updated	Disposition of Comment/ Rationale
38	Remove all 'remote surveillance control' from State Radio	1-day Review Workshop Participants	10/4/02	Done.
39	ATIS2: SDDOT Road and Weather Info Sys' → connects to → a) Media b) Weather Service c) State Radio d) SD LETS Teletype (New Element) Also, e) SDDOT Integrated Web Page → Media	1-day Review Workshop Participants	10/4/02 12/6/02	a) Done. b) Connected Weather service to Road and Weather System in MP MC06. c & d) Add new element SD LETS Teletype and Added connections to SDDOT Road and Weather System in ATMS08. e) Done.
40	Updates in mpsdatms.ppt, and mpsdatis.ppt with comments	1-day Review Workshop Participants	10/4/02	Done.
41	Flip Charts (see 45 through XYZ below)	1-day Review Workshop Participants	10/4/02	See below:
42	Remove the 'Snow Gate' ITS Element and put connections into 'Remote Control Snow Gate'	1-day Review Workshop Participants	10/4/02	Added Remote Controlled Snow Gates to MC06.
43	ATMS07 – Part 1: Traffic Information Coordination SDDOT Road and Weather Info Sys ←→ a) SDDOT Region Office b) SDDOT Mobil Traffic Management Center c) SDDOT Road Design Office d) SDDOT Area Offices e) County and Municipal Traffic Ops and Communications Center	1-day Review Workshop Participants	10/4/02 12/6/02	Done.
44	ATMS07 – Part 2: Traffic Control Coordination SDDOT Roadway Design Office ←→ a) SDDOT Region Office b) SDDOT Mobile Traffic Management Center c) State Traffic Signal Controller (Traffic Signals) d) County and Municipal Traffic Ops and Comm Center	1-day Review Workshop Participants	10/4/02 12/6/02	a, b, d) are in ATMS07 – Regional Traffic Control c and e) are in ATMS03 – Surface Street Control

No.	Comment	Comment From/Subject	Date Logged/Updated	Disposition of Comment/ Rationale
	AND, e) County and Municipal Traffic Ops and Comm Center ←→ City Traffic Signal Controller (Field Equipment)			
45	Flip Chart 1: SDDOT Operations a) Road and Weather → SDDOT Ops Office b) Region and Area C&M → SDDOT Ops Office c) State Radio → SDDOT Ops Office d) SDDOT Ops Office → DMS e) City TMCs → SDDOT Ops Office	1-day Review Workshop Participants	10/4/02 12/6/02	Connections a, b and e) are covered in ATMS07. Connection c) is in ATMS08 Connection d) is in ATMS06
46	Flip Chart 2: Rest Area Surveillance New Element: SDDOT Kiosk, SDDOT Rest Area Surveillance Cameras SDDOT Rest Area Surveillance Cameras → - SDDOT Operations - Region and Area C&M - HP District Offices - State Radio - County and Municipal Public Safety Dispatch	1-day Review Workshop Participants	10/4/02 12/6/02	Added additional MP to ATMS01 set.
47	Flip Chart 3: SD Automated Permitting Server MMA Comment above was generated from this Flip Chart Diagram	1-day Review Workshop Participants	10/4/02	
48	Flip Chart 4: SD GF&P Operations Center ITS Elements: - Dispatch uses State Radio - County and Municipal also Dispatches - Add G, F & P Law Enforcement Vehicles	1-day Review Workshop Participants	10/4/02 12/6/02	Done. See ATMS08.

Appendix B: Customized Market Packages

South Dakota
Statewide ITS Architecture

Customized Market Package Diagrams

based on
National ITS Architecture Version 4.0

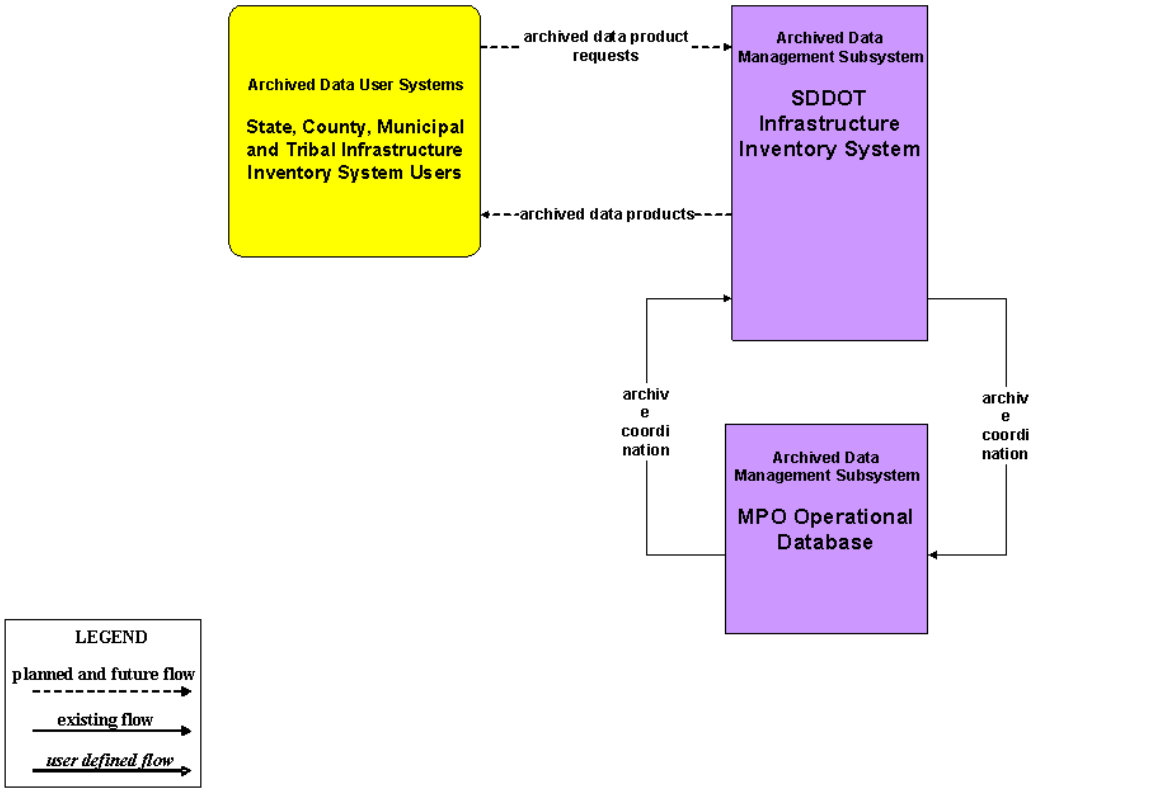
December 6, 2002

South Dakota
Statewide ITS Architecture

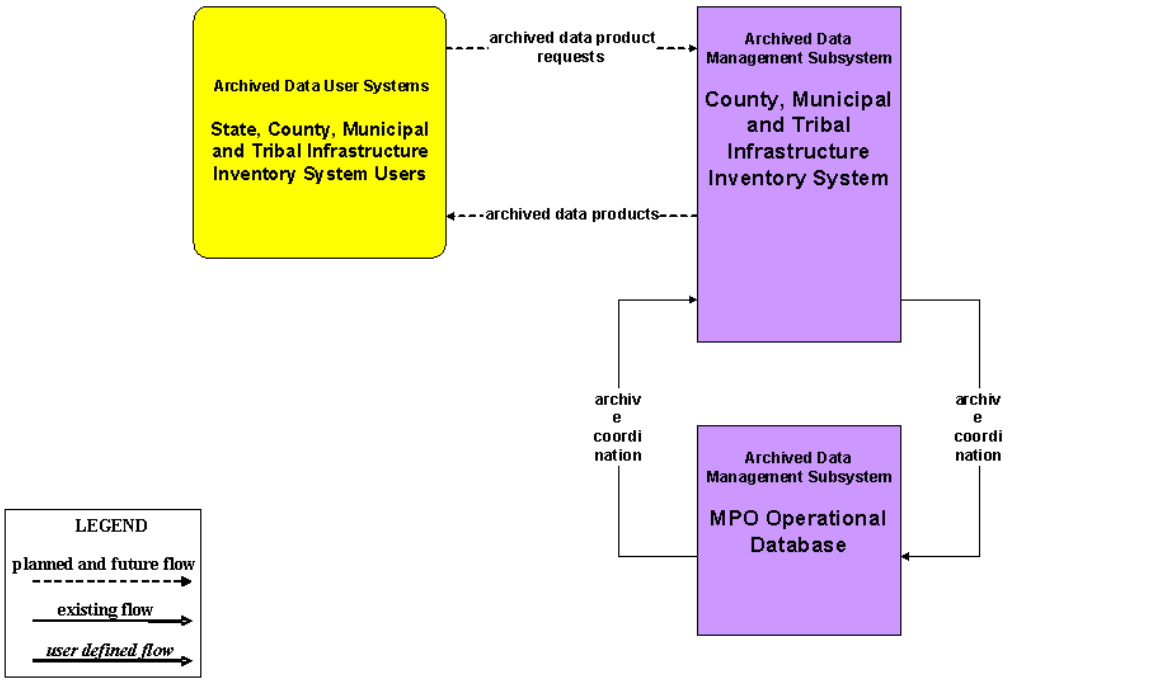
Customized Market Package Diagrams

Archived Data (AD)

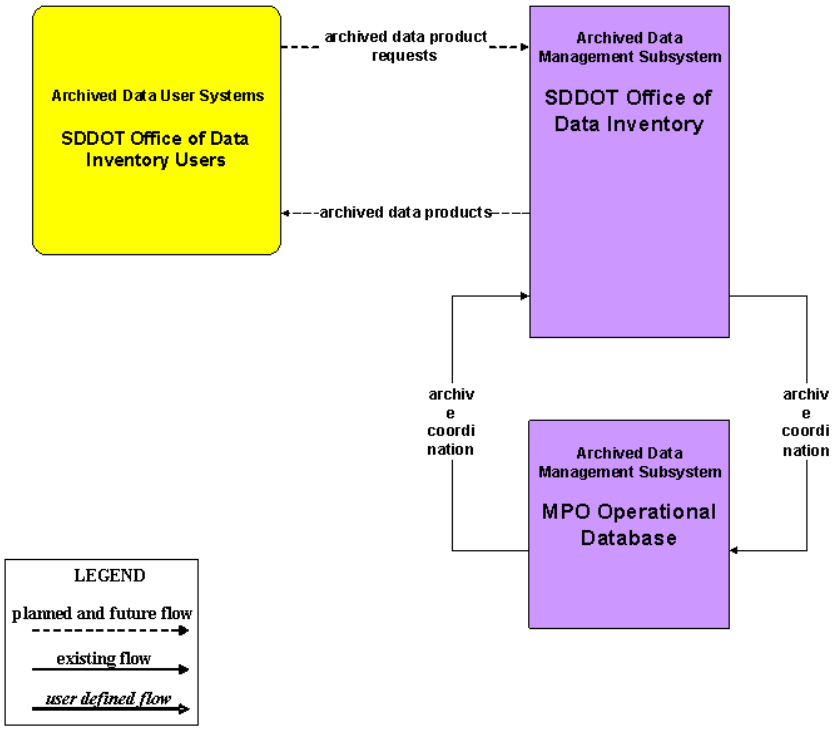
AD1 - ITS Data Mart
SDDOT Infrastructure Inventory System



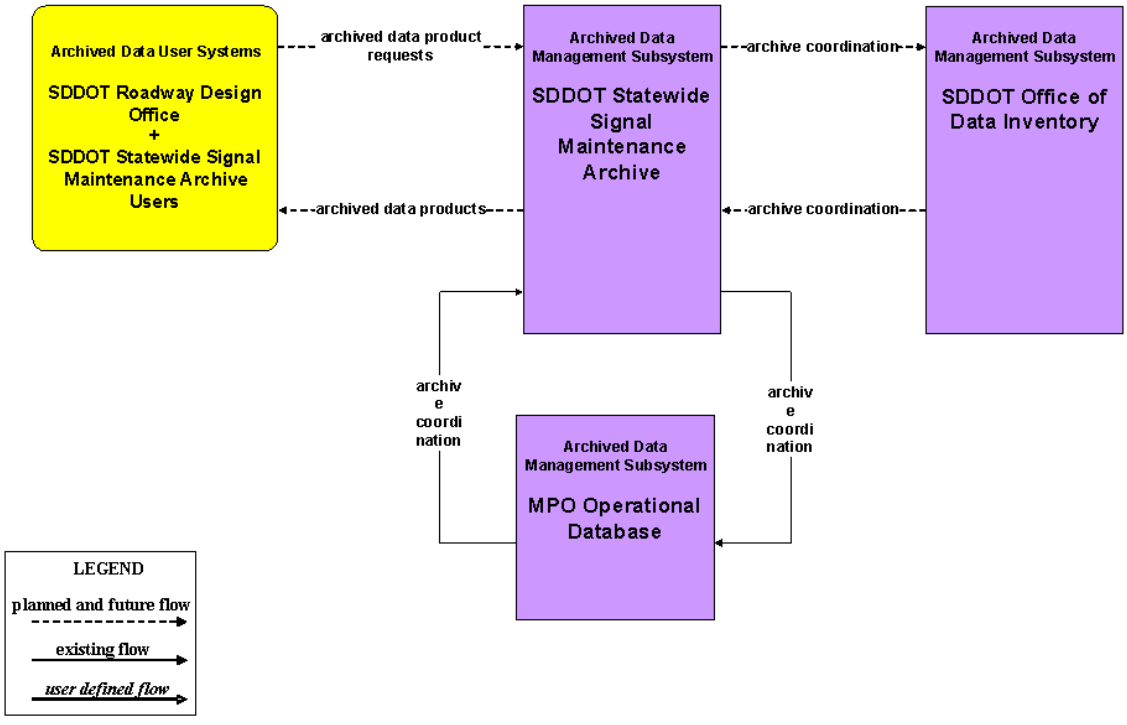
AD1 - ITS Data Mart
County, Municipal and Tribal Infrastructure Inventory System

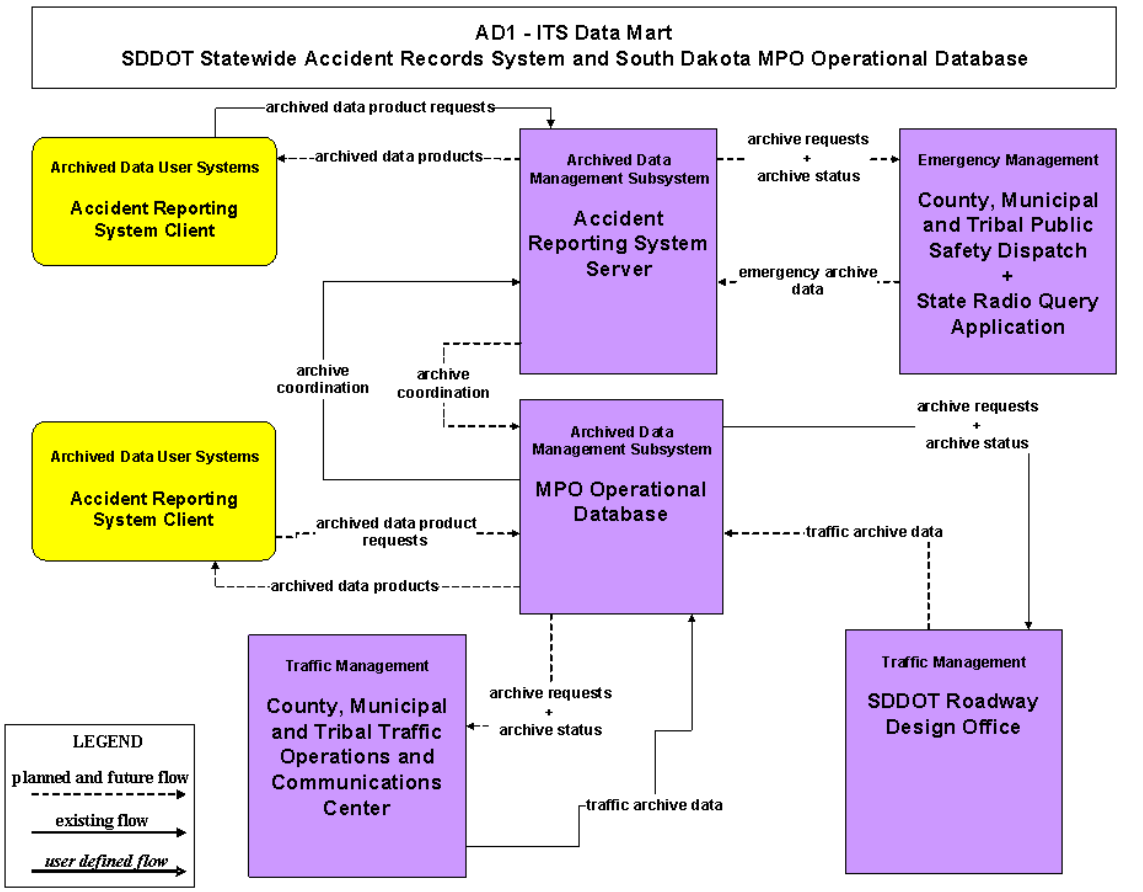


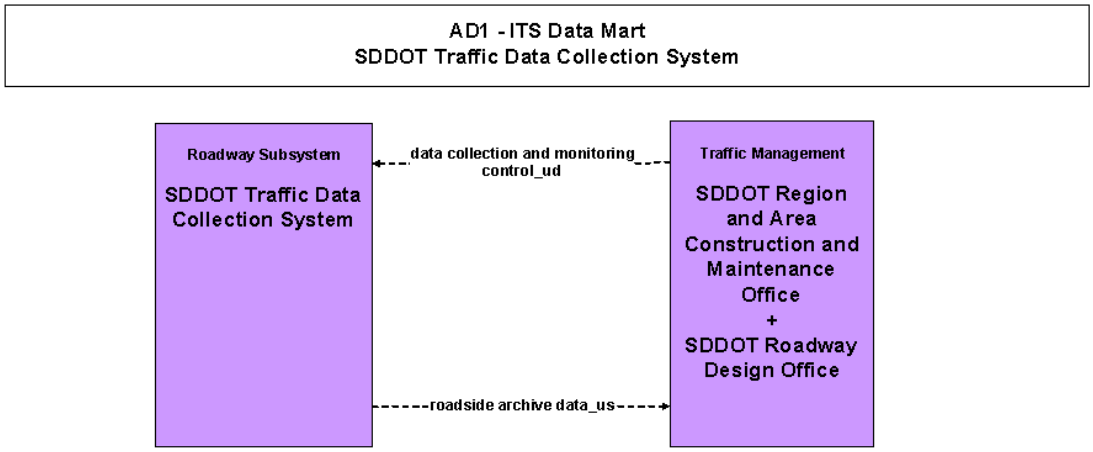
AD1 - ITS Data Mart
SDDOT Office of Data Inventory

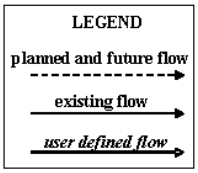


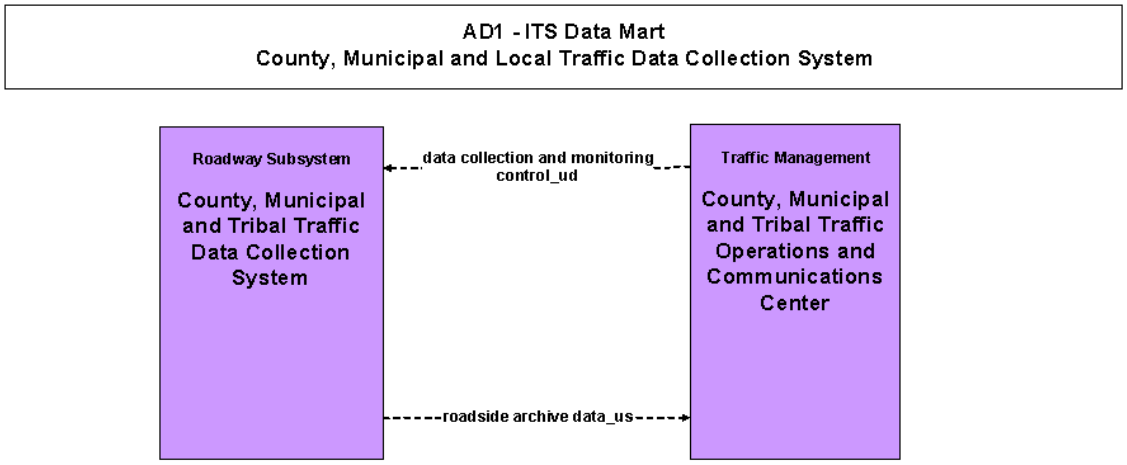
AD1 - ITS Data Mart
SDDOT Statewide Signal Maintenance Archive

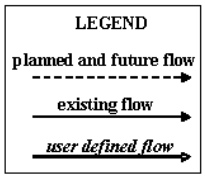



AD1 - ITS Data Mart
SDDOT Statewide Accident Records System and South Dakota MPO Operational Database
archived data product requests
Archived Data User Systems
Accident Reporting System Client
archived data products
Archived Data Management Subsystem
Accident Reporting System Server
archive requests + archive status
Emergency Management
County, Municipal and Tribal Public Safety Dispatch + State Radio Query Application
emergency archive data
archive coordination
archive coordination
Archived Data User Systems
Accident Reporting System Client
Archived Data Management Subsystem
MPO Operational Database
archive requests + archive status
archived data product requests
traffic archive data
archived data products
Traffic Management
County, Municipal and Tribal Traffic Operations and Communications Center
archive requests + archive status
Traffic Management
SDDOT Roadway Design Office
traffic archive data
LEGEND
planned and future flow
existing flow
user defined flow


AD1 - ITS Data Mart
SDDOT Traffic Data Collection System
Roadway Subsystem
SDDOT Traffic Data Collection System
data collection and monitoring control_ud
Traffic Management
SDDOT Region and Area Construction and Maintenance Office + SDDOT Roadway Design Office
roadside archive data_us


LEGEND
planned and future flow
existing flow
user defined flow


AD1 - ITS Data Mart
County, Municipal and Local Traffic Data Collection System
Roadway Subsystem
County, Municipal and Tribal Traffic Data Collection System
data collection and monitoring control_ud
Traffic Management
County, Municipal and Tribal Traffic Operations and Communications Center
roadside archive data_us

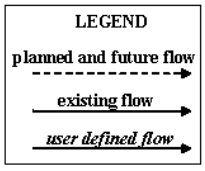

LEGEND
planned and future flow
existing flow
user defined flow

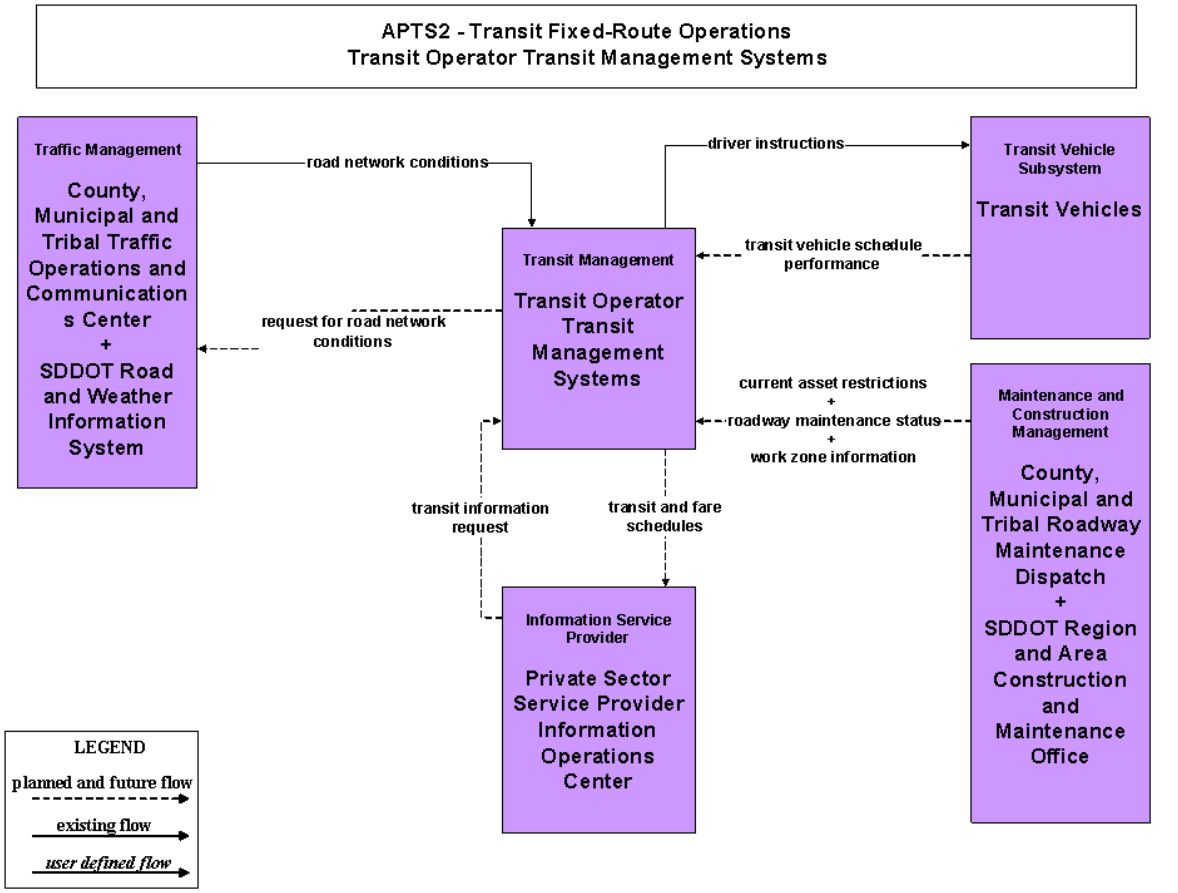
South Dakota
Statewide ITS Architecture

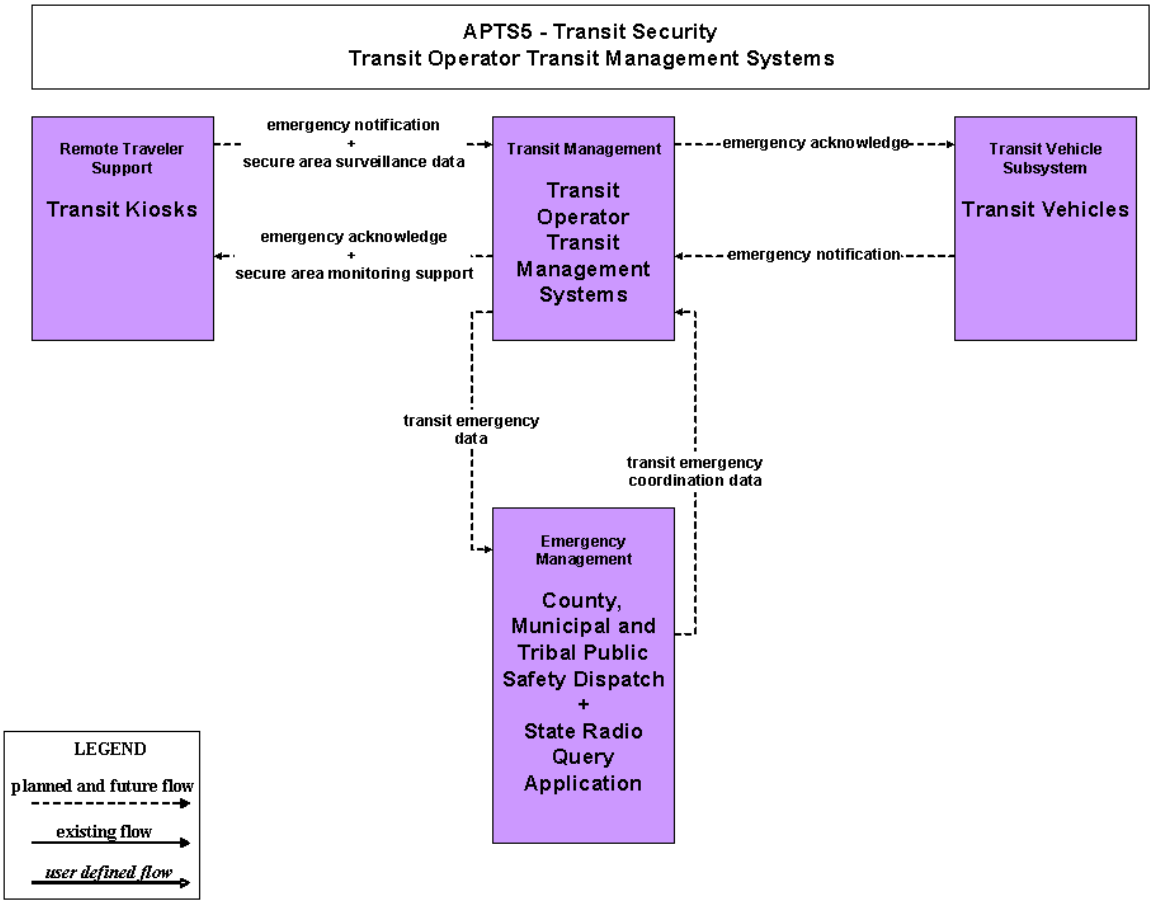
Customized Market Package Diagrams

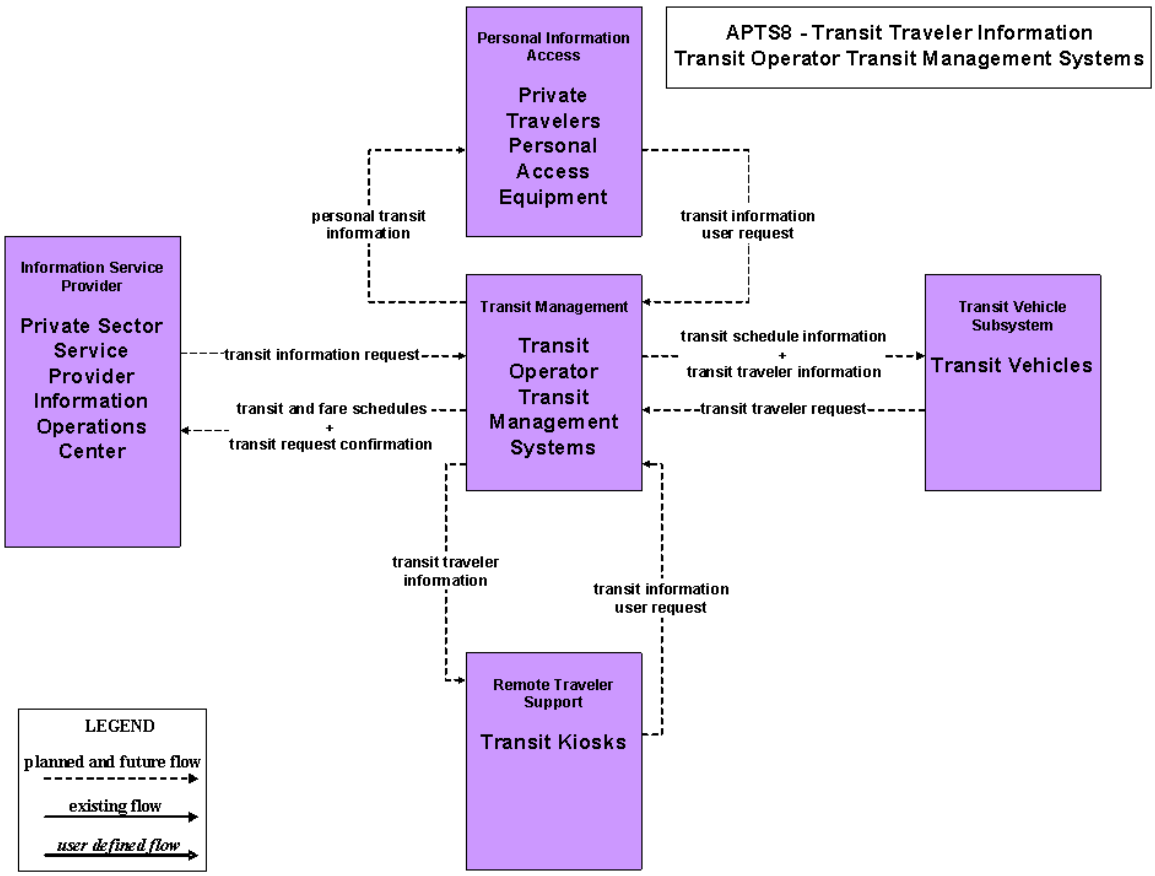
Advanced Public Transportation Systems (APTS)

APTS1 - Transit Vehicle Tracking
Transit Operator Transit Management Systems




APTS2 - Transit Fixed-Route Operations
Transit Operator Transit Management Systems
Traffic Management
County, Municipal and Tribal Traffic Operations and Communication s Center + SDDOT Road and Weather Information System
road network conditions
driver instructions
Transit Vehicle Subsystem
Transit Vehicles
Transit Management
Transit Operator Transit Management Systems
transit vehicle schedule performance
request for road network conditions
current asset restrictions + roadway maintenance status + work zone information
Maintenance and Construction Management
County, Municipal and Tribal Roadway Maintenance Dispatch + SDDOT Region and Area Construction and Maintenance Office
transit information request
transit and fare schedules
Information Service Provider
Private Sector Service Provider Information Operations Center
LEGEND
planned and future flow
existing flow
user defined flow

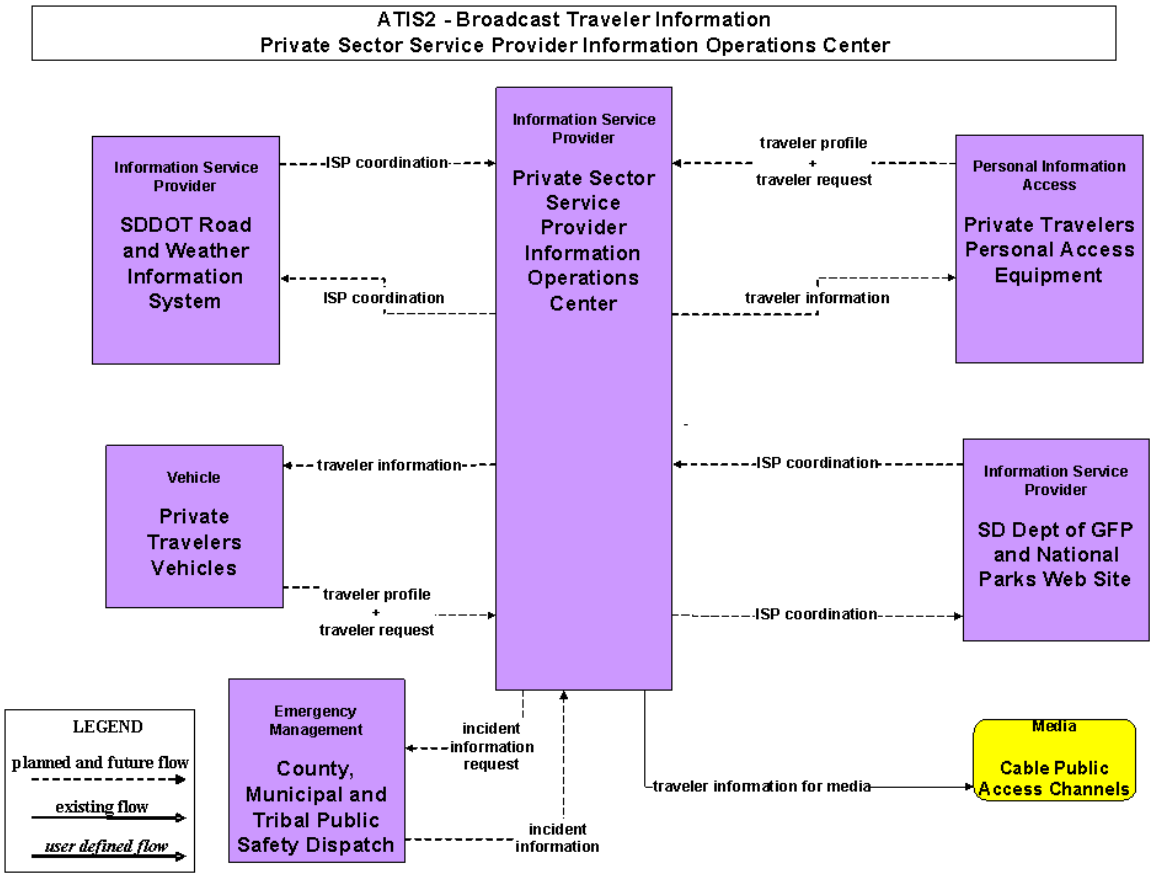

APTS5 - Transit Security
Transit Operator Transit Management Systems
Remote Traveler Support
Transit Kiosks
emergency notification + secure area surveillance data
emergency acknowledge + secure area monitoring support
Transit Management
Transit Operator Transit Management Systems
emergency acknowledge
emergency notification
Transit Vehicle Subsystem
Transit Vehicles
transit emergency data
transit emergency coordination data
Emergency Management
County, Municipal and Tribal Public Safety Dispatch + State Radio Query Application
LEGEND
planned and future flow
existing flow
user defined flow

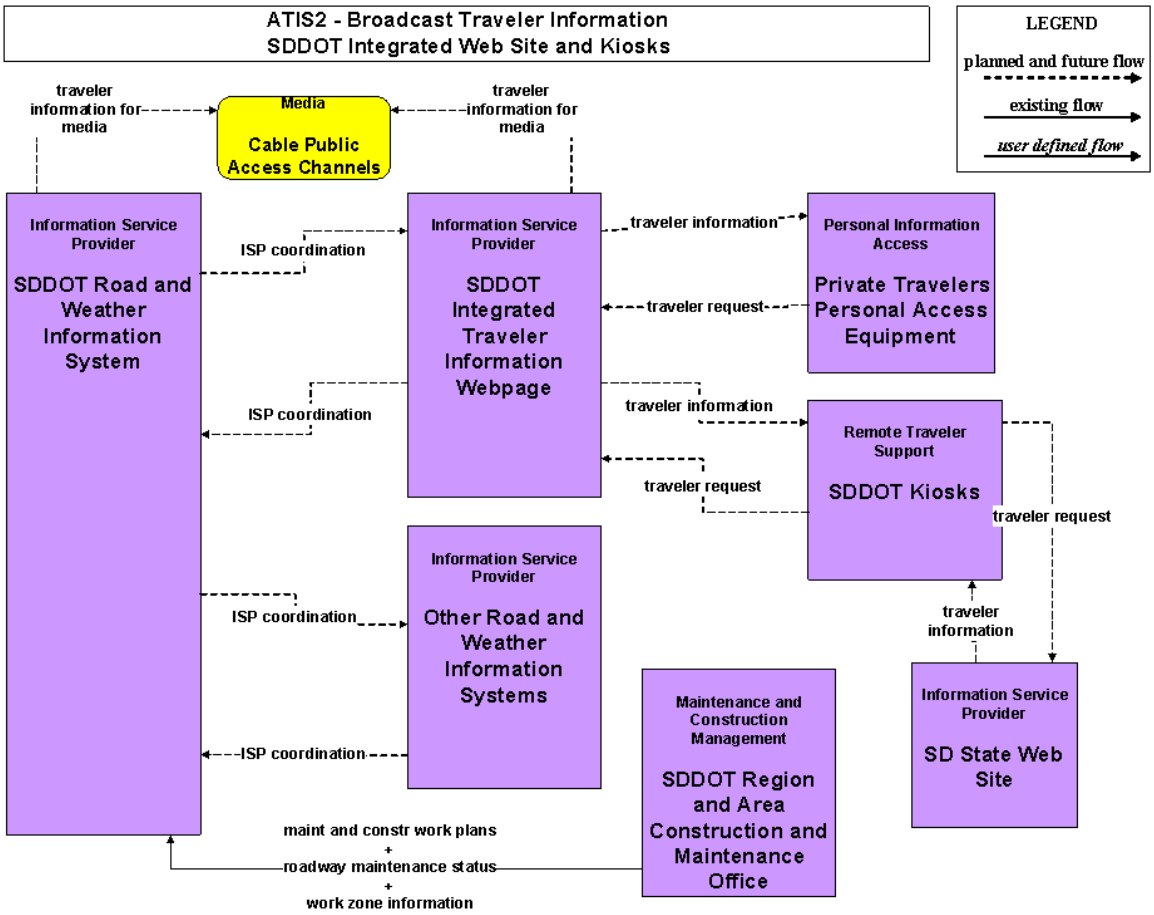

APTS8 - Transit Traveler Information
Transit Operator Transit Management Systems
Personal Information Access
Private Travelers Personal Access Equipment
personal transit information
transit information user request
Information Service Provider
Private Sector Service Provider Information Operations Center
Transit Management
Transit Operator Transit Management Systems
transit information request
transit and fare schedules + transit request confirmation
transit schedule information + transit traveler information
transit traveler request
Transit Vehicle Subsystem
Transit Vehicles
transit traveler information
transit information user request
Remote Traveler Support
Transit Kiosks
LEGEND
planned and future flow
existing flow
user defined flow

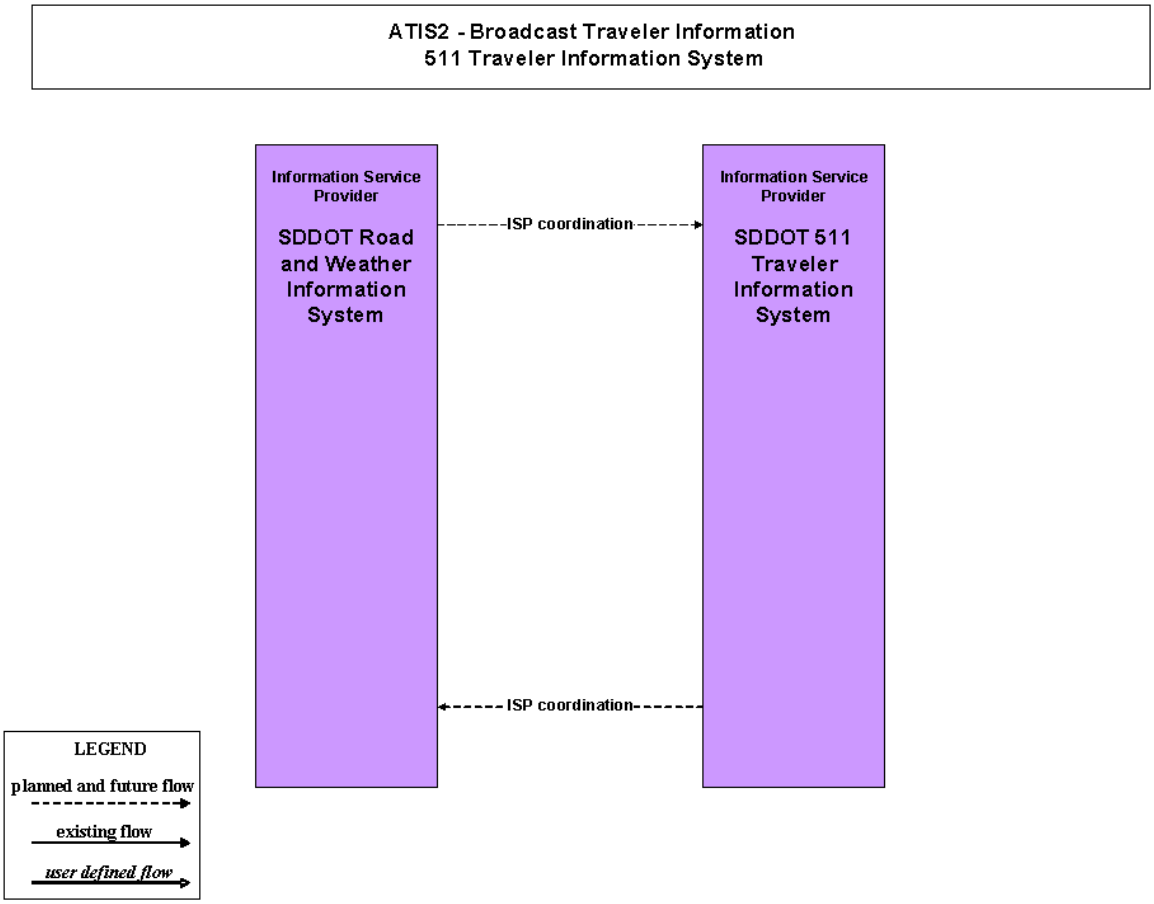
South Dakota
Statewide ITS Architecture

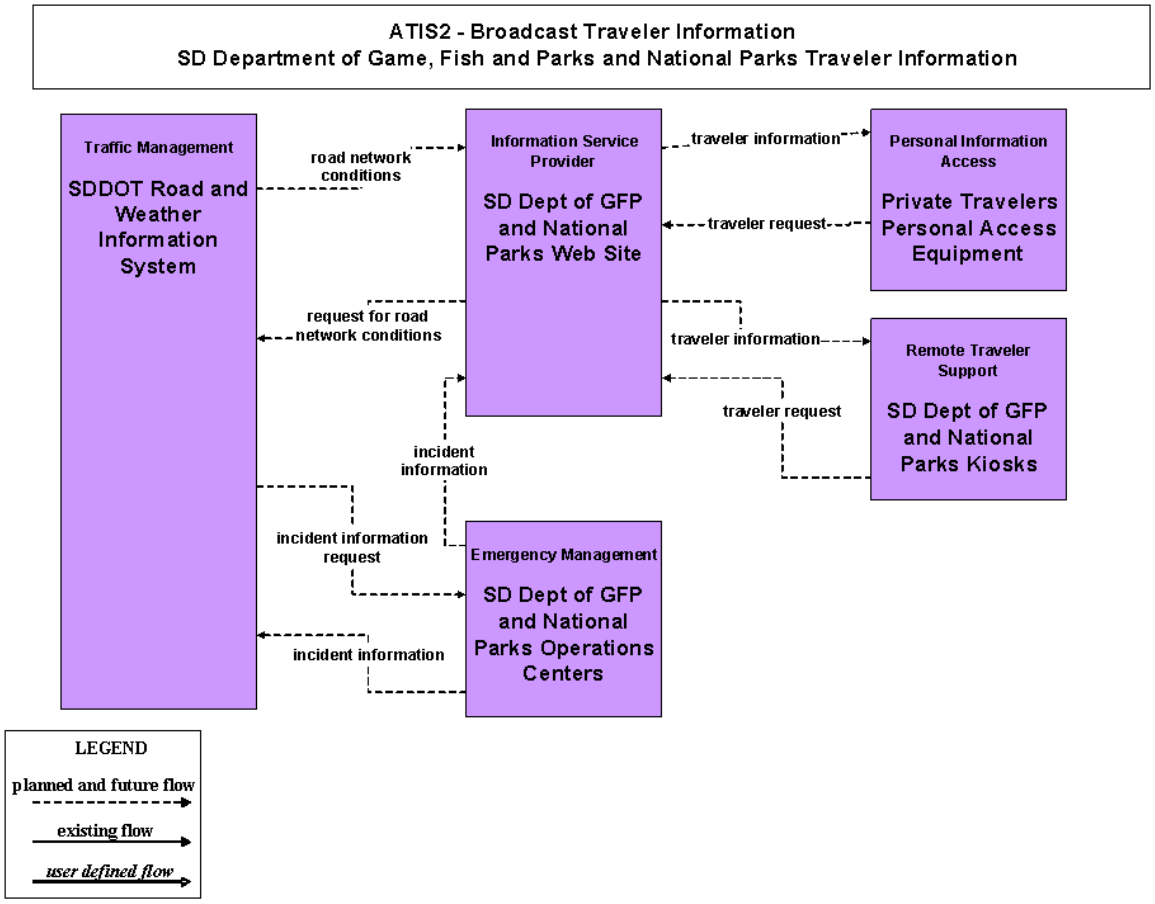
Customized Market Package Diagrams

Advanced Traveler Information Systems (ATIS)




ATIS2 - Broadcast Traveler Information
SDDOT Integrated Web Site and Kiosks
LEGEND
planned and future flow
existing flow
user defined flow
traveler information for media
Media
Cable Public Access Channels
traveler information for media
Information Service Provider
SDDOT Road and Weather Information System
ISP coordination
Information Service Provider
SDDOT Integrated Traveler Information Webpage
traveler information
Personal Information Access
Private Travelers Personal Access Equipment
traveler request
ISP coordination
traveler information
Remote Traveler Support
SDDOT Kiosks
traveler request
traveler request
Information Service Provider
Other Road and Weather Information Systems
ISP coordination
traveler information
Information Service Provider
SD State Web Site
Maintenance and Construction Management
SDDOT Region and Area Construction and Maintenance Office
ISP coordination
maint and constr work plans
+
roadway maintenance status
+
work zone information

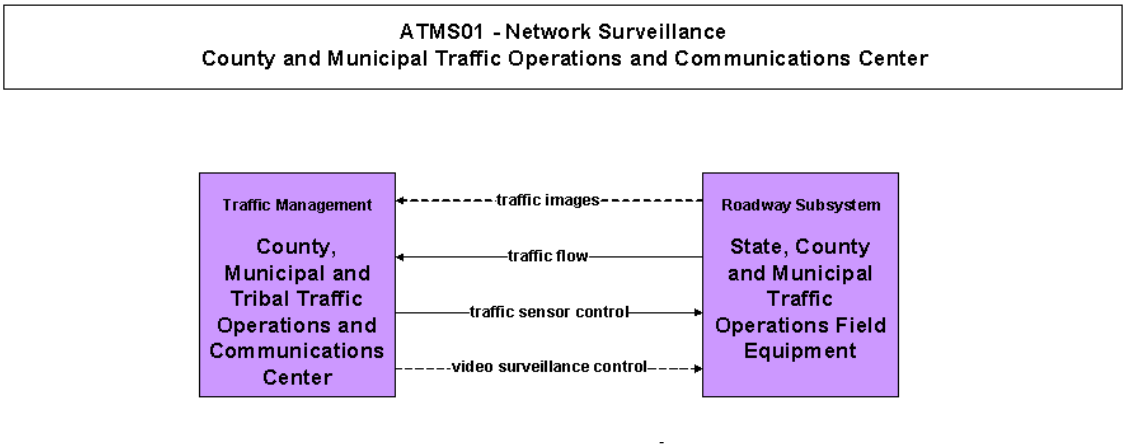

ATIS2 - Broadcast Traveler Information
511 Traveler Information System
Information Service Provider
SDDOT Road and Weather Information System
ISP coordination
Information Service Provider
SDDOT 511 Traveler Information System
ISP coordination
LEGEND
planned and future flow
existing flow
user defined flow

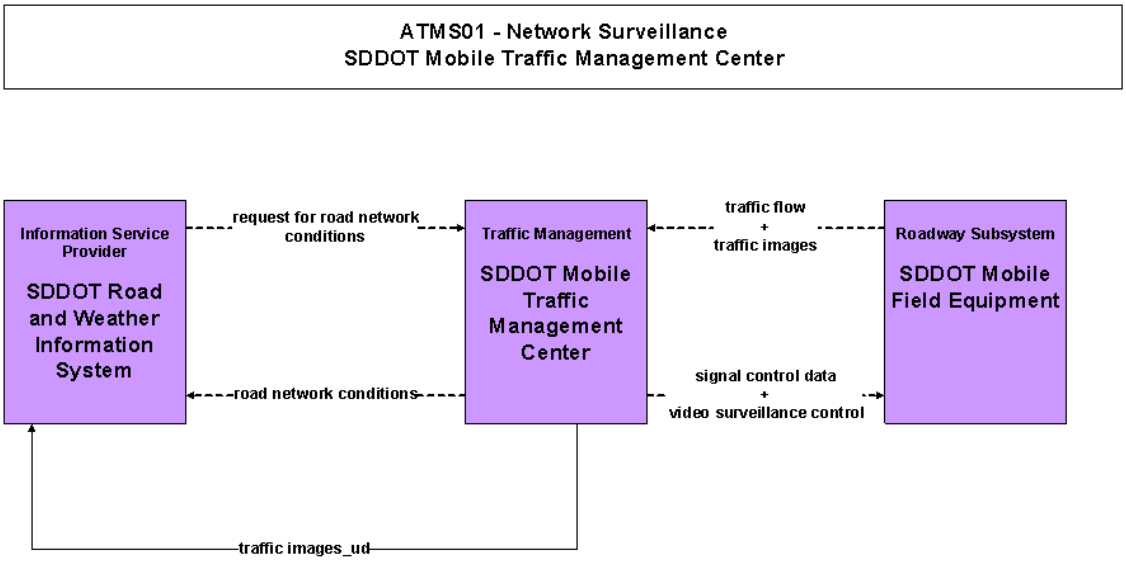

ATIS2 - Broadcast Traveler Information
SD Department of Game, Fish and Parks and National Parks Traveler Information
Traffic Management
SDDOT Road and Weather Information System
road network conditions
request for road network conditions
Information Service Provider
SD Dept of GFP and National Parks Web Site
traveler information
traveler request
Personal Information Access
Private Travelers Personal Access Equipment
traveler information
traveler request
Remote Traveler Support
SD Dept of GFP and National Parks Kiosks
incident information
incident information request
incident information
Emergency Management
SD Dept of GFP and National Parks Operations Centers
LEGEND
planned and future flow
existing flow
user defined flow

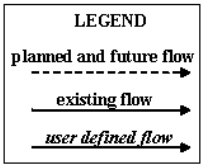
South Dakota
Statewide ITS Architecture

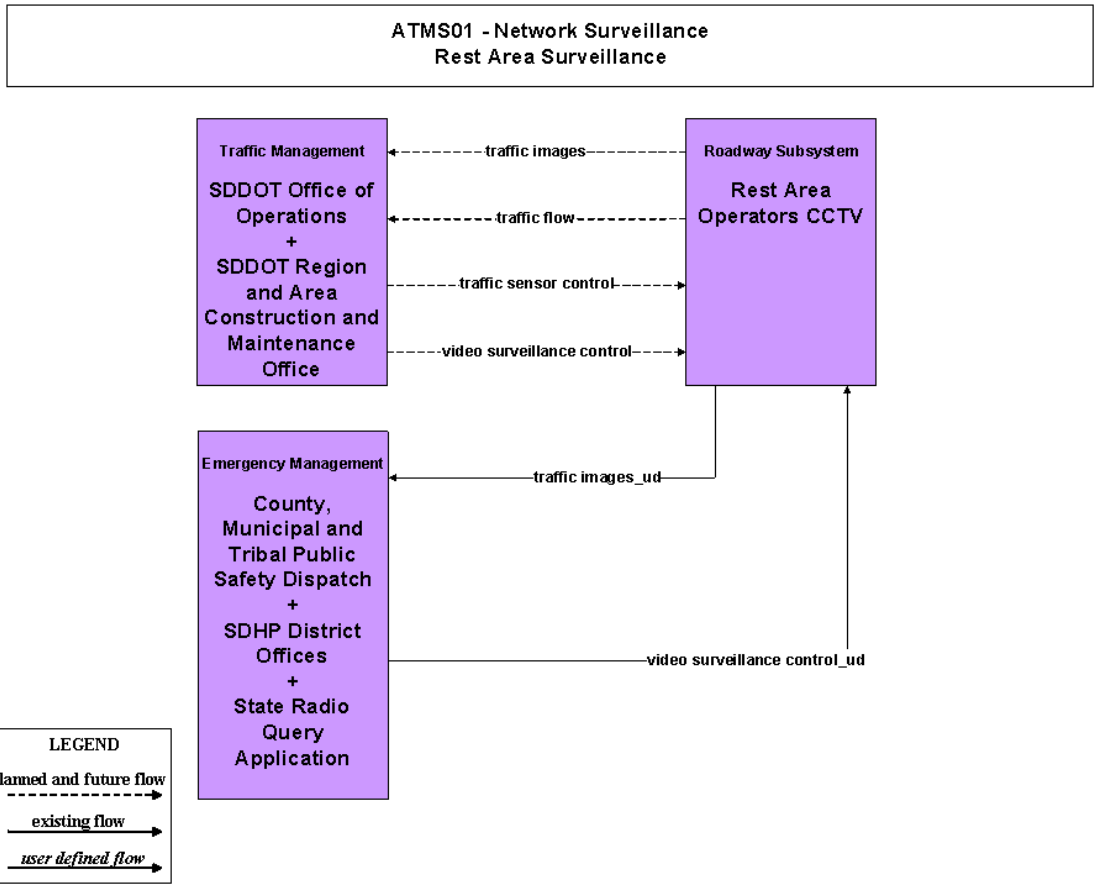
Customized Market Package Diagrams

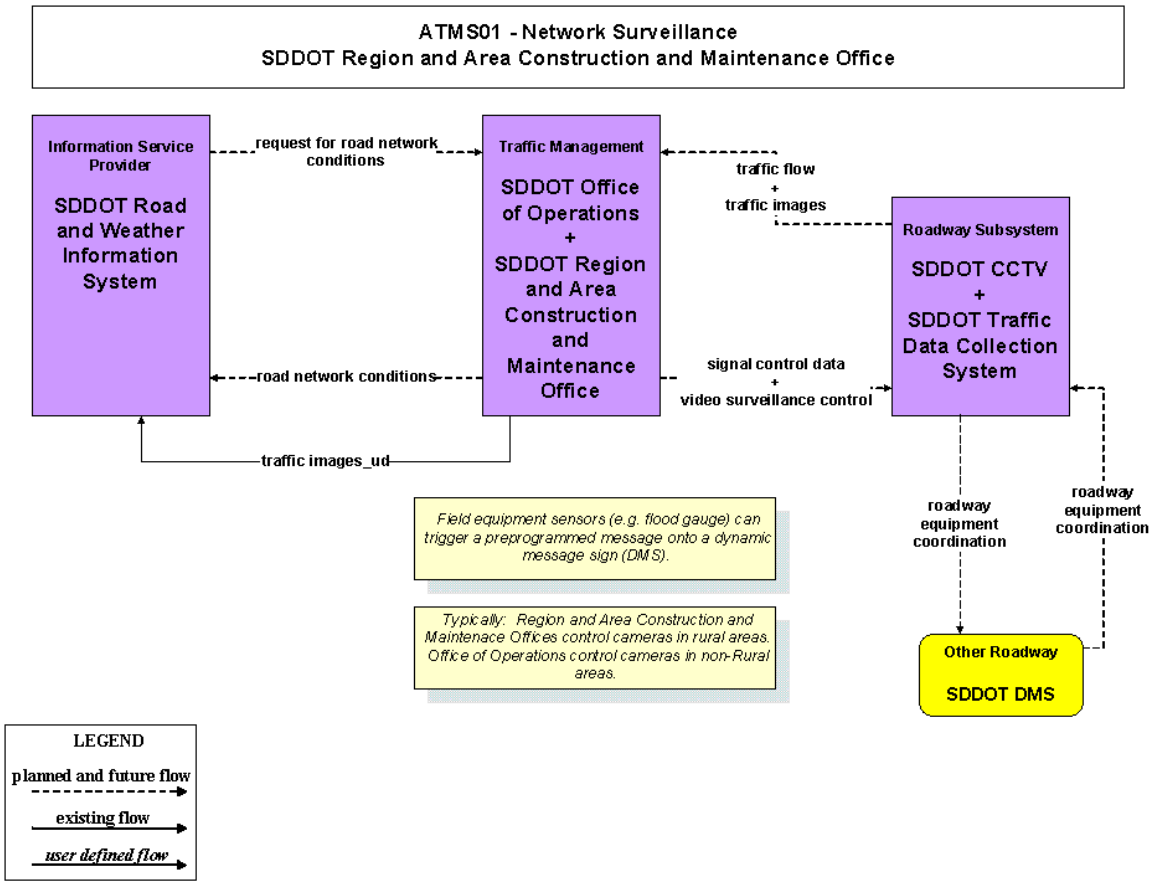
Advanced Traffic Management Systems (ATMS)

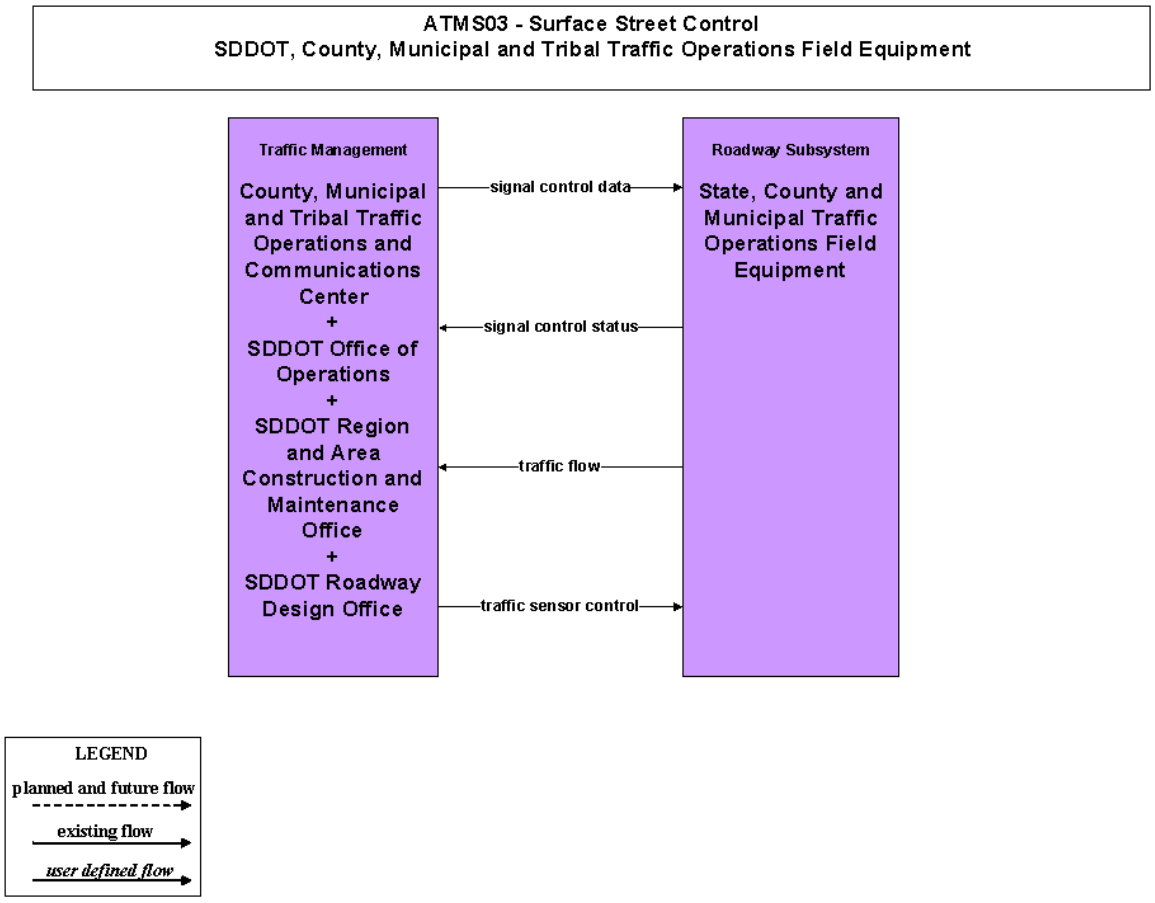


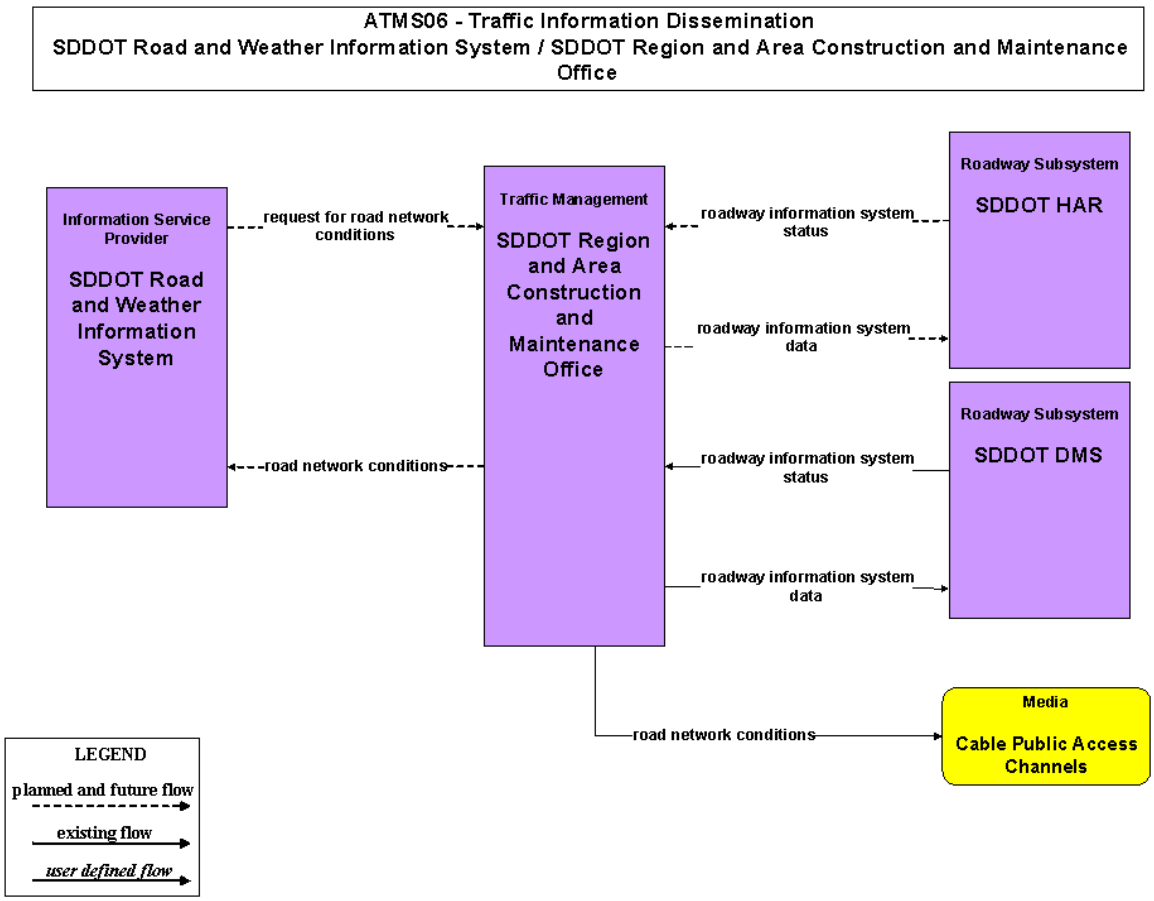

ATMS01 - Network Surveillance
SDDOT Mobile Traffic Management Center
Information Service Provider
SDDOT Road and Weather Information System
request for road network conditions
road network conditions
Traffic Management
SDDOT Mobile Traffic Management Center
traffic flow
+
traffic images
signal control data
+
video surveillance control
Roadway Subsystem
SDDOT Mobile Field Equipment
traffic images_ud

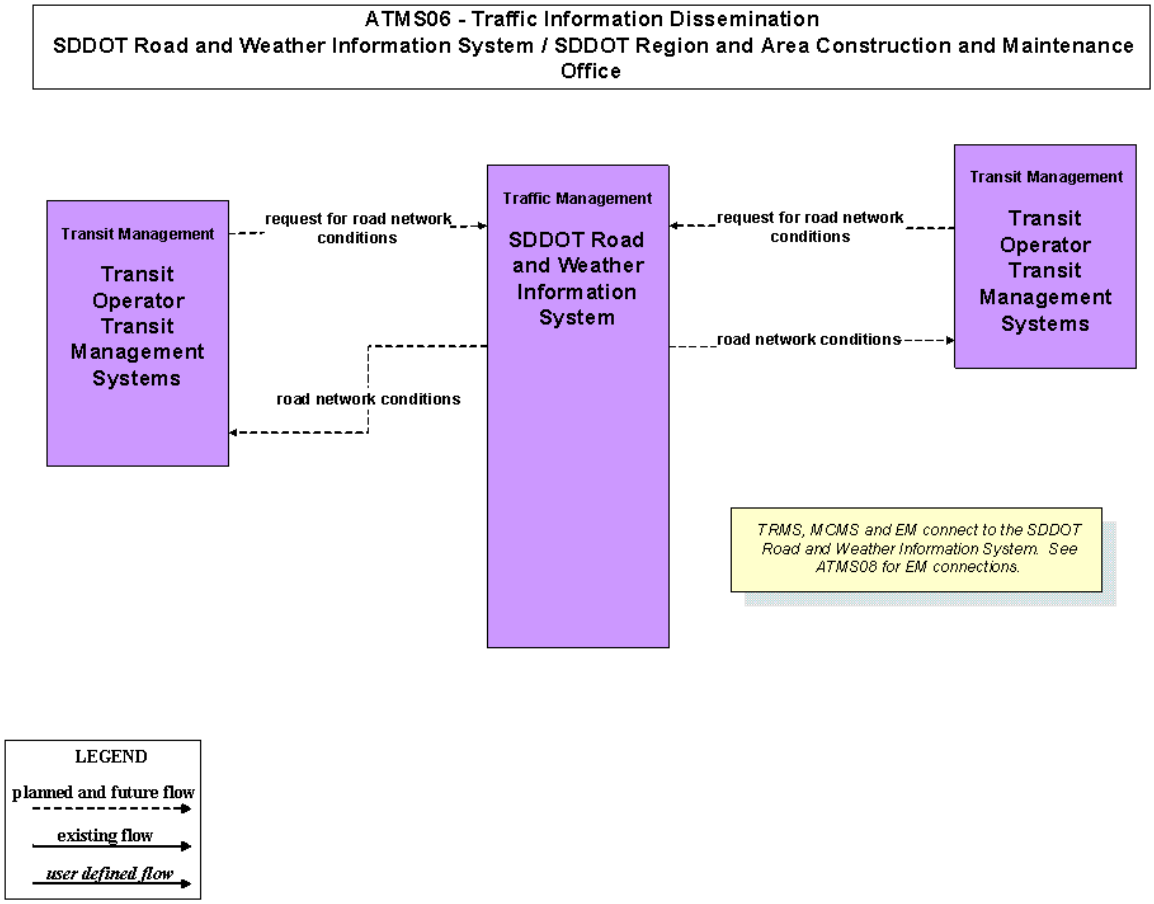

LEGEND
planned and future flow
existing flow
user defined flow


ATMS01 - Network Surveillance
Rest Area Surveillance
Traffic Management
SDDOT Office of Operations
+
SDDOT Region and Area Construction and Maintenance Office
traffic images
traffic flow
traffic sensor control
video surveillance control
Roadway Subsystem
Rest Area Operators CCTV
Emergency Management
County, Municipal and Tribal Public Safety Dispatch
+
SDHP District Offices
+
State Radio Query Application
traffic images_ud
video surveillance control_ud
LEGEND
planned and future flow
existing flow
user defined flow

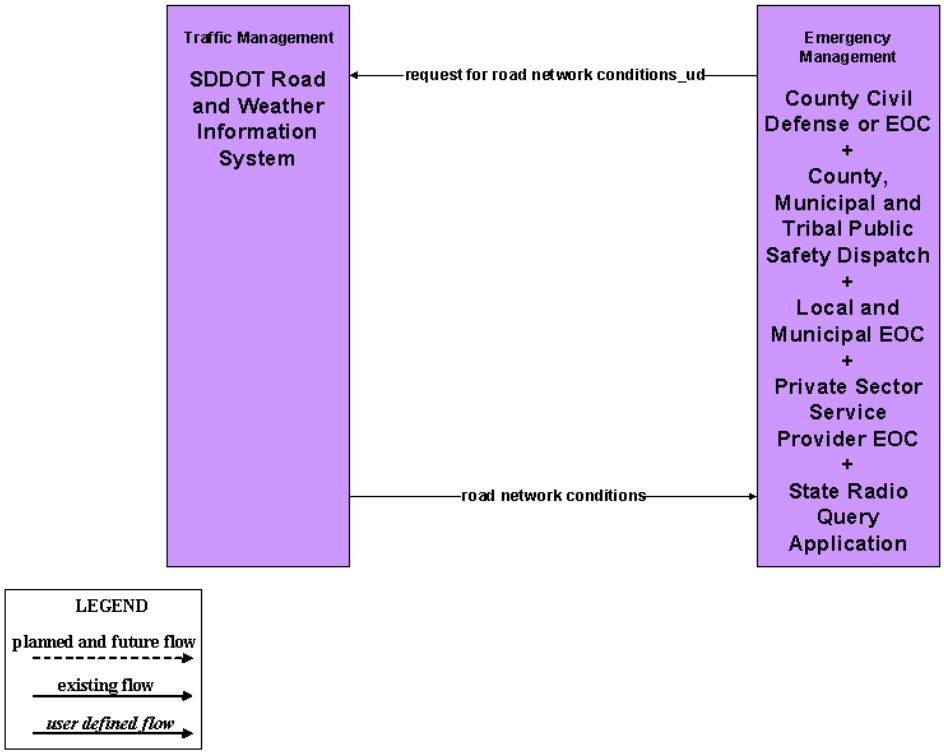

ATMS01 - Network Surveillance
SDDOT Region and Area Construction and Maintenance Office
Information Service Provider
SDDOT Road and Weather Information System
request for road network conditions
road network conditions
Traffic Management
SDDOT Office of Operations + SDDOT Region and Area Construction and Maintenance Office
traffic flow + traffic images
signal control data + video surveillance control
traffic images_ud
Roadway Subsystem
SDDOT CCTV + SDDOT Traffic Data Collection System
roadway equipment coordination
roadway equipment coordination
Other Roadway
SDDOT DMS
Field equipment sensors (e.g. flood gauge) can trigger a preprogrammed message onto a dynamic message sign (DMS).
Typically: Region and Area Construction and Maintenace Offices control cameras in rural areas. Office of Operations control cameras in non-Rural areas.
LEGEND
planned and future flow
existing flow
user defined flow


ATMS03 - Surface Street Control
SDDOT, County, Municipal and Tribal Traffic Operations Field Equipment
Traffic Management
County, Municipal and Tribal Traffic Operations and Communications Center + SDDOT Office of Operations + SDDOT Region and Area Construction and Maintenance Office + SDDOT Roadway Design Office
signal control data
signal control status
traffic flow
traffic sensor control
Roadway Subsystem
State, County and Municipal Traffic Operations Field Equipment
LEGEND
planned and future flow
existing flow
user defined flow

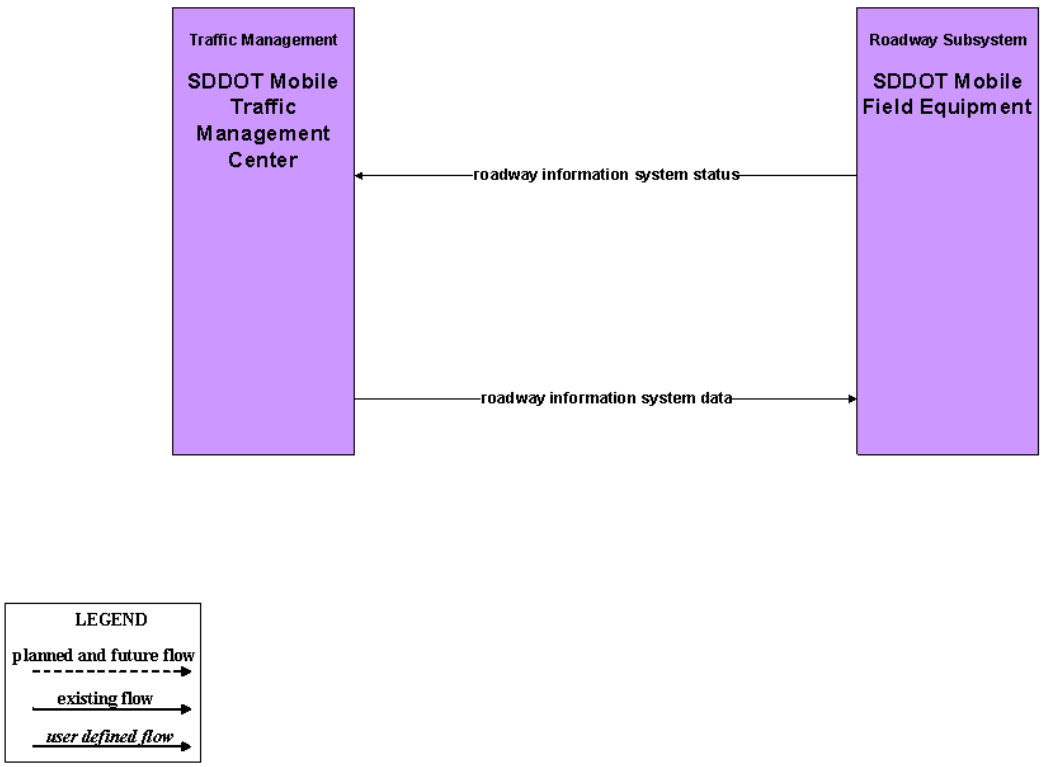

ATMS06 - Traffic Information Dissemination
SDDOT Road and Weather Information System / SDDOT Region and Area Construction and Maintenance Office
Information Service Provider
SDDOT Road and Weather Information System
request for road network conditions
road network conditions
Traffic Management
SDDOT Region and Area Construction and Maintenance Office
roadway information system status
roadway information system data
roadway information system status
roadway information system data
road network conditions
Roadway Subsystem
SDDOT HAR
Roadway Subsystem
SDDOT DMS
Media
Cable Public Access Channels
LEGEND
planned and future flow
existing flow
user defined flow

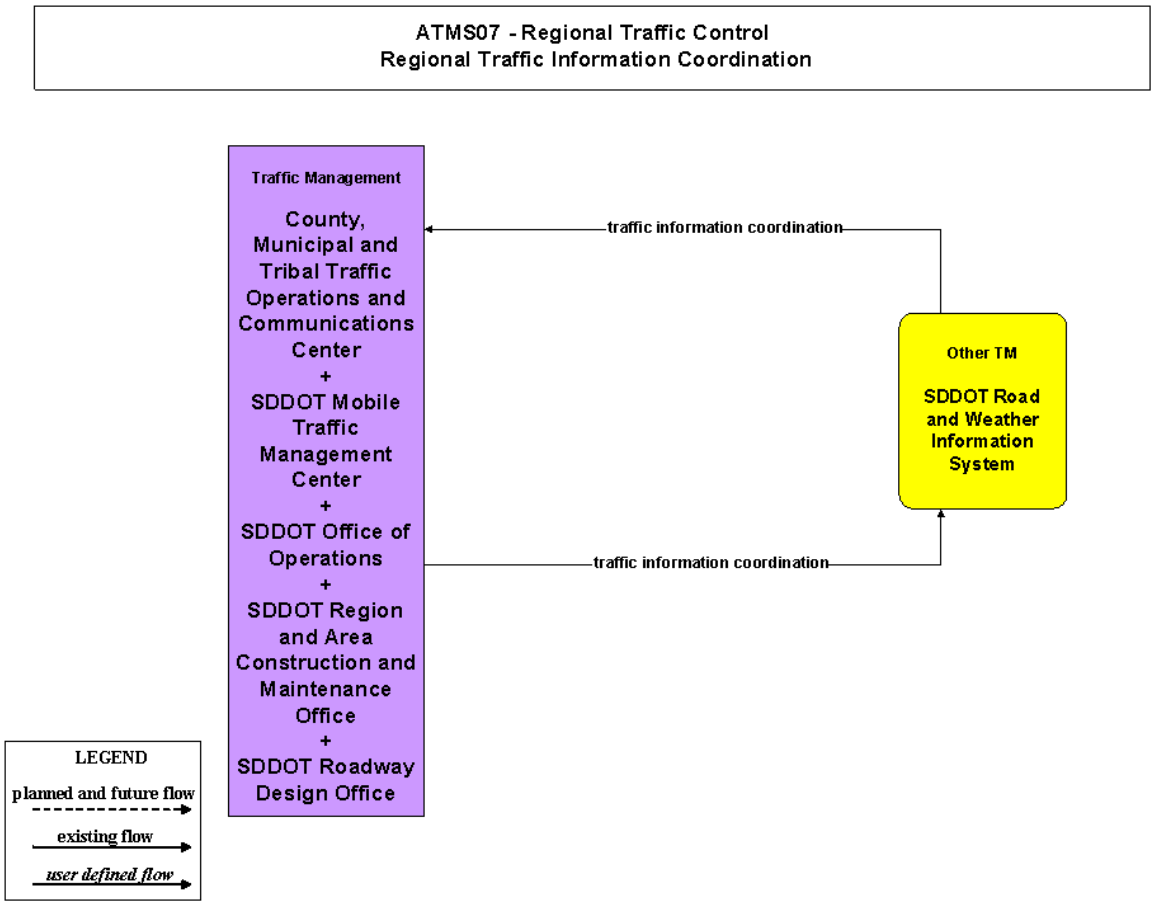

ATMS06 - Traffic Information Dissemination
SDDOT Road and Weather Information System / SDDOT Region and Area Construction and Maintenance Office
Transit Management
Transit Operator Transit Management Systems
request for road network conditions
road network conditions
Traffic Management
SDDOT Road and Weather Information System
request for road network conditions
road network conditions
Transit Management
Transit Operator Transit Management Systems
TRMS, MCMS and EM connect to the SDDOT Road and Weather Information System. See ATMS08 for EM connections.
LEGEND
planned and future flow
existing flow
user defined flow

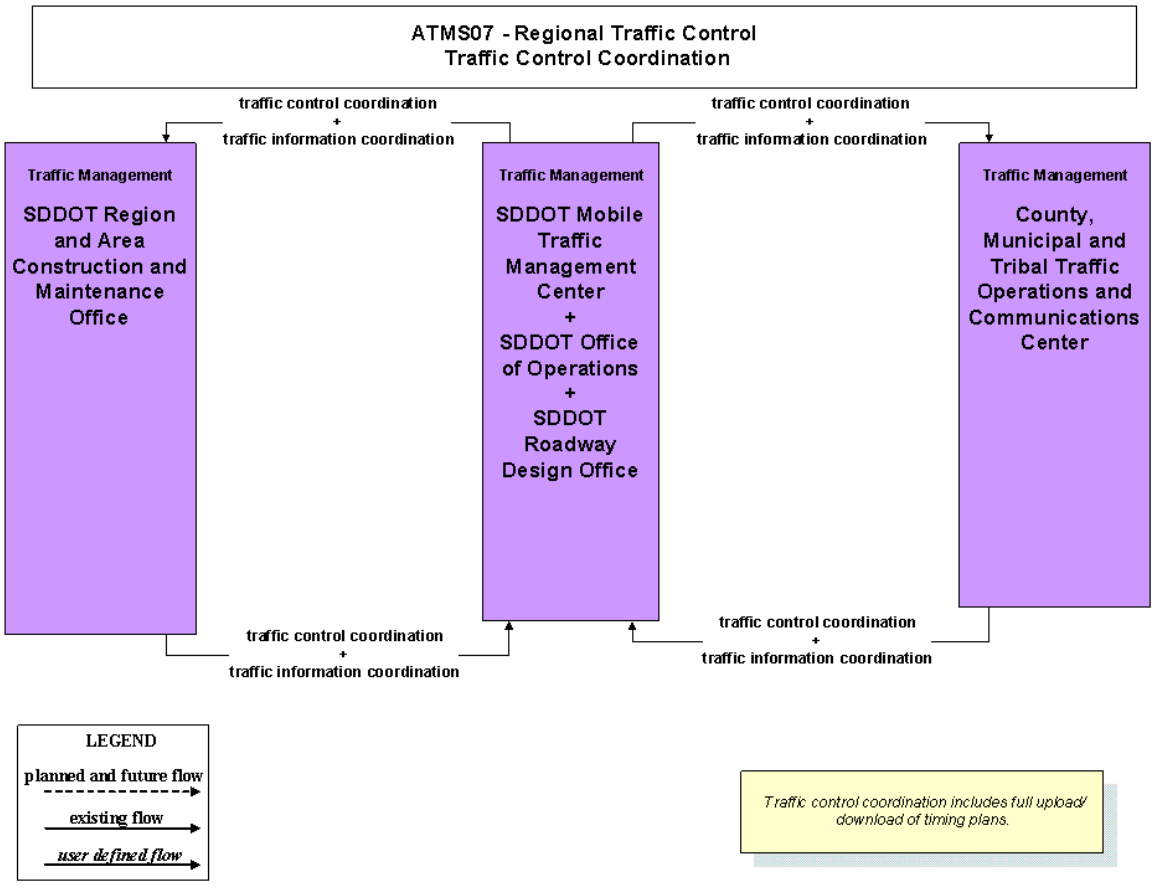
ATMS06 - Traffic Information Dissemination
SDDOT Road and Weather Information System / SDDOT Region and Area Construction and Maintenance Office

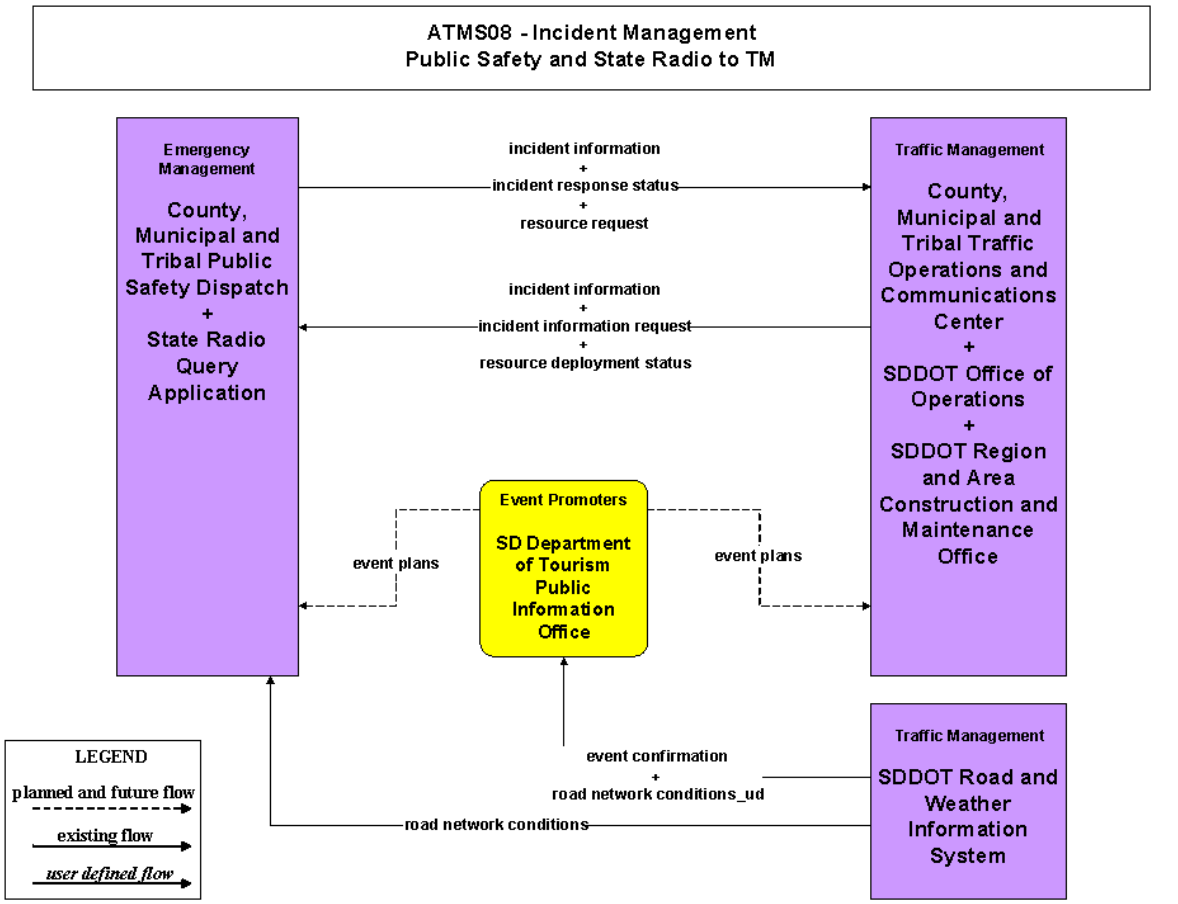


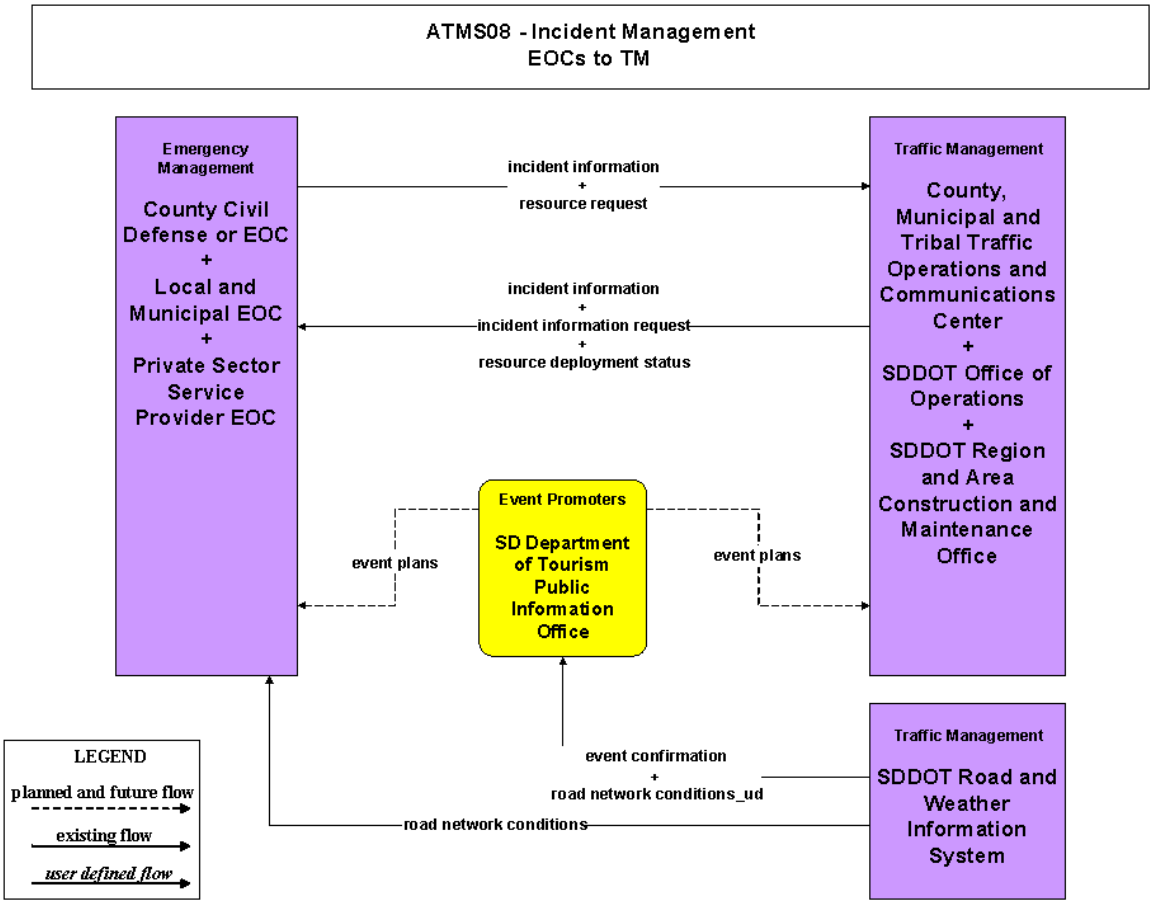
ATMS06 - Traffic Information Dissemination
SDDOT Mobile Traffic Management Center

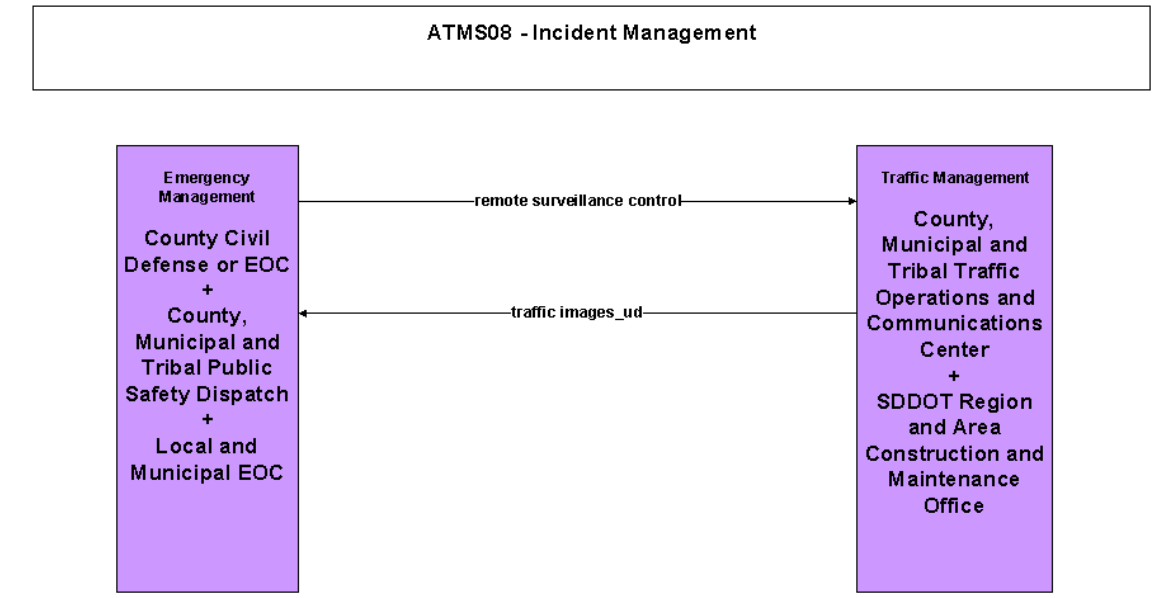


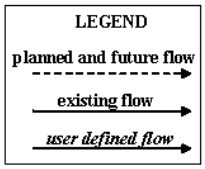

ATMS07 - Regional Traffic Control
Regional Traffic Information Coordination
Traffic Management
County, Municipal and Tribal Traffic Operations and Communications Center
+
SDDOT Mobile Traffic Management Center
+
SDDOT Office of Operations
+
SDDOT Region and Area Construction and Maintenance Office
+
SDDOT Roadway Design Office
traffic information coordination
traffic information coordination
Other TM
SDDOT Road and Weather Information System
LEGEND
planned and future flow
existing flow
user defined flow

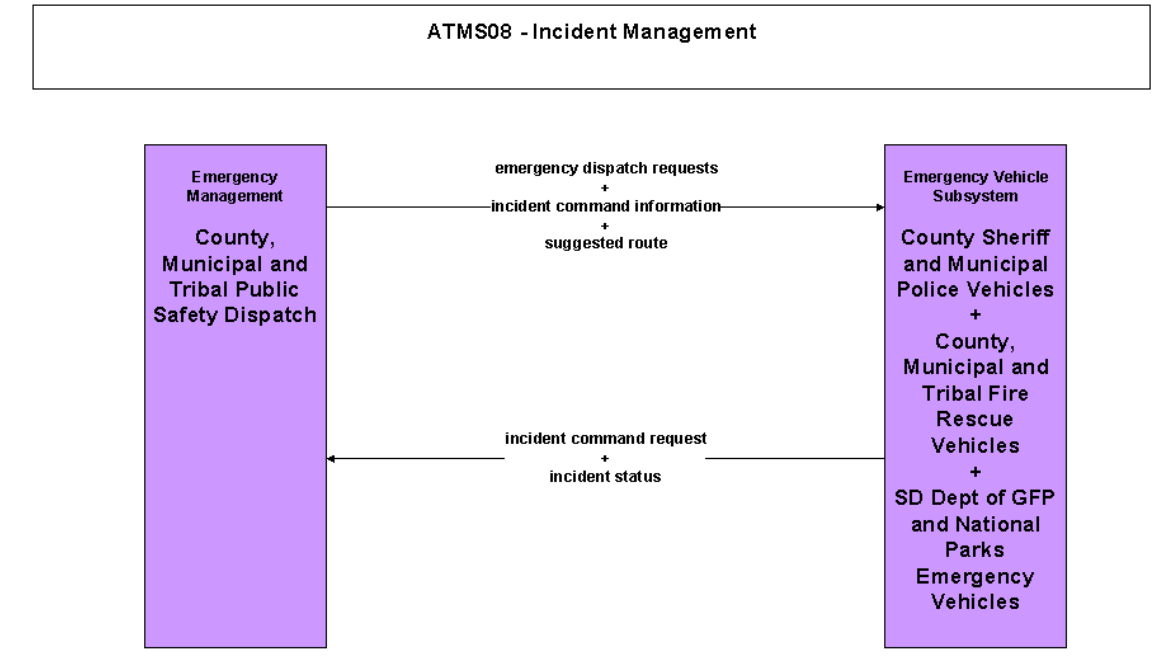

ATMS07 - Regional Traffic Control
Traffic Control Coordination
traffic control coordination
+
traffic information coordination
traffic control coordination
+
traffic information coordination
Traffic Management
SDDOT Region and Area Construction and Maintenance Office
Traffic Management
SDDOT Mobile Traffic Management Center
+
SDDOT Office of Operations
+
SDDOT Roadway Design Office
Traffic Management
County, Municipal and Tribal Traffic Operations and Communications Center
traffic control coordination
+
traffic information coordination
traffic control coordination
+
traffic information coordination
LEGEND
planned and future flow
existing flow
user defined flow
Traffic control coordination includes full upload/ download of timing plans.

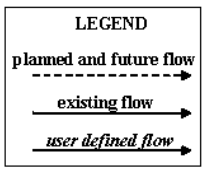

ATMS08 - Incident Management
Public Safety and State Radio to TM
Emergency Management
County, Municipal and Tribal Public Safety Dispatch
+
State Radio Query Application
incident information
+
incident response status
+
resource request
incident information
+
incident information request
+
resource deployment status
Traffic Management
County, Municipal and Tribal Traffic Operations and Communications Center
+
SDDOT Office of Operations
+
SDDOT Region and Area Construction and Maintenance Office
Event Promoters
SD Department of Tourism Public Information Office
event plans
event plans
Traffic Management
SDDOT Road and Weather Information System
event confirmation
+
road network conditions_ud
road network conditions
LEGEND
planned and future flow
existing flow
user defined flow


ATMS08 - Incident Management
EOCs to TM
Emergency Management
County Civil Defense or EOC
+
Local and Municipal EOC
+
Private Sector Service Provider EOC
incident information
+
resource request
incident information
+
incident information request
+
resource deployment status
Traffic Management
County, Municipal and Tribal Traffic Operations and Communications Center
+
SDDOT Office of Operations
+
SDDOT Region and Area Construction and Maintenance Office
Event Promoters
SD Department of Tourism Public Information Office
event plans
event plans
Traffic Management
SDDOT Road and Weather Information System
event confirmation
+
road network conditions_ud
road network conditions
LEGEND
planned and future flow
existing flow
user defined flow


ATMS08 - Incident Management
Emergency Management
County Civil Defense or EOC
+
County, Municipal and Tribal Public Safety Dispatch
+
Local and Municipal EOC
remote surveillance control
traffic images_ud
Traffic Management
County, Municipal and Tribal Traffic Operations and Communications Center
+
SDDOT Region and Area Construction and Maintenance Office


LEGEND
planned and future flow
existing flow
user defined flow


ATMS08 - Incident Management
Emergency Management
County, Municipal and Tribal Public Safety Dispatch
emergency dispatch requests
+
incident command information
+
suggested route
incident command request
+
incident status
Emergency Vehicle Subsystem
County Sheriff and Municipal Police Vehicles
+
County, Municipal and Tribal Fire Rescue Vehicles
+
SD Dept of GFP and National Parks Emergency Vehicles


LEGEND
planned and future flow
existing flow
user defined flow

Appendix C: Architecture Interfaces

Statewide ITS Architecture Interfaces

Element	Interfaces With
Accident Reporting System Client	Accident Reporting System Server
Accident Reporting System Client	MPO Operational Database
Accident Reporting System Server	Accident Reporting System Client
Accident Reporting System Server	CDL/DL
Accident Reporting System Server	County, Municipal and Tribal Public Safety Dispatch
Accident Reporting System Server	MPO Operational Database
Accident Reporting System Server	State Radio Query Application
Accident Reporting System Server	xCVIEW
ASPEN	CVO Inspector
ASPEN	SAFER
Automated Vehicle Identification	Commercial Vehicle Driver
Automated Vehicle Identification	Electronic Screening
Automated Vehicle Identification	HazMat
BIT Public Safety Incident and Mutual Aid Network	County Civil Defense or EOC
BIT Public Safety Incident and Mutual Aid Network	County, Municipal and Tribal Public Safety Dispatch
BIT Public Safety Incident and Mutual Aid Network	Local and Municipal EOC
BIT Public Safety Incident and Mutual Aid Network	Private Sector Service Provider EOC
BIT Public Safety Incident and Mutual Aid Network	SD Dept of GFP and National Parks Operations Centers
BIT Public Safety Incident and Mutual Aid Network	SD Governors Office of Homeland Security
BIT Public Safety Incident and Mutual Aid Network	SD Office of Emergency Management EOC
BIT Public Safety Incident and Mutual Aid Network	SDHP District Offices
BIT Public Safety Incident and Mutual Aid Network	State Radio Query Application
Cable Public Access Channels	County, Municipal and Tribal Public Safety Dispatch
Cable Public Access Channels	Private Sector Service Provider Information Operations Center
Cable Public Access Channels	SDDOT Integrated Traveler Information Webpage
Cable Public Access Channels	SDDOT Region and Area Construction and Maintenance Office
Cable Public Access Channels	SDDOT Road and Weather Information System
CAPRI	CVO Inspector
CAPRI	SAFETYNET 2000
Carrier Banks	COVERSnet

Element	Interfaces With
Carrier Banks	South Dakota State Treasury
CDL/DL	Accident Reporting System Server
CDL/DL	Roadside System Server
CDL/DL	State Radio Query Application
CDL/DL	Unified Judicial System
CDL/DL	xCVIEW
Commercial Vehicle	Electronic Screening
Commercial Vehicle Driver	Automated Vehicle Identification
Commercial Vehicle Driver	Electronic Screening
County Civil Defense or EOC	BIT Public Safety Incident and Mutual Aid Network
County Civil Defense or EOC	County, Municipal and Tribal Roadway Maintenance Dispatch
County Civil Defense or EOC	County, Municipal and Tribal Traffic Operations and Communications Center
County Civil Defense or EOC	SD Department of Tourism Public Information Office
County Civil Defense or EOC	SDDOT Office of Operations
County Civil Defense or EOC	SDDOT Region and Area Construction and Maintenance Office
County Civil Defense or EOC	SDDOT Road and Weather Information System
County Sheriff and Municipal Police Vehicles	County, Municipal and Tribal Public Safety Dispatch
County Sheriff and Municipal Police Vehicles	State Radio Query Application
County Sheriff and Municipal Police Vehicles	State, County and Municipal Traffic Operations Field Equipment
County, Municipal and Tribal Equipment Repair Facility	County, Municipal and Tribal Roadway Maintenance Dispatch
County, Municipal and Tribal Equipment Repair Facility	County, Municipal and Tribal Roadway Maintenance Vehicles
County, Municipal and Tribal Fire Rescue Vehicles	County, Municipal and Tribal Public Safety Dispatch
County, Municipal and Tribal Fire Rescue Vehicles	State, County and Municipal Traffic Operations Field Equipment
County, Municipal and Tribal Infrastructure Inventory System	MPO Operational Database
County, Municipal and Tribal Infrastructure Inventory System	State, County, Municipal and Tribal Infrastructure Inventory System Users
County, Municipal and Tribal Public Safety Dispatch	Accident Reporting System Server
County, Municipal and Tribal Public Safety Dispatch	BIT Public Safety Incident and Mutual Aid Network
County, Municipal and Tribal Public Safety Dispatch	Cable Public Access Channels
County, Municipal and Tribal Public Safety Dispatch	County Sheriff and Municipal Police Vehicles

Element	Interfaces With
County, Municipal and Tribal Public Safety Dispatch	County, Municipal and Tribal Fire Rescue Vehicles
County, Municipal and Tribal Public Safety Dispatch	County, Municipal and Tribal Roadway Maintenance Dispatch
County, Municipal and Tribal Public Safety Dispatch	County, Municipal and Tribal Traffic Operations and Communications Center
County, Municipal and Tribal Public Safety Dispatch	Emergency Telecommunications System
County, Municipal and Tribal Public Safety Dispatch	Private Sector Service Provider Information Operations Center
County, Municipal and Tribal Public Safety Dispatch	Private Travelers Personal Access Equipment
County, Municipal and Tribal Public Safety Dispatch	Private Travelers Vehicles
County, Municipal and Tribal Public Safety Dispatch	Rest Area Operators CCTV
County, Municipal and Tribal Public Safety Dispatch	SD Department of Tourism Public Information Office
County, Municipal and Tribal Public Safety Dispatch	SD Dept of GFP and National Parks Emergency Vehicles
County, Municipal and Tribal Public Safety Dispatch	SDDOT Kiosks
County, Municipal and Tribal Public Safety Dispatch	SDDOT Mobile Traffic Management Center
County, Municipal and Tribal Public Safety Dispatch	SDDOT Office of Operations
County, Municipal and Tribal Public Safety Dispatch	SDDOT Region and Area Construction and Maintenance Office
County, Municipal and Tribal Public Safety Dispatch	SDDOT Road and Weather Information System
County, Municipal and Tribal Public Safety Dispatch	SDDOT Roadway Design Office
County, Municipal and Tribal Public Safety Dispatch	SDHP Vehicles
County, Municipal and Tribal Public Safety Dispatch	State Radio Query Application
County, Municipal and Tribal Public Safety Dispatch	Transit Operator Transit Management Systems
County, Municipal and Tribal Roadway Maintenance Dispatch	County Civil Defense or EOC
County, Municipal and Tribal Roadway Maintenance Dispatch	County, Municipal and Tribal Equipment Repair Facility
County, Municipal and Tribal Roadway Maintenance Dispatch	County, Municipal and Tribal Public Safety Dispatch
County, Municipal and Tribal Roadway Maintenance Dispatch	County, Municipal and Tribal Roadway Maintenance Vehicles
County, Municipal and Tribal Roadway Maintenance Dispatch	County, Municipal and Tribal Traffic Operations and Communications Center

Element	Interfaces With
County, Municipal and Tribal Roadway Maintenance Dispatch	Local and Municipal EOC
County, Municipal and Tribal Roadway Maintenance Dispatch	National Weather Service
County, Municipal and Tribal Roadway Maintenance Dispatch	Private Sector Service Provider EOC
County, Municipal and Tribal Roadway Maintenance Dispatch	SDDOT Region and Area Construction and Maintenance Office
County, Municipal and Tribal Roadway Maintenance Dispatch	SDDOT Road and Weather Information System
County, Municipal and Tribal Roadway Maintenance Dispatch	SDDOT Roadway Design Office
County, Municipal and Tribal Roadway Maintenance Dispatch	SDHP District Offices
County, Municipal and Tribal Roadway Maintenance Dispatch	State Radio Query Application
County, Municipal and Tribal Roadway Maintenance Dispatch	Transit Operator Transit Management Systems
County, Municipal and Tribal Roadway Maintenance Vehicles	County, Municipal and Tribal Equipment Repair Facility
County, Municipal and Tribal Roadway Maintenance Vehicles	County, Municipal and Tribal Roadway Maintenance Dispatch
County, Municipal and Tribal Roadway Maintenance Vehicles	State, County and Municipal Traffic Operations Field Equipment
County, Municipal and Tribal Traffic Data Collection System	County, Municipal and Tribal Traffic Operations and Communications Center
County, Municipal and Tribal Traffic Operations and Communications Center	County Civil Defense or EOC
County, Municipal and Tribal Traffic Operations and Communications Center	County, Municipal and Tribal Public Safety Dispatch
County, Municipal and Tribal Traffic Operations and Communications Center	County, Municipal and Tribal Roadway Maintenance Dispatch
County, Municipal and Tribal Traffic Operations and Communications Center	County, Municipal and Tribal Traffic Data Collection System
County, Municipal and Tribal Traffic Operations and Communications Center	Local and Municipal EOC
County, Municipal and Tribal Traffic Operations and Communications Center	MPO Operational Database
County, Municipal and Tribal Traffic Operations and Communications Center	Private Sector Service Provider EOC
County, Municipal and Tribal Traffic Operations and Communications Center	Rail Operators
County, Municipal and Tribal Traffic Operations and Communications Center	SD Department of Tourism Public Information Office
County, Municipal and Tribal Traffic Operations and Communications Center	SDDOT Mobile Traffic Management Center
County, Municipal and Tribal Traffic Operations and Communications Center	SDDOT Office of Operations

Element	Interfaces With
County, Municipal and Tribal Traffic Operations and Communications Center	SDDOT Region and Area Construction and Maintenance Office
County, Municipal and Tribal Traffic Operations and Communications Center	SDDOT Road and Weather Information System
County, Municipal and Tribal Traffic Operations and Communications Center	SDDOT Roadway Design Office
County, Municipal and Tribal Traffic Operations and Communications Center	SDHP District Offices
County, Municipal and Tribal Traffic Operations and Communications Center	State Radio Query Application
County, Municipal and Tribal Traffic Operations and Communications Center	State, County and Municipal Traffic Operations Field Equipment
County, Municipal and Tribal Traffic Operations and Communications Center	Transit Operator Transit Management Systems
COVERS	COVERS ft
COVERS	COVERSnet
COVERS	IRP Clearinghouse
COVERS	South Dakota State Treasury
COVERS	Title/Registration
COVERS	xCVIEW
COVERS ft	COVERS
COVERS ft	COVERSnet
COVERS ft	IFTA Clearinghouse
COVERS ft	xCVIEW
COVERSnet	Carrier Banks
COVERSnet	COVERS
COVERSnet	COVERS ft
COVERSnet	Motor Carrier System
CVO Inspector	ASPEN
CVO Inspector	CAPRI
CVO Inspector	Electronic Screening
CVO Inspector	Roadside System Server
Electronic Screening	Automated Vehicle Identification
Electronic Screening	Commercial Vehicle
Electronic Screening	Commercial Vehicle Driver
Electronic Screening	CVO Inspector
Electronic Screening	xCVIEW
Emergency Telecommunications System	County, Municipal and Tribal Public Safety Dispatch
HazMat	Automated Vehicle Identification
HazMat	Motor Carrier System
HazMat	South Dakota Automated Permitting System Server
HazMat	Title/Registration
HazMat	xCVIEW
IFTA Clearinghouse	COVERS ft
IRP Clearinghouse	COVERS

Element	Interfaces With
Local and Municipal EOC	BIT Public Safety Incident and Mutual Aid Network
Local and Municipal EOC	County, Municipal and Tribal Roadway Maintenance Dispatch
Local and Municipal EOC	County, Municipal and Tribal Traffic Operations and Communications Center
Local and Municipal EOC	SD Department of Tourism Public Information Office
Local and Municipal EOC	SDDOT Office of Operations
Local and Municipal EOC	SDDOT Region and Area Construction and Maintenance Office
Local and Municipal EOC	SDDOT Road and Weather Information System
Meridian Maintenance Weather Forecast System	SDDOT Region and Area Construction and Maintenance Office
Meridian Maintenance Weather Forecast System	SDDOT Road and Weather Information System
Motor Carrier Management Information System	SAFER
Motor Carrier Management Information System	SAFETYNET 2000
Motor Carrier System	COVERSnet
Motor Carrier System	HazMat
Motor Carrier System	South Dakota Automated Permitting System Client
MPO Operational Database	Accident Reporting System Client
MPO Operational Database	Accident Reporting System Server
MPO Operational Database	County, Municipal and Tribal Infrastructure Inventory System
MPO Operational Database	County, Municipal and Tribal Traffic Operations and Communications Center
MPO Operational Database	SDDOT Infrastructure Inventory System
MPO Operational Database	SDDOT Office of Data Inventory
MPO Operational Database	SDDOT Roadway Design Office
MPO Operational Database	SDDOT Statewide Signal Maintenance Archive
National Weather Service	County, Municipal and Tribal Roadway Maintenance Dispatch
National Weather Service	SDDOT Region and Area Construction and Maintenance Office
National Weather Service	SDDOT Road and Weather Information System
Other Road and Weather Information Systems	SDDOT Road and Weather Information System
Private Sector Service Provider EOC	BIT Public Safety Incident and Mutual Aid Network
Private Sector Service Provider EOC	County, Municipal and Tribal Roadway Maintenance Dispatch

Element	Interfaces With
Private Sector Service Provider EOC	County, Municipal and Tribal Traffic Operations and Communications Center
Private Sector Service Provider EOC	SD Department of Tourism Public Information Office
Private Sector Service Provider EOC	SDDOT Office of Operations
Private Sector Service Provider EOC	SDDOT Region and Area Construction and Maintenance Office
Private Sector Service Provider EOC	SDDOT Road and Weather Information System
Private Sector Service Provider Information Operations Center	Cable Public Access Channels
Private Sector Service Provider Information Operations Center	County, Municipal and Tribal Public Safety Dispatch
Private Sector Service Provider Information Operations Center	Private Travelers Personal Access Equipment
Private Sector Service Provider Information Operations Center	Private Travelers Vehicles
Private Sector Service Provider Information Operations Center	SD Dept of GFP and National Parks Parking Management Systems
Private Sector Service Provider Information Operations Center	SD Dept of GFP and National Parks Web Site
Private Sector Service Provider Information Operations Center	SDDOT Road and Weather Information System
Private Sector Service Provider Information Operations Center	Transit Operator Transit Management Systems
Private Travelers Personal Access Equipment	County, Municipal and Tribal Public Safety Dispatch
Private Travelers Personal Access Equipment	Private Sector Service Provider Information Operations Center
Private Travelers Personal Access Equipment	SD Dept of GFP and National Parks Web Site
Private Travelers Personal Access Equipment	SDDOT Integrated Traveler Information Webpage
Private Travelers Personal Access Equipment	Transit Operator Transit Management Systems
Private Travelers Vehicles	County, Municipal and Tribal Public Safety Dispatch
Private Travelers Vehicles	Private Sector Service Provider Information Operations Center
Rail Operators	County, Municipal and Tribal Traffic Operations and Communications Center
Rail Operators	SDDOT Road and Weather Information System
Rail Operators Wayside Equipment	State, County and Municipal Traffic Operations Field Equipment
Rest Area Operators CCTV	County, Municipal and Tribal Public Safety Dispatch
Rest Area Operators CCTV	SDDOT Office of Operations

Element	Interfaces With
Rest Area Operators CCTV	SDDOT Region and Area Construction and Maintenance Office
Rest Area Operators CCTV	SDHP District Offices
Rest Area Operators CCTV	State Radio Query Application
Roadside System Server	CDL/DL
Roadside System Server	CVO Inspector
Roadside System Server	South Dakota Automated Permitting System Server
Roadside System Server	State Radio Query Application
Roadside System Server	Title/Registration
Roadside System Server	Unified Judicial System
Roadside System Server	xCVIEW
SAFER	ASPEN
SAFER	Motor Carrier Management Information System
SAFER	SAFETYNET 2000
SAFER	xCVIEW
SAFETYNET 2000	CAPRI
SAFETYNET 2000	Motor Carrier Management Information System
SAFETYNET 2000	SAFER
SD Department of Tourism Public Information Office	County Civil Defense or EOC
SD Department of Tourism Public Information Office	County, Municipal and Tribal Public Safety Dispatch
SD Department of Tourism Public Information Office	County, Municipal and Tribal Traffic Operations and Communications Center
SD Department of Tourism Public Information Office	Local and Municipal EOC
SD Department of Tourism Public Information Office	Private Sector Service Provider EOC
SD Department of Tourism Public Information Office	SDDOT Office of Operations
SD Department of Tourism Public Information Office	SDDOT Region and Area Construction and Maintenance Office
SD Department of Tourism Public Information Office	SDDOT Road and Weather Information System
SD Department of Tourism Public Information Office	State Radio Query Application
SD Dept of GFP and National Parks Emergency Vehicles	County, Municipal and Tribal Public Safety Dispatch
SD Dept of GFP and National Parks Emergency Vehicles	SD Dept of GFP and National Parks Operations Centers
SD Dept of GFP and National Parks Kiosks	SD Dept of GFP and National Parks Web Site
SD Dept of GFP and National Parks Operations Centers	BIT Public Safety Incident and Mutual Aid Network
SD Dept of GFP and National Parks Operations Centers	SD Dept of GFP and National Parks Emergency Vehicles

Element	Interfaces With
SD Dept of GFP and National Parks Operations Centers	SD Dept of GFP and National Parks Web Site
SD Dept of GFP and National Parks Operations Centers	SDDOT Road and Weather Information System
SD Dept of GFP and National Parks Operations Centers	State Radio Query Application
SD Dept of GFP and National Parks Parking Management Systems	Private Sector Service Provider Information Operations Center
SD Dept of GFP and National Parks Parking Management Systems	SDDOT Road and Weather Information System
SD Dept of GFP and National Parks Web Site	Private Sector Service Provider Information Operations Center
SD Dept of GFP and National Parks Web Site	Private Travelers Personal Access Equipment
SD Dept of GFP and National Parks Web Site	SD Dept of GFP and National Parks Kiosks
SD Dept of GFP and National Parks Web Site	SD Dept of GFP and National Parks Operations Centers
SD Dept of GFP and National Parks Web Site	SDDOT Road and Weather Information System
SD Governors Office of Homeland Security	BIT Public Safety Incident and Mutual Aid Network
SD Governors Office of Homeland Security	SDDOT Road and Weather Information System
SD LETS Teletype	SDDOT Road and Weather Information System
SD Office of Emergency Management EOC	BIT Public Safety Incident and Mutual Aid Network
SD Office of Emergency Management EOC	SDDOT Road and Weather Information System
SD State Web Site	SDDOT Kiosks
SDDOT 511 Traveler Information System	SDDOT Road and Weather Information System
SDDOT CCTV	SDDOT DMS
SDDOT CCTV	SDDOT Office of Operations
SDDOT CCTV	SDDOT Region and Area Construction and Maintenance Office
SDDOT DMS	SDDOT CCTV
SDDOT DMS	SDDOT Region and Area Construction and Maintenance Office
SDDOT DMS	SDDOT Traffic Data Collection System
SDDOT Equipment Repair Facility	SDDOT Maintenance Vehicles
SDDOT Equipment Repair Facility	SDDOT Region and Area Construction and Maintenance Office
SDDOT Fixed Anti-Icing Systems	SDDOT Region and Area Construction and Maintenance Office
SDDOT HAR	SDDOT Region and Area Construction and Maintenance Office
SDDOT Infrastructure Inventory System	MPO Operational Database

Element	Interfaces With
SDDOT Infrastructure Inventory System	State, County, Municipal and Tribal Infrastructure Inventory System Users
SDDOT Integrated Traveler Information Webpage	Cable Public Access Channels
SDDOT Integrated Traveler Information Webpage	Private Travelers Personal Access Equipment
SDDOT Integrated Traveler Information Webpage	SDDOT Kiosks
SDDOT Integrated Traveler Information Webpage	SDDOT Road and Weather Information System
SDDOT Kiosks	County, Municipal and Tribal Public Safety Dispatch
SDDOT Kiosks	SD State Web Site
SDDOT Kiosks	SDDOT Integrated Traveler Information Webpage
SDDOT Maintenance Vehicles	SDDOT Equipment Repair Facility
SDDOT Maintenance Vehicles	SDDOT Region and Area Construction and Maintenance Office
SDDOT Maintenance Vehicles	SDDOT Work Zone Field Sensors
SDDOT Mobile Field Equipment	SDDOT Mobile Traffic Management Center
SDDOT Mobile Traffic Management Center	County, Municipal and Tribal Public Safety Dispatch
SDDOT Mobile Traffic Management Center	County, Municipal and Tribal Traffic Operations and Communications Center
SDDOT Mobile Traffic Management Center	SDDOT Mobile Field Equipment
SDDOT Mobile Traffic Management Center	SDDOT Region and Area Construction and Maintenance Office
SDDOT Mobile Traffic Management Center	SDDOT Road and Weather Information System
SDDOT Mobile Traffic Management Center	SDHP District Offices
SDDOT Mobile Traffic Management Center	State Radio Query Application
SDDOT Office of Data Inventory	MPO Operational Database
SDDOT Office of Data Inventory	SDDOT Office of Data Inventory Users
SDDOT Office of Data Inventory	SDDOT Roadway Design Office
SDDOT Office of Data Inventory	SDDOT Statewide Signal Maintenance Archive
SDDOT Office of Data Inventory Users	SDDOT Office of Data Inventory
SDDOT Office of Operations	County Civil Defense or EOC
SDDOT Office of Operations	County, Municipal and Tribal Public Safety Dispatch
SDDOT Office of Operations	County, Municipal and Tribal Traffic Operations and Communications Center
SDDOT Office of Operations	Local and Municipal EOC
SDDOT Office of Operations	Private Sector Service Provider EOC
SDDOT Office of Operations	Rest Area Operators CCTV
SDDOT Office of Operations	SD Department of Tourism Public Information Office
SDDOT Office of Operations	SDDOT CCTV

Element	Interfaces With
SDDOT Office of Operations	SDDOT Region and Area Construction and Maintenance Office
SDDOT Office of Operations	SDDOT Road and Weather Information System
SDDOT Office of Operations	SDDOT Traffic Data Collection System
SDDOT Office of Operations	State Radio Query Application
SDDOT Office of Operations	State, County and Municipal Traffic Operations Field Equipment
SDDOT Region and Area Construction and Maintenance Office	Cable Public Access Channels
SDDOT Region and Area Construction and Maintenance Office	County Civil Defense or EOC
SDDOT Region and Area Construction and Maintenance Office	County, Municipal and Tribal Public Safety Dispatch
SDDOT Region and Area Construction and Maintenance Office	County, Municipal and Tribal Roadway Maintenance Dispatch
SDDOT Region and Area Construction and Maintenance Office	County, Municipal and Tribal Traffic Operations and Communications Center
SDDOT Region and Area Construction and Maintenance Office	Local and Municipal EOC
SDDOT Region and Area Construction and Maintenance Office	Meridian Maintenance Weather Forecast System
SDDOT Region and Area Construction and Maintenance Office	National Weather Service
SDDOT Region and Area Construction and Maintenance Office	Private Sector Service Provider EOC
SDDOT Region and Area Construction and Maintenance Office	Rest Area Operators CCTV
SDDOT Region and Area Construction and Maintenance Office	SD Department of Tourism Public Information Office
SDDOT Region and Area Construction and Maintenance Office	SDDOT CCTV
SDDOT Region and Area Construction and Maintenance Office	SDDOT DMS
SDDOT Region and Area Construction and Maintenance Office	SDDOT Equipment Repair Facility
SDDOT Region and Area Construction and Maintenance Office	SDDOT Fixed Anti-Icing Systems
SDDOT Region and Area Construction and Maintenance Office	SDDOT HAR
SDDOT Region and Area Construction and Maintenance Office	SDDOT Maintenance Vehicles
SDDOT Region and Area Construction and Maintenance Office	SDDOT Mobile Traffic Management Center
SDDOT Region and Area Construction and Maintenance Office	SDDOT Office of Operations
SDDOT Region and Area Construction and Maintenance Office	SDDOT Remote Controlled Snow Gates

Element	Interfaces With
SDDOT Region and Area Construction and Maintenance Office	SDDOT Road and Weather Information System
SDDOT Region and Area Construction and Maintenance Office	SDDOT Roadway Design Office
SDDOT Region and Area Construction and Maintenance Office	SDDOT RWIS Stations
SDDOT Region and Area Construction and Maintenance Office	SDDOT Traffic Data Collection System
SDDOT Region and Area Construction and Maintenance Office	SDDOT Work Zone Field Sensors
SDDOT Region and Area Construction and Maintenance Office	SDHP District Offices
SDDOT Region and Area Construction and Maintenance Office	State Radio Query Application
SDDOT Region and Area Construction and Maintenance Office	State, County and Municipal Traffic Operations Field Equipment
SDDOT Region and Area Construction and Maintenance Office	Transit Operator Transit Management Systems
SDDOT Remote Controlled Snow Gates	SDDOT Region and Area Construction and Maintenance Office
SDDOT Road and Weather Information System	Cable Public Access Channels
SDDOT Road and Weather Information System	County Civil Defense or EOC
SDDOT Road and Weather Information System	County, Municipal and Tribal Public Safety Dispatch
SDDOT Road and Weather Information System	County, Municipal and Tribal Roadway Maintenance Dispatch
SDDOT Road and Weather Information System	County, Municipal and Tribal Traffic Operations and Communications Center
SDDOT Road and Weather Information System	Local and Municipal EOC
SDDOT Road and Weather Information System	Meridian Maintenance Weather Forecast System
SDDOT Road and Weather Information System	National Weather Service
SDDOT Road and Weather Information System	Other Road and Weather Information Systems
SDDOT Road and Weather Information System	Private Sector Service Provider EOC
SDDOT Road and Weather Information System	Private Sector Service Provider Information Operations Center
SDDOT Road and Weather Information System	Rail Operators
SDDOT Road and Weather Information System	SD Department of Tourism Public Information Office
SDDOT Road and Weather Information System	SD Dept of GFP and National Parks Operations Centers

Element	Interfaces With
SDDOT Road and Weather Information System	SD Dept of GFP and National Parks Parking Management Systems
SDDOT Road and Weather Information System	SD Dept of GFP and National Parks Web Site
SDDOT Road and Weather Information System	SD Governors Office of Homeland Security
SDDOT Road and Weather Information System	SD LETS Teletype
SDDOT Road and Weather Information System	SD Office of Emergency Management EOC
SDDOT Road and Weather Information System	SDDOT 511 Traveler Information System
SDDOT Road and Weather Information System	SDDOT Integrated Traveler Information Webpage
SDDOT Road and Weather Information System	SDDOT Mobile Traffic Management Center
SDDOT Road and Weather Information System	SDDOT Office of Operations
SDDOT Road and Weather Information System	SDDOT Region and Area Construction and Maintenance Office
SDDOT Road and Weather Information System	SDDOT Roadway Design Office
SDDOT Road and Weather Information System	State Radio Query Application
SDDOT Road and Weather Information System	Transit Operator Transit Management Systems
SDDOT Roadway Design Office	County, Municipal and Tribal Public Safety Dispatch
SDDOT Roadway Design Office	County, Municipal and Tribal Roadway Maintenance Dispatch
SDDOT Roadway Design Office	County, Municipal and Tribal Traffic Operations and Communications Center
SDDOT Roadway Design Office	MPO Operational Database
SDDOT Roadway Design Office	SDDOT Office of Data Inventory
SDDOT Roadway Design Office	SDDOT Region and Area Construction and Maintenance Office
SDDOT Roadway Design Office	SDDOT Road and Weather Information System
SDDOT Roadway Design Office	SDDOT Statewide Signal Maintenance Archive
SDDOT Roadway Design Office	SDDOT Traffic Data Collection System
SDDOT Roadway Design Office	State Radio Query Application
SDDOT Roadway Design Office	State, County and Municipal Traffic Operations Field Equipment
SDDOT RWIS Stations	SDDOT Region and Area Construction and Maintenance Office
SDDOT Statewide Signal Maintenance Archive	MPO Operational Database

Element	Interfaces With
SDDOT Statewide Signal Maintenance Archive	SDDOT Office of Data Inventory
SDDOT Statewide Signal Maintenance Archive	SDDOT Roadway Design Office
SDDOT Statewide Signal Maintenance Archive	SDDOT Statewide Signal Maintenance Archive Users
SDDOT Statewide Signal Maintenance Archive Users	SDDOT Statewide Signal Maintenance Archive
SDDOT Traffic Data Collection System	SDDOT DMS
SDDOT Traffic Data Collection System	SDDOT Office of Operations
SDDOT Traffic Data Collection System	SDDOT Region and Area Construction and Maintenance Office
SDDOT Traffic Data Collection System	SDDOT Roadway Design Office
SDDOT Work Zone Field Sensors	SDDOT Maintenance Vehicles
SDDOT Work Zone Field Sensors	SDDOT Region and Area Construction and Maintenance Office
SDHP District Offices	BIT Public Safety Incident and Mutual Aid Network
SDHP District Offices	County, Municipal and Tribal Roadway Maintenance Dispatch
SDHP District Offices	County, Municipal and Tribal Traffic Operations and Communications Center
SDHP District Offices	Rest Area Operators CCTV
SDHP District Offices	SDDOT Mobile Traffic Management Center
SDHP District Offices	SDDOT Region and Area Construction and Maintenance Office
SDHP District Offices	SDHP Vehicles
SDHP District Offices	State Radio Query Application
SDHP District Offices	Transit Operator Transit Management Systems
SDHP Vehicles	County, Municipal and Tribal Public Safety Dispatch
SDHP Vehicles	SDHP District Offices
SDHP Vehicles	State Radio Query Application
SDHP Vehicles	State, County and Municipal Traffic Operations Field Equipment
South Dakota Automated Permitting System Client	Motor Carrier System
South Dakota Automated Permitting System Client	South Dakota Automated Permitting System Server
South Dakota Automated Permitting System Server	HazMat
South Dakota Automated Permitting System Server	Roadside System Server
South Dakota Automated Permitting System Server	South Dakota Automated Permitting System Client
South Dakota Automated Permitting System Server	South Dakota State Treasury

Element	Interfaces With
South Dakota Automated Permitting System Server	State Radio Query Application
South Dakota Automated Permitting System Server	Title/Registration
South Dakota Automated Permitting System Server	xCVIEW
South Dakota State Treasury	Carrier Banks
South Dakota State Treasury	COVERS
South Dakota State Treasury	South Dakota Automated Permitting System Server
SSRS, Interstate Exempt Reg.	xCVIEW
State Radio Query Application	Accident Reporting System Server
State Radio Query Application	BIT Public Safety Incident and Mutual Aid Network
State Radio Query Application	CDL/DL
State Radio Query Application	County Sheriff and Municipal Police Vehicles
State Radio Query Application	County, Municipal and Tribal Public Safety Dispatch
State Radio Query Application	County, Municipal and Tribal Roadway Maintenance Dispatch
State Radio Query Application	County, Municipal and Tribal Traffic Operations and Communications Center
State Radio Query Application	Rest Area Operators CCTV
State Radio Query Application	Roadside System Server
State Radio Query Application	SD Department of Tourism Public Information Office
State Radio Query Application	SD Dept of GFP and National Parks Operations Centers
State Radio Query Application	SDDOT Mobile Traffic Management Center
State Radio Query Application	SDDOT Office of Operations
State Radio Query Application	SDDOT Region and Area Construction and Maintenance Office
State Radio Query Application	SDDOT Road and Weather Information System
State Radio Query Application	SDDOT Roadway Design Office
State Radio Query Application	SDHP District Offices
State Radio Query Application	SDHP Vehicles
State Radio Query Application	South Dakota Automated Permitting System Server
State Radio Query Application	Transit Operator Transit Management Systems
State, County and Municipal Traffic Operations Field Equipment	County Sheriff and Municipal Police Vehicles
State, County and Municipal Traffic Operations Field Equipment	County, Municipal and Tribal Fire Rescue Vehicles
State, County and Municipal Traffic Operations Field Equipment	County, Municipal and Tribal Roadway Maintenance Vehicles

Element	Interfaces With
State, County and Municipal Traffic Operations Field Equipment	County, Municipal and Tribal Traffic Operations and Communications Center
State, County and Municipal Traffic Operations Field Equipment	Rail Operators Wayside Equipment
State, County and Municipal Traffic Operations Field Equipment	SDDOT Office of Operations
State, County and Municipal Traffic Operations Field Equipment	SDDOT Region and Area Construction and Maintenance Office
State, County and Municipal Traffic Operations Field Equipment	SDDOT Roadway Design Office
State, County and Municipal Traffic Operations Field Equipment	SDHP Vehicles
State, County, Municipal and Tribal Infrastructure Inventory System Users	County, Municipal and Tribal Infrastructure Inventory System
State, County, Municipal and Tribal Infrastructure Inventory System Users	SDDOT Infrastructure Inventory System
Title/Registration	COVERS
Title/Registration	HazMat
Title/Registration	Roadside System Server
Title/Registration	South Dakota Automated Permitting System Server
Title/Registration	xCVIEW
Transit Kiosks	Transit Operator Transit Management Systems
Transit Operator Transit Management Systems	County, Municipal and Tribal Public Safety Dispatch
Transit Operator Transit Management Systems	County, Municipal and Tribal Roadway Maintenance Dispatch
Transit Operator Transit Management Systems	County, Municipal and Tribal Traffic Operations and Communications Center
Transit Operator Transit Management Systems	Private Sector Service Provider Information Operations Center
Transit Operator Transit Management Systems	Private Travelers Personal Access Equipment
Transit Operator Transit Management Systems	SDDOT Region and Area Construction and Maintenance Office
Transit Operator Transit Management Systems	SDDOT Road and Weather Information System
Transit Operator Transit Management Systems	SDHP District Offices
Transit Operator Transit Management Systems	State Radio Query Application
Transit Operator Transit Management Systems	Transit Kiosks
Transit Operator Transit Management Systems	Transit Vehicles
Transit Vehicles	Transit Operator Transit Management Systems
Unified Judicial System	CDL/DL

Element	Interfaces With
Unified Judicial System	Roadside System Server
xCVIEW	Accident Reporting System Server
xCVIEW	CDL/DL
xCVIEW	COVERS
xCVIEW	COVERS ft
xCVIEW	Electronic Screening
xCVIEW	HazMat
xCVIEW	Roadside System Server
xCVIEW	SAFER
xCVIEW	South Dakota Automated Permitting System Server
xCVIEW	SSRS, Interstate Exempt Reg.
xCVIEW	Title/Registration

Appendix D: Functional Requirements

Functional Assigned to Elements of the Architecture

Element	Function
Accident Reporting System Client	Credentials and Taxes Administration
	CV Data Collection
	CV Information Exchange
	CV Safety Administration
	Credentials and Taxes Administration
	CV Data Collection
	CV Information Exchange
	CV Safety Administration
	Government Reporting Systems Support
	ITS Data Repository
	Traffic and Roadside Data Archival
ASPEN	Citation and Accident Electronic Recording
	Roadside Electronic Screening
	Roadside Safety Inspection
Automated Vehicle Identification	On-board Cargo Monitoring
	On-board CV Electronic Data
CAPRI	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
CDL/DL	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
County Civil Defense or EOC	Emergency Response Management
County Sheriff and Municipal Police Vehicles	On-board EV En Route Support
	On-board EV Incident Management Communication
County, Municipal and Tribal Fire Rescue Vehicles	On-board EV En Route Support
	On-board EV Incident Management Communication
County, Municipal and Tribal Infrastructure Inventory System	Government Reporting Systems Support
	ITS Data Repository
	Traffic and Roadside Data Archival
County, Municipal and Tribal Public Safety Dispatch	Emergency Call-Taking
	Emergency Data Collection
	Emergency Dispatch
	Emergency Response Management
	Emergency Secure Area Surveillance
	Mayday Support
County, Municipal and Tribal Roadway Maintenance Dispatch	MCM Environmental Information Processing
	MCM Incident Management
	MCM Maintenance Decision Support
County, Municipal and Tribal Roadway	MCM Roadway Maintenance and

Element	Function
Maintenance Dispatch	Construction
	MCM Vehicle and Equipment Maintenance Management
	MCM Vehicle Tracking
	MCM Winter Maintenance Management
	MCM Work Activity Coordination
	MCM Work Zone Management
	MCM Work Zone Safety Management
County, Municipal and Tribal Roadway Maintenance Vehicles	MCV Infrastructure Monitoring
	MCV Roadway Maintenance and Construction
	MCV Vehicle Location Tracking
	MCV Vehicle Safety Monitoring
	MCV Vehicle System Monitoring and Diagnostics
	MCV Winter Maintenance
County, Municipal and Tribal Traffic Data Collection System	Roadside Data Collection
County, Municipal and Tribal Traffic Operations and Communications Center	Collect Traffic Surveillance
	HRI Traffic Management
	MCM Data Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Maintenance Decision Support
	MCM Roadway Maintenance and Construction
	MCM Winter Maintenance Management
	Rail Operations Coordination
	TMC Environmental Monitoring
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Signal Control
	Traffic Data Collection
	Traffic Maintenance
COVERS	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
COVERS ft	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
COVERSnet	Credentials and Taxes Administration
	CV Information Exchange
Electronic Screening	Citation and Accident Electronic Recording
	Roadside Electronic Screening
	Roadside Safety Inspection

Element	Function
	Roadside WIM
HazMat	CV Information Exchange
	CV Safety Administration
	Emergency Response Management
	Mayday Support
IFTA Clearinghouse	Credentials and Taxes Administration
	CV Information Exchange
IRP Clearinghouse	Credentials and Taxes Administration
	CV Information Exchange
Local and Municipal EOC	Emergency Response Management
Motor Carrier Management Information System	Credentials and Taxes Administration
	CV Information Exchange
Motor Carrier System	Fleet Administration
	Fleet Credentials and Taxes Management and Reporting
	Fleet HAZMAT Management
MPO Operational Database	Government Reporting Systems Support
	ITS Data Repository
	Traffic and Roadside Data Archival
Other Road and Weather Information Systems	Interactive Infrastructure Information
Private Sector Service Provider EOC	Emergency Environmental Monitoring
	Emergency Response Management
Private Sector Service Provider Information Operations Center	Interactive Infrastructure Information
Private Travelers Personal Access Equipment	Personal Basic Information Reception
	Personal Interactive Information Reception
	Personal Location Determination
	Personal Mayday I/F
Private Travelers Vehicles	Interactive Vehicle Reception
	Vehicle Location Determination
	Vehicle Mayday I/F
Rest Area Operators CCTV	Roadway Basic Surveillance
Roadside System Server	Citation and Accident Electronic Recording
	Roadside Electronic Screening
	Roadside Safety Inspection
	Roadside WIM
SAFER	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
SAFETYNET 2000	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
SD Dept of GFP and National Parks Emergency Vehicles	On-board EV Incident Management Communication
SD Dept of GFP and National Parks Kiosks	Remote Interactive Information Reception
SD Dept of GFP and National Parks Operations Centers	Emergency Call-Taking
	Emergency Environmental Monitoring

Element	Function
	Emergency Response Management
SD Dept of GFP and National Parks Parking Management Systems	Parking Electronic Payment
	Parking Management
	Parking Surveillance
SD Dept of GFP and National Parks Web Site	Basic Information Broadcast
	Interactive Infrastructure Information
SD Governors Office of Homeland Security	Emergency Response Management
SD LETS Teletype	Emergency Response Management
SD Office of Emergency Management EOC	Emergency Environmental Monitoring
	Emergency Response Management
SD State Web Site	Basic Information Broadcast
	Interactive Infrastructure Information
SDDOT 511 Traveler Information System	Interactive Infrastructure Information
SDDOT CCTV	Roadway Basic Surveillance
	Roadway Incident Detection
SDDOT DMS	Roadway Equipment Coordination
	Roadway Traffic Information Dissemination
SDDOT Fixed Anti-Icing Systems	Roadway Automated Treatment
SDDOT HAR	Roadway Equipment Coordination
	Roadway Traffic Information Dissemination
SDDOT Infrastructure Inventory System	Government Reporting Systems Support
	ITS Data Repository
	Traffic and Roadside Data Archival
SDDOT Integrated Traveler Information Webpage	Basic Information Broadcast
	Interactive Infrastructure Information
SDDOT Kiosks	Personal Basic Information Reception
	Personal Interactive Information Reception
	Personal Location Determination
	Personal Mayday I/F
	Remote Interactive Information Reception
	Remote Mayday I/F
SDDOT Maintenance Vehicles	MCV Infrastructure Monitoring
	MCV Roadway Maintenance and Construction
	MCV Vehicle Location Tracking
	MCV Vehicle Safety Monitoring
	MCV Vehicle System Monitoring and Diagnostics
	MCV Winter Maintenance
	MCV Work Zone Support
SDDOT Mobile Field Equipment	Roadway Basic Surveillance
	Roadway Equipment Coordination
	Roadway Incident Detection
	Roadway Traffic Information Dissemination
SDDOT Mobile Traffic Management Center	Collect Traffic Surveillance
	TMC Incident Detection
	TMC Incident Dispatch

Element	Function
	Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Traffic Maintenance
SDDOT Office of Data Inventory	Government Reporting Systems Support
	ITS Data Repository
	Traffic and Roadside Data Archival
SDDOT Office of Operations	Collect Traffic Surveillance
	MCM Incident Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Signal Control
	Traffic Maintenance
SDDOT Region and Area Construction and Maintenance Office	Collect Traffic Surveillance
	MCM Automated Treatment System Control
	MCM Data Collection
	MCM Environmental Information Collection
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Maintenance Decision Support
	MCM Roadway Maintenance and Construction
	MCM Vehicle and Equipment Maintenance Management
	MCM Vehicle Tracking
	MCM Winter Maintenance Management
	MCM Work Zone Safety Management
	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Signal Control
	TMC Traffic Information Dissemination
	Traffic Data Collection
	Traffic Maintenance
SDDOT Remote Controlled Snow Gates	Roadway Freeway Control
SDDOT Road and Weather Information System	Basic Information Broadcast
SDDOT Road and Weather Information System	Collect Traffic Surveillance
	Interactive Infrastructure Information
	MCM Environmental Information Processing
	MCM Incident Management
	MCM Maintenance Decision Support
	MCM Winter Maintenance Management
	TMC Environmental Monitoring
	TMC Incident Detection

Element	Function
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Traffic Information Dissemination
	Traffic Maintenance
SDDOT Roadway Design Office	TMC Incident Detection
	TMC Incident Dispatch Coordination/Communication
	TMC Regional Traffic Control
	TMC Signal Control
	Traffic Data Collection
	Traffic Maintenance
SDDOT RWIS Stations	Roadway Environmental Monitoring
SDDOT Statewide Signal Maintenance Archive	Government Reporting Systems Support
	ITS Data Repository
	Traffic and Roadside Data Archival
SDDOT Traffic Data Collection System	Roadside Data Collection
	Roadway Basic Surveillance
SDDOT Work Zone Field Sensors	Roadway Work Zone Safety
SDHP District Offices	Emergency Call-Taking
	Emergency Environmental Monitoring
	Emergency Response Management
SDHP Vehicles	On-board EV En Route Support
	On-board EV Incident Management Communication
South Dakota Automated Permitting System Client	Credentials and Taxes Administration
	CV Information Exchange
South Dakota Automated Permitting System Server	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
South Dakota State Treasury	Credentials and Taxes Administration
	CV Information Exchange
SSRS, Interstate Exempt Reg.	Credentials and Taxes Administration
SSRS, Interstate Exempt Reg.	CV Information Exchange
SSRS, Interstate Exempt Reg.	CV Safety Administration
State Radio Query Application	CV Data Collection
State Radio Query Application	CV Information Exchange
State Radio Query Application	CV Safety Administration
	Emergency Data Collection
	Emergency Environmental Monitoring
	Emergency Response Management
State, County and Municipal Traffic Operations Field Equipment	Roadside Signal Priority
	Roadway Basic Surveillance
	Roadway Equipment Coordination
	Roadway Signal Controls
	Roadway Work Zone Safety

Element	Function
	Standard Rail Crossing
Title/Registration	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration
Transit Kiosks	Remote Mayday I/F
	Remote Transit Information Services
	Secure Area Monitoring
Transit Operator Transit Management Systems	Transit Center Fixed-Route Operations
	Transit Center Information Services
	Transit Center Paratransit Operations
	Transit Center Security
	Transit Center Tracking and Dispatch
	Transit Environmental Monitoring
	Transit Garage Maintenance
	Transit Garage Operations
Transit Vehicles	On-board Fixed Route Schedule Management
	On-board Paratransit Operations
	On-board Transit Information Services
	On-board Transit Security
	On-board Transit Trip Monitoring
xCVIEW	Credentials and Taxes Administration
	CV Information Exchange
	CV Safety Administration

Appendix E: Users Guide to Extending the Architecture

South Dakota Statewide ITS Architecture

Regional ITS Architecture
Software User Guide

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1.2.3.2 Web Publication Tab 169

1. Guide to the Regional ITS Architecture Software Suite

A suite of software tools was used to develop the South Dakota Statewide ITS Architecture and publish the architecture web site. The software tools that were used are either commercially available or provided as a contract deliverable. The required tools are:

- **Turbo Architecture Version 2.0** – Used to develop the South Dakota Statewide ITS Architecture
- **Turbo Extensions Version 2.2** – Includes tools that augment the capabilities of Turbo Architecture, including a tool that generates the architecture web site.
- **Microsoft Access 2000** (or newer) – Required to run Turbo Extensions. Also allows direct access to Turbo Architecture databases, supporting development of other custom extensions to support South Dakota's specific regional architecture needs.
- **Any HTML Editor** (e.g., Microsoft Front Page) – Used to create and maintain the Template HTML files that include the narrative text that is included on the web site.
- **Graphics software** (e.g., Adobe Photoshop, Microsoft PowerPoint) – PowerPoint was used to generate the Market Package diagrams and Sausage Diagram for the region. A graphics program is also required to prepare the various GIF and JPG files that are included on the web site.
- **Adobe Acrobat** – Used to generate the PDF-format market package diagrams that are used on the web site.

The first two tools in this list are specialized regional ITS architecture development tools that may not be familiar to many readers. These two tools are documented in the following paragraphs. The last four tools are all common commercially available tools that are widely understood and are not discussed further in this document.

1.1. Turbo Architecture

*Turbo Architecture is the industry-standard software for development of regional and project ITS architectures. Version 2.0 of this software was used to develop the South Dakota Regional ITS Architecture. Turbo Architecture is a standard Windows Application that includes a user's manual, installation guide, and on-line help. The product is available from the Mc*Trans *Software Center at the University of Florida for $190. Discounts are available for multiple and agency licenses and upgrade pricing ($50) is available to those who own older versions. Contact McTrans at:*

McTrans Center, University of Florida
512 Weil Hall
P.O. Box 116585
Gainesville, FL 32611-6585
FEID # 59-6002052
(352) 392-0378
Messages 800-226-1013

McFAX (352) 392-3224
E-mail: mctrans@ce.ufl.edu
http://mctrans.ce.ufl.edu

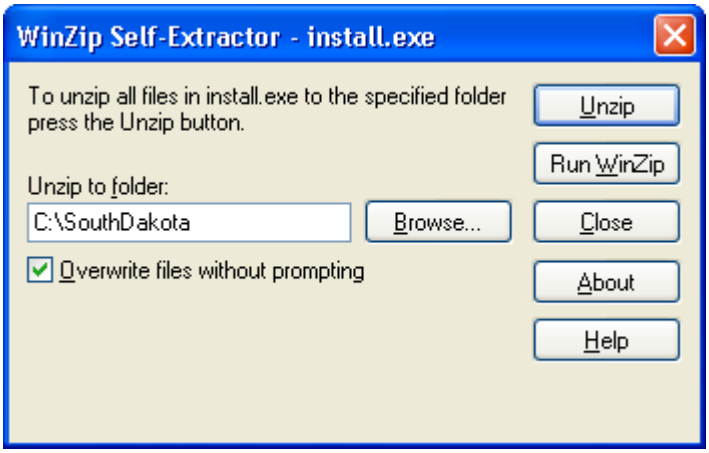
1.2. Turbo Extensions

The "Turbo Extensions" Microsoft Access Database application provides architecture development and publication features that are not otherwise available, through Turbo Architecture or any other commercially available product. A full-featured executable version of this application was delivered as part of this contract. This section guides the prospective user through installation and use of this application.

1.2.1. Installation

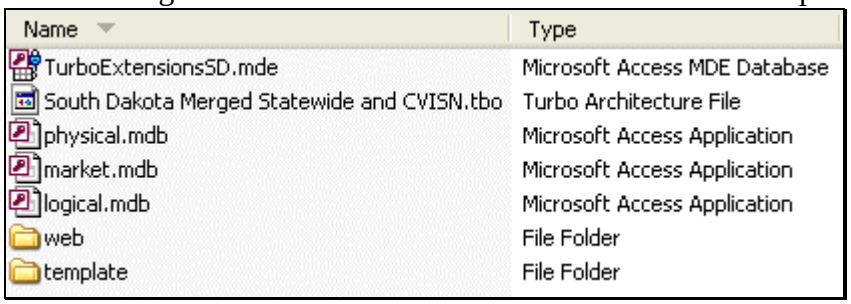
Follow these steps to install Turbo Extensions and all supporting files on your system:

1. If not already installed, install Microsoft Access 2000 or Access 2002/XP on your PC since the Turbo Extensions application is a Microsoft Access database executable (an MDE file) that requires Microsoft Access. Microsoft Access can also be used to directly view and manipulate the regional ITS architecture databases that are created by Turbo Architecture.
2. Insert your South Dakota Regional ITS Architecture CD into the CD-ROM drive and run "install.exe", which is a self-extracting zip file that will install all necessary files, including the MDE file, all supporting databases and other supporting files, and a complete image of the South Dakota Regional ITS Architecture web site.



3. Identify the destination folder for the files to be installed, as shown at right. Either an existing folder or a new folder can be identified; the folder will be created automatically if necessary.
4. Select "Unzip" which will begin the installation process. All required subdirectories will be created and the MDE file, all supporting files, and a baseline image of the web site will be installed. Select "Ok" to complete the installation.

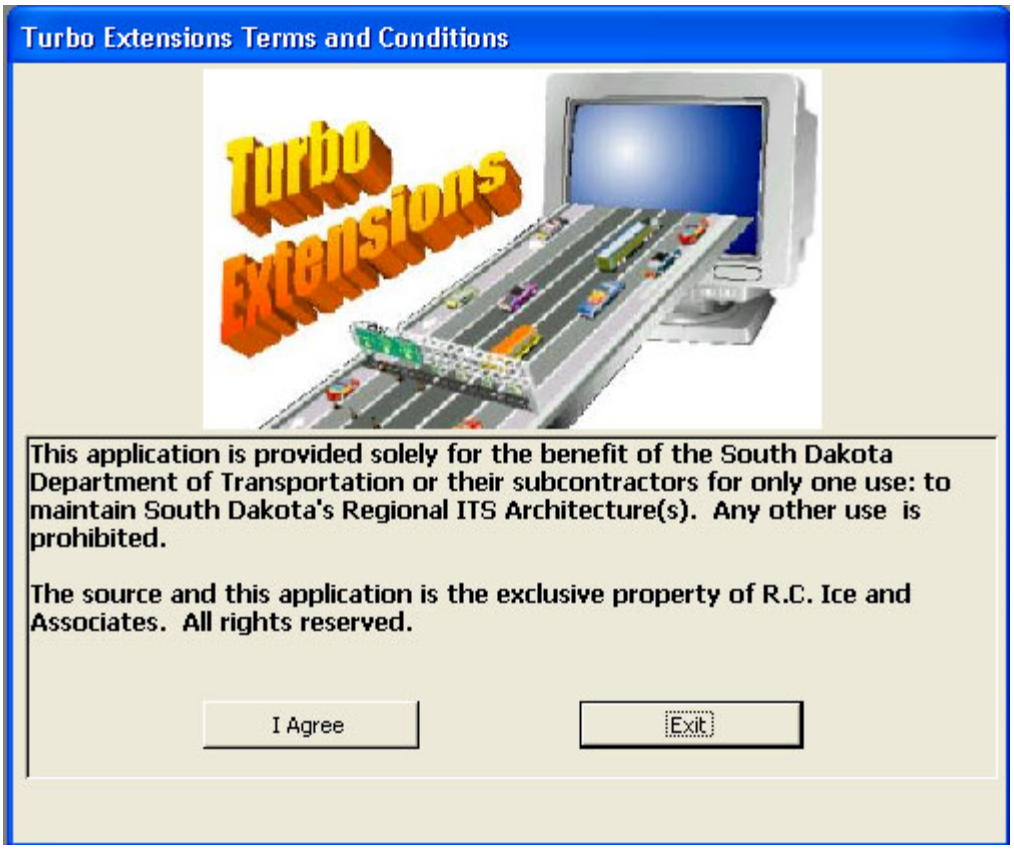
Over 1000 files are installed by install.exe. The vast majority of these files are the HTML and GIF/JPG graphics files that make up the web site image. The top level directory should include the following files and subdirectories when installation is complete:



TurboExtensionsSD.mde – The Turbo Extensions Microsoft Access database executable. This is the tool that provides the extended architecture management and web site generation capabilities. See the following section for more information on using this tool.
South Dakota Merged Statewide and CVISN.tbo – The Turbo Architecture database that contains the South Dakota Regional ITS Architecture. (Note that the tbo file name may vary depending on the name of the final Turbo Architecture database.)
Physical.mdb, market.mdb, logical.mdb – These Version 4.0 National ITS Architecture databases are also available on the National ITS Architecture Version 4.0 CD. They are included in the installation as a convenience and to ensure that the baseline architecture configuration that was used to originally generate the architecture is maintained.
Web folder – This folder contains a complete image of the South Dakota Regional ITS Architecture, including all graphics and HTML files. The HTML files in this directory can be updated using the Turbo Extensions software.
Template folder – Turbo Extensions uses template HTML files that contain the basic text that describes the regional architecture and the various pages that are included in the web site. All of the template files are included in this directory. They may be edited (using an HTML editor) to change the "front matter" text that is included on the web site.

1.2.2. Starting Turbo Extensions

1. Run the TurboExtensionSD.mde file, either by double-clicking on it or opening the file with Microsoft Access. The application may take a minute to open the first time it runs after installation because it must update all external database references ("linked tables") and so they are consistent with the file structure on your PC. In the unlikely event that some of the references cannot be resolved, you will be notified of the files that cannot be found.
2. The application will now present the terms and conditions of use. Read these terms and conditions and select "I Agree" if you agree with, and can abide by, the terms and conditions. Please notify ConSysTec, Corp. (914-248-8466) if you have a question about these terms or are aware of use of this tool that is inconsistent with these terms and conditions.

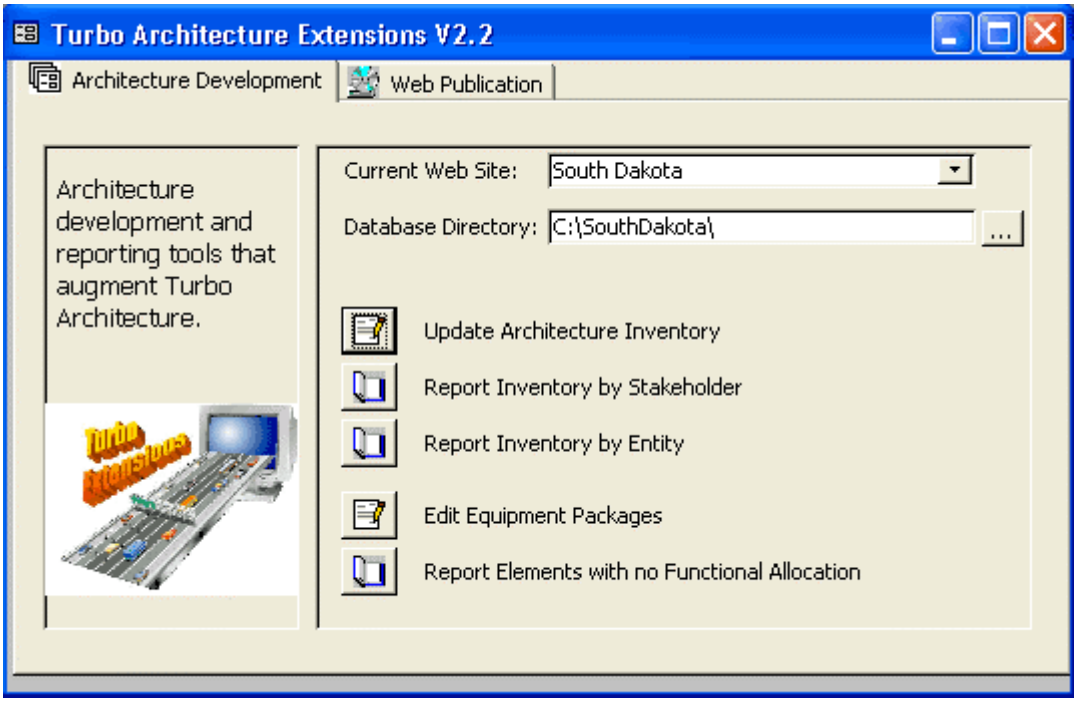


1.2.3. Using the Application

Once you agree with the terms and conditions, a tabbed form is displayed that provides access to all the features of the application.

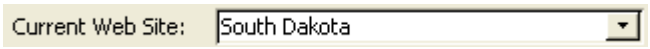
In general, the user will progress from left to right across the two tabs as the architecture is updated and the revised architecture definition is published on the Internet. Each of the tabs ("Architecture Development" and "Web Publication") is discussed in the following sections.

> Note that this application, like all Microsoft Access applications, saves any changes that you make immediately to the regional architecture database file. Keep this in mind, and make it a habit to save backup copies of your files in case you inadvertently make a change that is difficult to reverse.

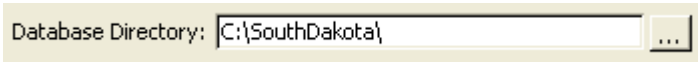


1.2.3.1. Architecture Development Tab

This tab provides enhanced architecture development tools that extend the basic tools available in Turbo Architecture. Enhanced data entry forms were used during the workshops to develop the inventory for the regional architecture. Several custom reports also augment the reporting capabilities of Turbo Architecture. Each of these architecture development tools is described in the following paragraphs.

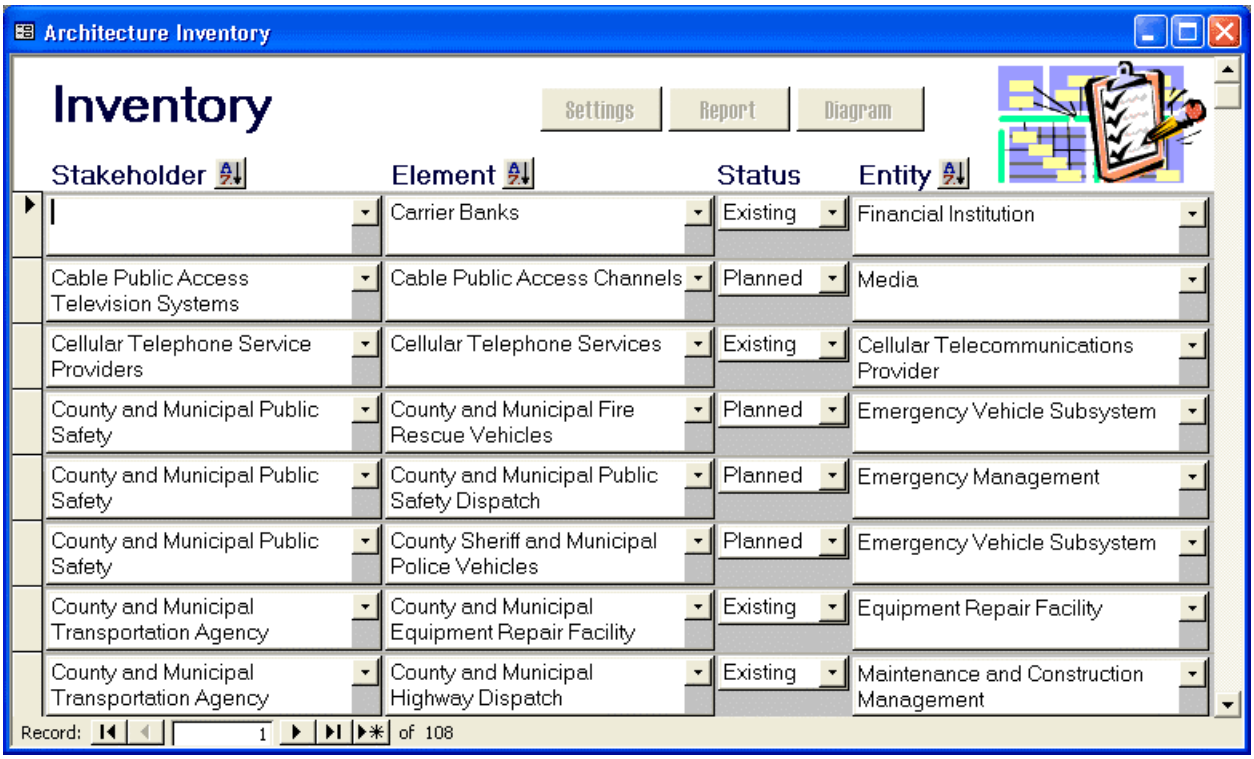


This pull-down menu indicates that the current web site is South Dakota. This is the only web site that can be updated with this version of the software.



This text box identifies the directory that TurboExtensions is to use for access to the Turbo Architecture database and National ITS Architecture databases. This is normally the same directory where the Turbo Extensions mde file is stored, but you can change the directory by selecting the command button with the three dots (…) and browsing to the directory that includes the databases. It is recommended that you leave the file locations in the "as installed" location.

Click here to display the tabular inventory form that was used to develop the inventory for the regional ITS architecture during the workshops. This form provides essentially the same functionality as the "Inventory Tab" in Turbo Architecture, but facilitates quick updates because it allows the inventory to be sorted by Stakeholder, by Element, or by Entity.



This form may be used to update the stakeholder, element name, element status, and associated National ITS Architecture entity (subsystem or terminator) for each element in the inventory. To add a new element in the inventory, page down to the last row in the form and add the new information there. The "A to Z" command buttons above each of the major columns allow the inventory to be sorted by stakeholder, by element, and by entity. Each entry on the form is actually a pull-down menu that encourages reuse of names that have already been defined. If the user types in a new name in either the Stakeholder or Element columns, then the software asks the user before adding the new name to the inventory. This is a working tool that still has a few minor issues that can be worked around. Here are a few of the known issues:

- When you begin to enter text into this form, the software will try to auto complete your entry to match one of the valid names. If you want to enter a different name, just keep typing. You should always terminate a new entry with a carriage return so that the software knows that you have completed your entry.
- This form does not perform stringent checks on the names you type, so you can inadvertently enter names that are not allowed in Turbo Architecture. Do not include single or double quotes in any of the names that you enter to prevent problems once you move over to Turbo Architecture.
- When an element is mapped to more than one entity, the stakeholder name and element name is repeated more than once on this form. Though it can be done by creating duplicate entries on this form, you will probably find it easier to use Turbo Architecture to create a mapping between a single element and many architecture entities.

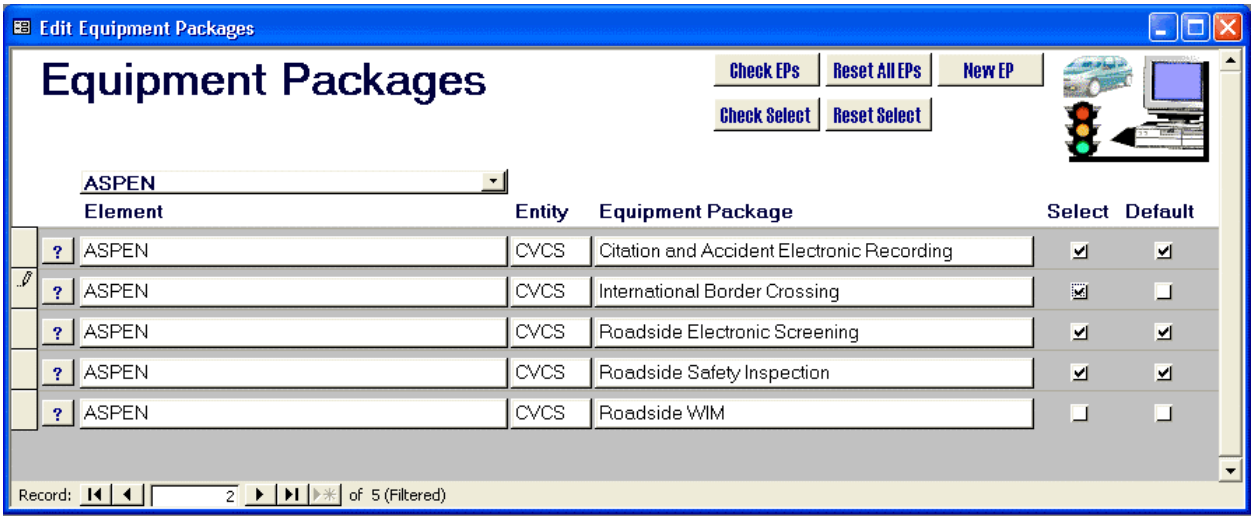
Double click on a Stakeholder or Element to display any associated attributes. Each of the displayed attributes is editable, allowing entry of detailed definitions, hyperlinks, and parent information for each name. Note that some of the detailed items (e.g., contact information) are

not supported in this version of the tool. Detailed information that is entered is published in the architecture HTML.

This command provides a complete inventory report, sorted by stakeholder. This report is more space efficient than the standard report generated by Turbo Architecture.

This command provides a complete inventory report, this time sorted by National ITS Architecture entity. This report is more space efficient that the standard report generated by Turbo Architecture.

This command displays a form that allows the user to tailor the equipment packages that are automatically assigned to each ITS inventory element by Turbo Extensions. These assignments drive the functional definitions for each inventory element that are displayed on the web site.



Turbo architecture does not support the equipment package level tailoring that is provided by this form. To use the form, use the pull-down menu above the "Element" column to select the element that should be tailored. Once the element is selected, tailor the equipment package choices by changing the checkboxes in the "Select" column (in the example, "International Border Crossing" was added – an erroneous choice for South Dakota, but it demonstrates the process).

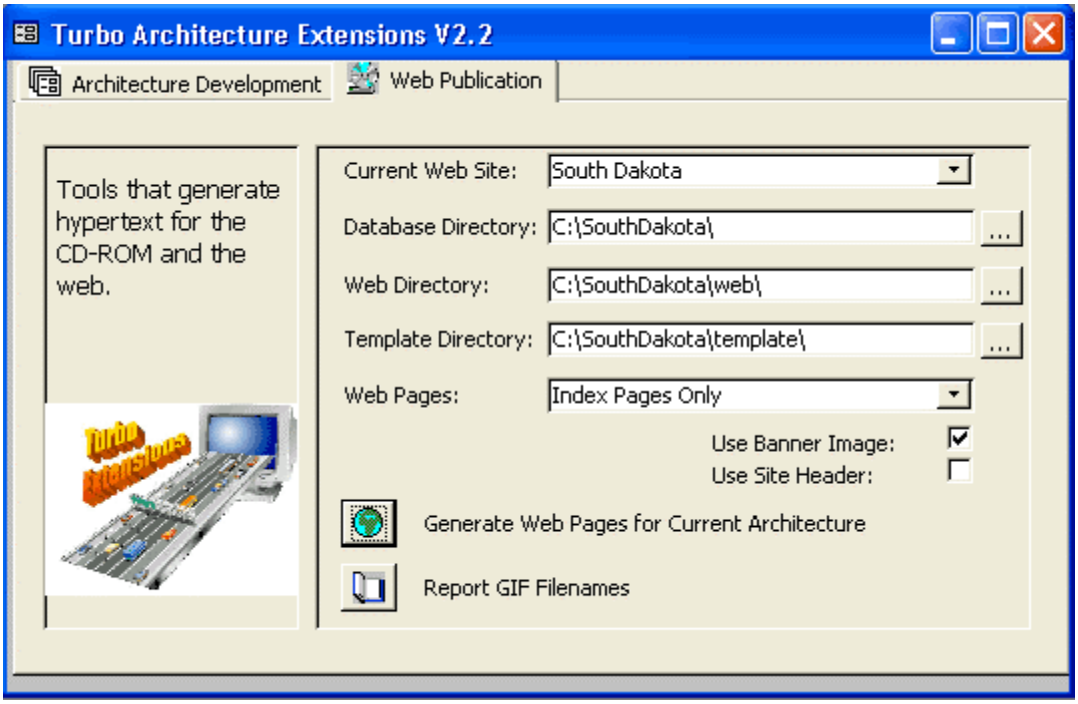
The question mark command buttons at the left hand side of the form serve two purposes: 1) they show the equipment package description and other relevant data to help determine whether the EP is applicable to the element, and 2) the same forms allow the EP descriptions to be tailored. As soon as the EP description is tailored, the display changes to highlight the fact that the EP has been customized so that the user can easily distinguish between "stock" equipment packages and customized equipment packages.

The various command buttons at the top of the form provide the following functions:
Check EPs – This command identifies any equipment package level tailoring that has been performed in the database. If EP descriptions have been modified or new custom equipment packages have been created, this command will identify all of these changes.
Check Select – This command identifies any changes that have been made in the "Select" column. It identifies any differences between the "Default" column and the "Select" column in the entire database. Since the "Default" column matches the default functionality that is assigned by Turbo Extensions, this report identifies any equipment package selection-level tailoring that has been done.
Reset All EPs – This command provides a warning, and then removes all equipment package customization that has been performed. (After this command is run, "Check EPs" will find no differences.)
Reset Select – This command provides a warning, and then removes all "Select" customization from the regional architecture. (After this command is run, "Check Select" will find no differences.)
New EP – This command allows a new custom equipment package to be defined. For example, an equipment package could be defined for a National ITS Architecture terminator so that functionality that is important to a regional architecture, but omitted from the National ITS Architecture, can be included.

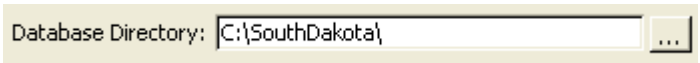
This command identifies elements that have been mapped to one or more National ITS Architecture subsystems that have not yet been allocated any equipment packages based on Market Package associations or custom tailoring using the "Edit Equipment Packages" function. This report can be used to verify that the functional definitions are as complete as possible. Consider adding market package associations for any elements that are identified by this report so that functional specifications based on the National ITS Architecture can be generated.

1.2.3.2. Web Publication Tab

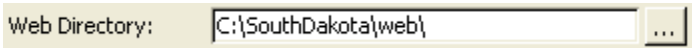
One of the distinguishing features of the South Dakota Statewide Architecture is the detailed architecture web site that provides comprehensive, hyperlinked access to the architecture definitions. This tab provides access to tools that generate these web pages and a report that guides the user in use of Turbo Architecture to regenerate the architecture graphics that are also included in the web site. The proper operation of this tab is described in the following paragraphs.



This pull-down menu indicates that the current web site is South Dakota. This is the only web site that can be updated with this version of the software. Identical to the same field on the Architecture Development tab.



This text box identifies the directory that TurboExtensions is to use for access to the Turbo Architecture database and National ITS Architecture databases. This is normally the same directory where the Turbo Extensions mde file is stored, but you can change the directory by selecting the command button with the three dots (…) and browsing to the directory that includes the databases. It is recommended that you leave the file locations in the "as installed" location. Identical to the same field on the Architecture Development tab.

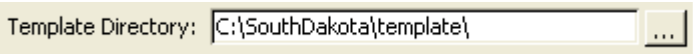


This text field establishes the base directory on the local hard disk where the web pages will be generated. Use the command button to the right of the field to browse for a new directory to hold the web site image. The identified directory must contain the following:

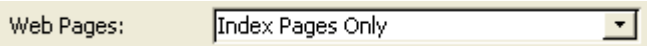
- southdakota subdirectory
- images subdirectory
- roll.js – Javascipt supporting button "rollover" events

The baseline content of this directory is automatically generated by the installation program in the web subdirectory. Within the web subdirectory, the "images" directory is automatically loaded with all the static image files and cascading style sheet that are used by the web site. All

other subdirectories underneath the “southdakota” subdirectory are automatically populated with all required HTML files by the commands on this tab.



This text field establishes the directory on the local hard disk where the template HTML files are stored. The template files contain the narrative text that is included on many of the top level pages on the web site. Use the command button to the right of the field to browse for a new directory to hold the web site image. The installation program automatically creates a “template” subdirectory that holds all the initial template files that were delivered with the contract.



This pull-down menu controls how many different web pages are generated when the web generation commands are invoked. The “All Pages” option is used most of the time, but the other options may be useful for rapidly testing changes without taking the time to generate a full web site. The pull-down menu offers the following choices:

Index Pages Only: This option will only generate the top-level web pages that are immediately selectable from the left-hand menu of the web site. Use this option to regenerate just a few pages to test a design or format change, or to regenerate the top level pages to reflect a content change made to the template files.

Index Pages + Sample Detailed Pages: This option will generate all the top level index pages and also a sample page of every other type of page. This option is useful after a change to image files or another change is made and the impact to all the different types of pages is desired.

All Pages: When “All” is selected, the web generator will regenerate the entire web site including inventory, context diagram, functionality, interface, and standards pages.

This command causes the web generator to generate the web pages identified in the “Web Pages” pull-down menu. If substantial changes are made, it is recommended that you clear all HTML files from the web subdirectories prior to generating the web pages so that old widowed pages will not remain in the subdirectory after web site generation.

This command identifies the subdirectories and filenames where GIF files must be updated on the web site if the interfaces to a particular element are changed.

Turbo Architecture is used to generate the detailed architecture graphics that are used for the web site. Two basic types of graphics are generated:

1) A context diagram is generated for every element in the inventory. A context diagram shows every interface for a particular element. A context diagram is generated in Turbo Architecture by selecting a single element in the Element Selection form and selecting the “Show All” checkbox on the Diagrams form.
2) An Interface Control Diagram (ICD) is generated for every interface (pair of interconnected elements) in the architecture. The ICD shows every architecture flow that goes between a specific pair of elements. An ICD is generated in Turbo

Architecture by selecting a pair of elements in the Element Selection form and deselecting the “Show All” checkbox.

The diagrams generated by Turbo Architecture can be saved as enhanced metafiles (emf). These files must then be converted to GIF files before they can be published to the web site. Many commercially available tools will support the required EMF to GIF file conversion. The GIF filenames must be very specific since they are referenced in the HTML produced by the web generator. The report generated by this command specifies the subdirectories and filenames that must be used for each GIF file. See the following example.