Technical Memorandum 3:
ITS Infrastructure Recommendations for the CANAMEX Smart Tourism Corridor

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- Idaho Transportation Department
- Utah Department of Transportation
- Nevada Department of Transportation
- Arizona Department of Transportation

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1. INTRODUCTION

1.1. Purpose

The purpose of Technical Memorandum 3 (TM #3) is to present the recommended program for the CANAMEX Smart Tourist Corridor. The program is based upon the research, analyses and findings of TM #1 and TM #2. For additional information on the CANAMEX Corridor, please refer to the Appendix.

1.2. Document Organization

The document is organized as follows:

- Section 1 is **Introduction**, and contains relevant background information to the study genesis and purpose.
- Section 2 is **Methodology**, which describes the methodology of the study. All of the background research and analysis that formed the recommendations for this report are contained in the Appendix.
- Section 3 is **Recommended Program**, which describes the strategic initiatives and key outcomes of the Smart Tourism Corridor. Included in this section are one-page summaries of the eight strategic initiatives that comprise the Smart Tourism Corridor program.
- Section 4 is **Projects and Costs**, which identifies specific project activities and estimated costs for each.
- Section 5 is **Benefits**, which describes the expected benefits of the Smart Tourism Corridor.
- Section 6 is **Next Steps**, which includes the next steps for the project and issues for future consideration.
- The **Appendix** contains all of the background research and analysis that formed the basis for the recommendations in this report. Further, the Appendix contains the results of the ITS Architecture analysis process.

1.3. Related Documents

This is the third in a series of three Technical Memoranda produced for the CANAMEX Corridor Coalition. The first Tech Memo studied Tourism issues and needs in the Corridor. The second Tech Memo studied operational issues and needs in the Corridor.

2. METHODOLOGY

This section describes the methodology for Technical Memorandum #3, and how it builds upon the previous work in Tech Memo's #1 and #2. .

2.1. Methodology

The methodology for Technical Memorandum #3 was structured to follow the ITS regional architecture development process developed by FHWA. Although the results are not intended to be an architecture for the region, the process itself is a useful structure to develop technology solutions tailored to stakeholder needs. The FHWA ITS Regional Architecture Process is displayed in Figure 1.

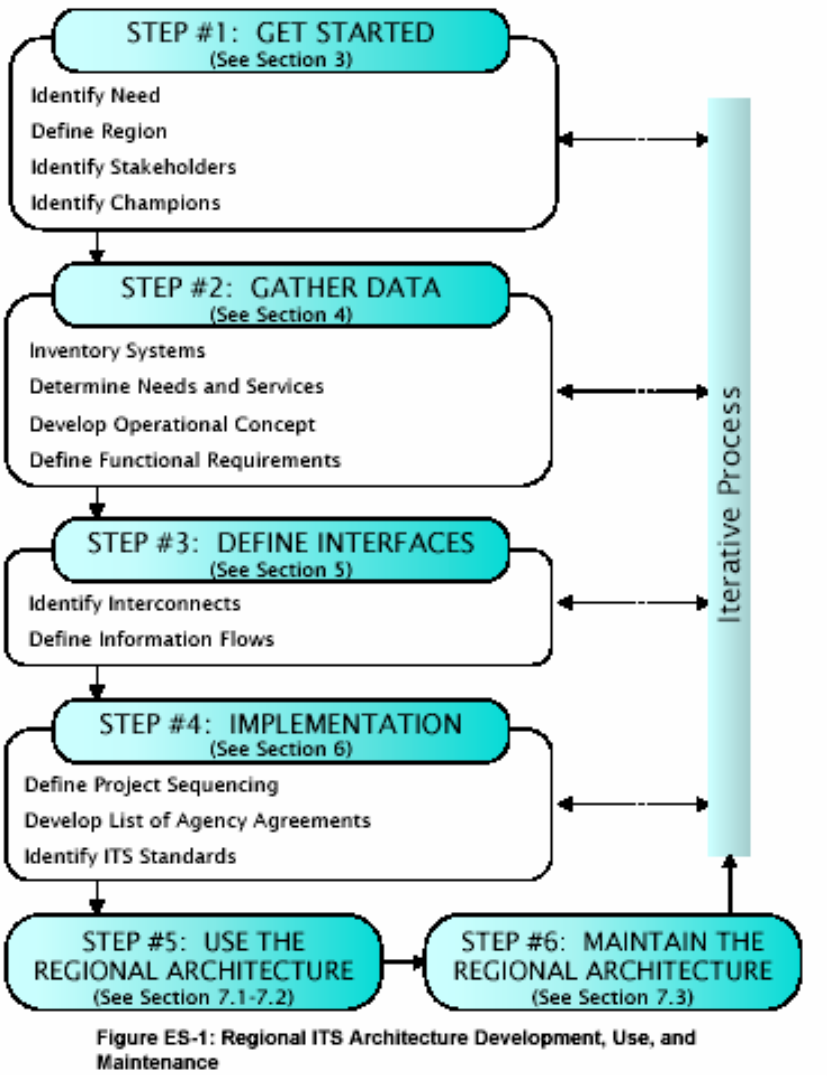


Figure 1: Methodology for Project Architecture (Source: *Regional ITS Architecture Guidance Document*, FHWA, October 2001)

The first two steps in this process were completed as part of the efforts for TM #1 and TM #2. In TM #1, for tourism, the corridor was defined, stakeholders identified, stakeholder meetings/outreach was conducted, and the resulting needs were determined. Also in TM #1, initial concepts for the Smart Tourism Corridor were presented.

In TM #2, for operations, a similar process was followed. Stakeholders were identified, meetings were held, and systems inventories/field studies were conducted. TM #2 also developed a list of related needs and corresponding recommendations.

For TM #3, the next steps were to gather any additional relevant data and conduct research. This included field visits to the project area, collection of transportation data, refinement of the ITS inventory, and research/review of relevant ITS industry trends. The results of this work are contained in Appendix A.

Once the additional data/research was gathered and reviewed, WTI refined the needs identified in TM #1 and TM #2. Based on these needs, the corresponding user services and market packages were identified from the FHWA ITS Architecture. The results of the user services and market packages analysis are contained in Appendix B.

Subsequently, strategic initiatives for the implementation of the Smart Corridor were identified. These strategic initiatives, which comprise the Smart Tourism Corridor program, are described in Section 3. Fundamental to the success of the program are appropriate agency agreements, which are also described in Section 3.

After the development of the strategic initiatives, the high level details (functional requirements) of each initiative were defined. These details include the physical elements, institutional elements, and private sector roles, which are described in Section 3. Further, the interdependencies, interconnects, and data flows of each initiative were documented, and are contained in Appendix C.

Next, the strategic initiatives were divided into specific projects, with corresponding costs. These projects are contained in Section 4.

Lastly, the potential benefits of the program were analyzed. The benefits for each strategic initiative and for each stakeholder are summarized in Section 5.

3. RECOMMENDED PROGRAM

3.1. Fundamental Themes

The principal goal of the Smart Tourism Corridor is to stimulate job creation in the tourism sector, particularly in rural areas. For this study, it is essential that any recommended projects/institutional activities ultimately foster results that lead to enhanced tourism and create jobs.

Based on all of the meetings, research, analysis, and stakeholder input to this study, we have identified five themes that are critical to a successful Smart Tourism Corridor program. These five themes are:

1. Increase Safety and Security of the Corridor
2. Create Federal/Multi-State Partnerships
3. Stimulate Rural Tourism Opportunities
4. Bolster State Efficiencies
5. Capitalize on Private Partnerships

The resultant Smart Tourism program (i.e., series of coordinated projects and institutional activities) recommended for the Coalition must have strong nexus to these guiding principles. Otherwise, the primary goals—safety and security along with positive economic impact through enhanced tourism—may not be successfully achieved.

3.1.1. Increase Safety and Security of the Corridor

A consistent theme thoughout the project outreach was the importance of traveler safety and security in the corridor. In fact, during tourism outreach efforts it was identified as one of the most important needs. Gaps in cellular coverage and lack of broadband service in many areas negatively affect residents and travelers alike. Any program intended to improve the visitor experience and bolster the tourism economy must have components that address personal safety/homeland security needs.

3.1.2. Create Federal/Multi-State Partnerships

A basic foundation of the success of the CANAMEX project will be building partnerships at many levels. Partnerships must be built:

- Within each state, among different agencies
- From state to state
- From states to federal land owners/managers
- From states to international lands (Canada, Mexico and Tribal Lands).

In order to foster these beneficial relationships among many diverse organizations, CANAMEX will require:

- Individual champions that advance project initiatives,

- Leadership and support from the highest levels of government,
- An institutional framework that stimulates cooperation, coordination and communication, and
- Dedicated support staff to CANAMEX that will independently and collaboratively sustain project efforts and see them through to completion.

The CANAMEX Corridor Coalition (CCC) and the Technical Advisory Committee (TAC) are currently examining organization options for continuing CANAMEX initiatives.

3.1.3. Stimulate Rural Tourism Opportunities

It is implicit in the scope of this project that a Smart Tourism Corridor concept will be developed. The concept must be more than a series of projects; it should be a program that appropriately addresses all appropriate facets of transportation and tourism. Many discrete project elements, if done independently, will not have the collective impact of a well-planned and coordinated program.

For many sections of the non-urban portions of the CANAMEX Corridor, tourism is the centerpiece of rural economic development efforts. Success is measured in increased sales and bed tax revenues so vital to community health. Unlike other national corridors the CANAMEX corridor is mostly rural. In addition, most of the lands in the corridor states are federal or tribal lands. Lastly, the major urban areas (e.g., Las Vegas, Phoenix, Salt Lake City) in the Corridor already have thriving economies. The largest potential for economic and tourism gains lies in maximizing opportunities in the rural areas, leveraging their natural assets.

3.1.4. Bolster State Efficiencies

In any economic climate, especially the current one, the efficiency of state government and programs is paramount. The CANAMEX Corridor Coalition offers opportunities for states and agencies to leverage economies of scale for purchasing equipment, negotiating, and implementing projects. The Coalition also offers opportunities for states/agencies to collaborate on similar program efforts (e.g., tourism marketing efforts).

In negotiating with the private sector, a coalition of states and other partner organizations will be especially effective. It offers a broader and larger market to the private sector, which encourages private sector investment and potential for success.

3.1.5. Capitalize on Private Partnerships

As documented in our research and meetings, the private sector is moving forward with many new and stimulating technology opportunities for transportation and tourism. To increase the prospects of private sector investment in the Corridor, the Coalition agencies must provide the appropriate atmosphere, including suitable policies/regulations, and institutional willingness/preparedness. A productive Smart Tourism Concept must be structured to assure private sector opportunities and investment.

3.2. Strategic Initiatives for the Smart Tourism Corridor

Based on all of the meetings, research, analysis, and stakeholder input to this study, we have identified eight strategic initiatives that comprise the Smart Tourism Corridor program. These strategic initiatives are:

1. Multi-state Data Warehouse
2. Real-time Date Gathering
3. CANAMEX Gateway
4. Tourist Center Information Exchange
5. Information Dissemination
6. Communications
7. Smart Devices
8. Safety/Security and Operations

The eight strategic initiatives are all linked together and interdependent. Many of the initiatives cannot be successful implemented without the completion of others. For example, the Tourist Center Information Exchange initiative is dependent on the creation of the Data Warehouse.

The eight strategic initiatives represent a **bold, unique, innovative and feasible** Smart Tourism Corridor program. For example, the creation of a data warehouse is a simple and feasible concept. However, the scope of the data warehouse, requiring a multi-state partnership, including multiple agencies within each state and federal agencies, is bold and unique. No where in the United States have multiple agencies developed such a concept.

The eight strategic initiatives are described in the following sections. Section 3.2.1 presents a one-page summary of each initiative. Section 3.2.2 presents the recommendations of each initiative in terms of discrete physical, institutional, and private sector elements, along with order-of-magnitude costs.

3.2.1. One Page Summaries of Strategic Initiatives

Each of the eight strategic initiatives is summarized in a one page format on the following pages. The one page format includes a brief overview of the initiative, benefits of the initiative, identification of the major elements, location, and priority. Also included are flow charts for some of the initiatives, that identify relationships and interconnects.

MULTI-STATE DATA WAREHOUSE

OVERVIEW

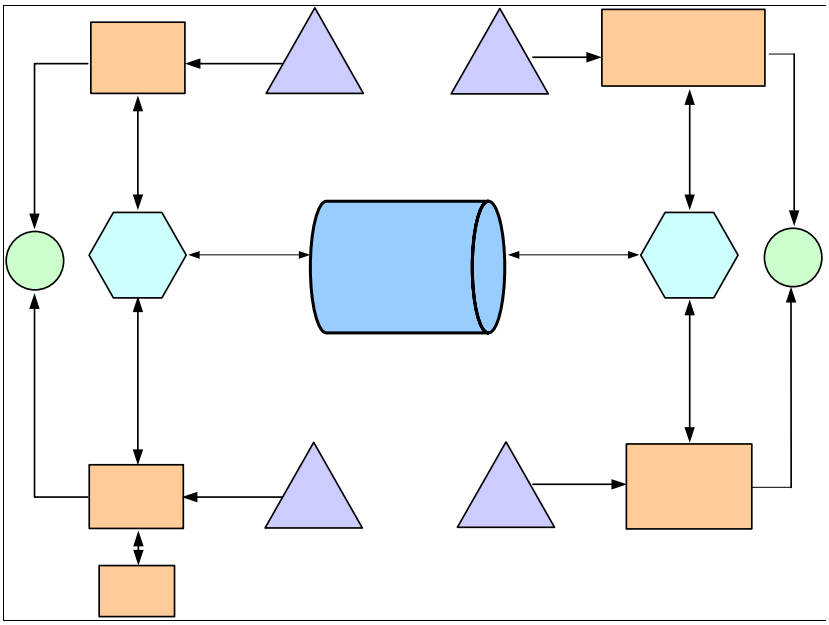


Figure 2: Data Warehouse

The multi-state data warehouse (Figure 2) will be the central repository for all corridor related data. This data will include both transportation data (such as construction activities, weather, and real-time traffic conditions) and tourism data (such as services, locations, and special events).

The data warehouse is a critical component to the success of the Smart Tourism Corridor concept. The data warehouse will be the collection point of data from multiple states, and multiple agencies within each of the states. The data warehouse will gather, process, organize, archive, and distribute the data to appropriate recipients. It is imperative that the data be accurate, reliable, and real-time for the success of the project.

BENEFITS

The major benefits of the data warehouse are:

- It will provide one location to access all of the critical information in the corridor.
- It provides for easy access to universally formatted data for agencies, the traveling public, and the private sector.
- It provides the basis for information exchange among agencies, states, and countries.
- The data warehouse will employ new software/hardware technologies that pull data from agencies with negligible impact on the agencies existing resources and processes.
- Correspondingly, the data warehouse will push data out to agencies and others to enhance existing processes.

ELEMENTS

The main physical element of the data warehouse is the hardware/software required for the database. Required institutional elements include the protocols, procedures and standards (such as use of XML) for establishing, operating, and maintaining the database.

LOCATION

Because of the advent of technology, the physical location of the warehouse is flexible.

PRIORITY

As many other initiatives are dependent on the data warehouse, it is a high priority.

REAL-TIME DATA GATHERING

OVERVIEW

The purpose of the real-time data gathering initiative is to enhance the amount and accuracy of transportation data in the corridor, especially in rural areas. Two methods to collect additional data include traditional methods by state DOT's, and innovative methods through public/private partnerships.

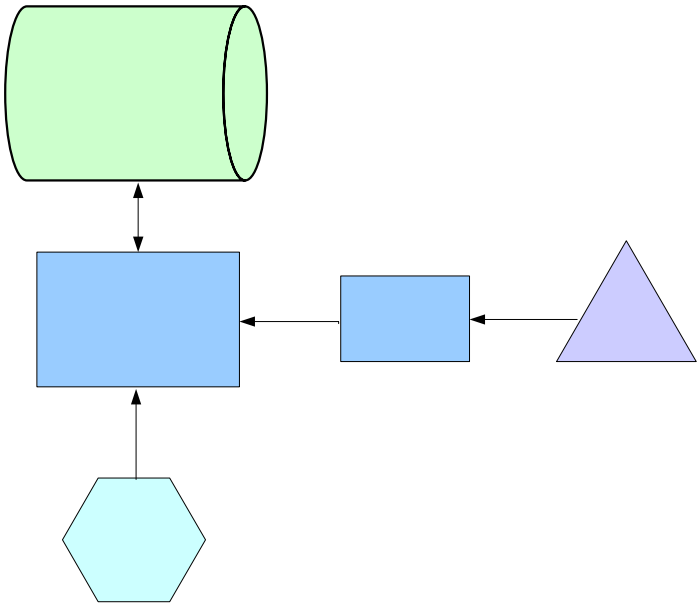


Figure 3 Real-Time Data Gathering

The traditional methods include further deployment of roadway weather information systems (RWIS), traffic monitoring stations, and closed circuit television cameras (CCTV). The innovative methods include several options, as follows:

- Partner with the private sector to deploy additional traditional data collection devices in the corridor, in both urban areas and around major attractions. An example is Mobility Technologies, which is currently considering deploying in Phoenix and Salt Lake City.
- Partner with private sector organizations that have access to probe vehicle data in the corridor. Examples include Qualcomm, which collects data from the trucking industry, and telematics companies such as Onstar.
- Use DOT and other state agency vehicles as probes, assuming deployment of automated vehicle location systems on fleet vehicles.

BENEFITS

The major benefits of the real-time data gathering are:

- Providing accurate and reliable transportation information to the traveling public.
- Expanding data collection from primarily urban areas into the rural areas of the corridor.
- Cost efficient collection of data over a wide area through the use of innovative methods.

ELEMENTS

For traditional data collection, the major elements include RWIS, TMS, and CCTV. For innovative data collection, the main element includes AVL for state vehicles—other innovative approaches will come from the private sector.

Data Warehouse/ Gateway

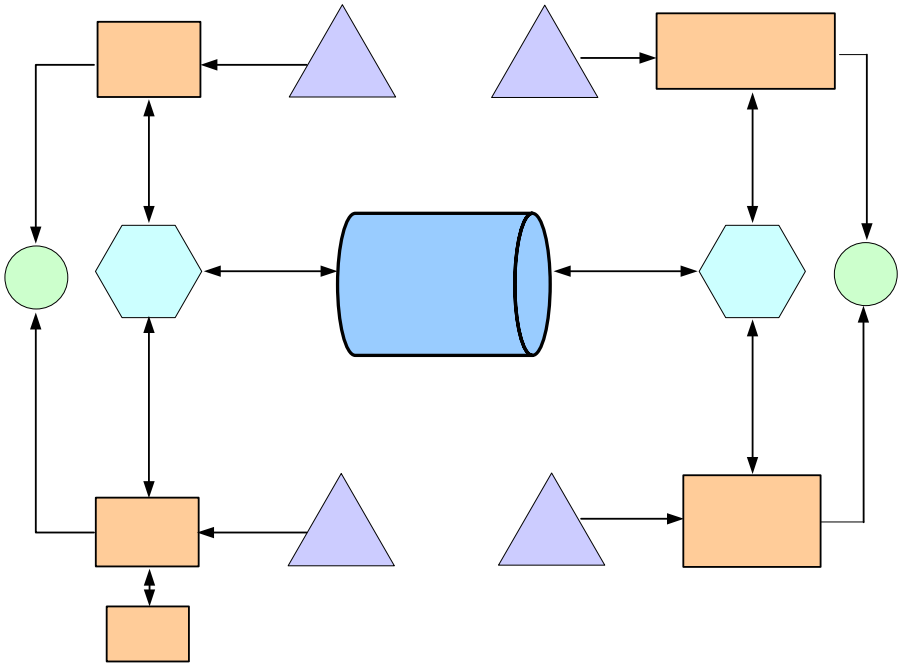
LOCATION

Devices will be located in all five states throughout the corridor.

PRIORITY

As many of other initiatives are dependent on accurate real-time data, it is a high priority.

CANAMEX GATEWAY



OVERVIEW

The CANAMEX Gateway will consist of a website that provides the traveling public with access to the information in the data warehouse. The Gateway will add value to the existing state tourism and transportation websites, rather than replace them, and be a corridor wide concept supported through a branding initiative and other tourism marketing activities.

Figure 4 CANAMEX Gateway

BENEFITS

The major benefits of the CANAMEX Gateway are:

- Providing one place for information for travelers.
- Branding the CANAMEX corridor.
- Providing accurate and reliable transportation/tourism information to the traveling public.
- Providing the opportunity to track traveler's preferences, information needs, and even profiles through surveys.

ELEMENTS

The main physical element of the Gateway includes the hardware/software required for development of the website. The institutional element includes branding/marketing the Gateway, and developing procedures for maintaining/updating the website.

Tourist Information Center (services)

Data Gather

LOCATION

Because of the advent of technology, the physical location of the warehouse is flexible.

PRIORITY

The Gateway is dependent on the establishment of the data warehouse; thus it is a second level priority.

TOURIST CENTER INFORMATION EXCHANGE

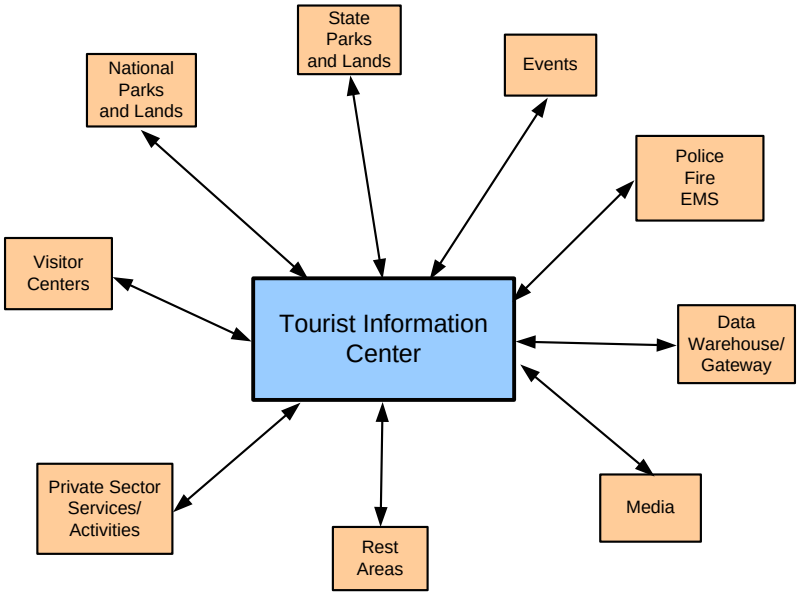


Figure 5 Tourist Information Center

OVERVIEW

The purpose of the tourism center information exchange is to expand data access (for both transportation and tourism related information) to those organizations involved in the tourism industry. The exchange will use available technology to push relevant data and notifications to relevant organizations. For example, if an incident occurred on I-15 in southern Utah, the information would be broadcast (via e-mail) to those tourist organizations affected, such as Zion/Bryce Canyon National Parks and St. Georges's Visitor Center.

There are several important considerations that will make this concept a success. First, tourism organizations will be provided with accurate, real-time information. Second, tourist organizations will not be bombarded with useless notifications (e.g., Tucson won't receive notifications on the closings of Bozeman Pass on I-90 in Montana). Third, the tourist organizations will not have to search or look for the information, it will be provided ("pushed") to them.

BENEFITS

The major benefits of the tourist center information exchange are:

- It will provide all partner organizations with access to current, real-time, and accurate transportation/tourism data.
- Tourist centers will be able to make more informed decisions related to their own operations activities.
- Tourist centers will be able to provide customers with improved transportation/tourism information.

ELEMENTS

The main physical element of the tourist center information exchange is the data warehouse, which will be the mechanism for receiving/sending information. Required institutional elements include identifying the partner organizations and developing the processes, procedures and standards for establishing the information exchange.

LOCATION

Because of the advent of technology, the physical location of the warehouse is flexible.

PRIORITY

The information exchange is dependent on the establishment of the data warehouse; thus it is a second level priority.

INFORMATION DISSEMINATION

OVERVIEW

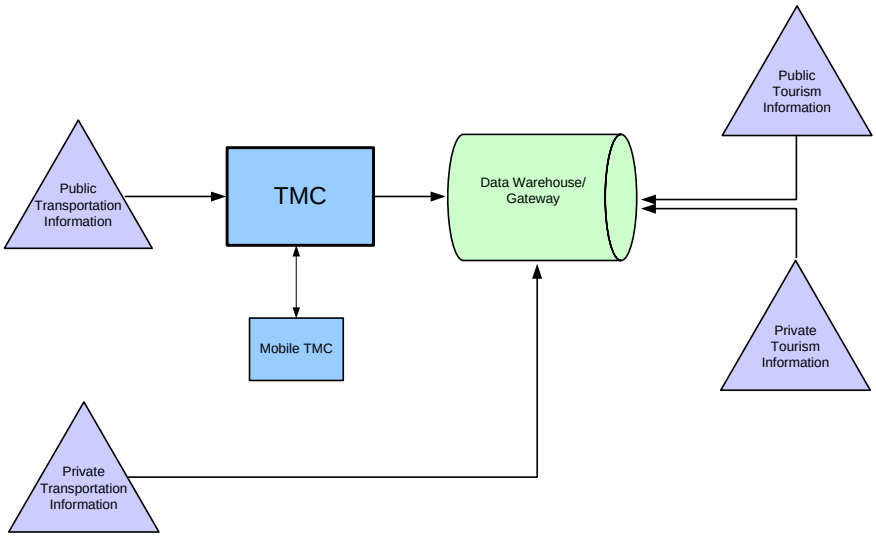


Figure 6 Information Dissemination

This initiative consists of expanding the state DOT's use of traditional and new ITS methods for disseminating information to the traveling public. These methods include dynamic message signs (DMS), highway advisory radio (HAR), and enhanced 511. The enhanced 511 concept includes not only multi-modal transportation information, but also access to tourism services information. For DMS's, the focus is to expand their deployment further in rural areas of the corridor.

BENEFITS

The major benefits of the information dissemination are:

- It will provide travelers access to information en-route.
- It expands DMS coverage into rural areas, especially those areas used to access National Parks and other tourism venues.
- It enhances the utility of 511 by providing tourism services information.

ELEMENTS

The main physical elements of the information dissemination initiative are DMS's, HAR's, and enhanced 511. Required institutional elements include the developing processes, procedures and standards for establishing, operating, and maintaining the tourist service information on 511.

LOCATION

The DMS's and HAR's will be located throughout each of the states. Enhanced 511 is recommended for each state.

PRIORITY

Deployment of the DMS's and HAR's will be phased in over the next ten years. Enhanced 511 is second level priority dependent on establishment of the data warehouse.

COMMUNICATIONS

OVERVIEW

The communications initiative is comprised of three main components: completing cellular coverage in the corridor, providing communications to ITS field devices, and providing satellite phones for state DOT responder/maintenance personnel in rural areas. Completing the cellular coverage in the corridor is essential for the personal safety of travelers in the corridor, and is also essential for the application of innovative private sector technologies. Communications to ITS field devices, especially in rural areas, can be difficult; however, through a variety of methods, including cellular, satellite, phone line, and radio communications can be efficiently provided. Satellite phones are a valuable option for communications, especially during emergencies and incident response. The cost and usability of satellite communications have improved significantly very recently, and will be even more viable in the future.

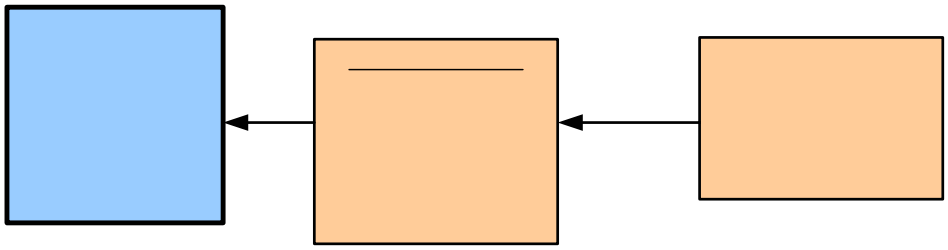


Figure 7 Communications

BENEFITS

The major benefits of the communications initiative are:

- Completing cellular coverage in the corridor will improve traveler safety/security, provide an alternative for ITS communications, and also provide the basis for private sector traveler information applications.
- Providing a variety of communications options to ITS field devices in rural areas will improve flexibility and reduce costs.
- Providing satellite phones will improve the communications of DOT personnel in rural areas, bolstering safety, security and operations activities.

ELEMENTS

The main physical elements of the communications initiative include cellular towers, communications for field devices, and satellite phones. Institutional elements include the design studies for communications devices, including the cellular towers.

LOCATION

Communications equipment will be located in all five states throughout the corridor.

TMC

PRIORITY

The completion of the cellular coverage is a high priority. Communications for field devices will be phased in over the next ten years. Satellite phones are second level priority.

SMART DEVICES

OVERVIEW

Smart devices (i.e., cellular phones, personal digital assistants, in-vehicle units, etc.) are rapidly developing in usage and applications. A key objective of the Smart Tourism Corridor is for the state agencies to prepare for private sector deployment of tourism and transportation applications in the Corridor. This preparation includes physical elements such as the collection of reliable, real-time transportation data and tourism data, plus the development of an institutional and regulatory environment conducive to private sector investment.

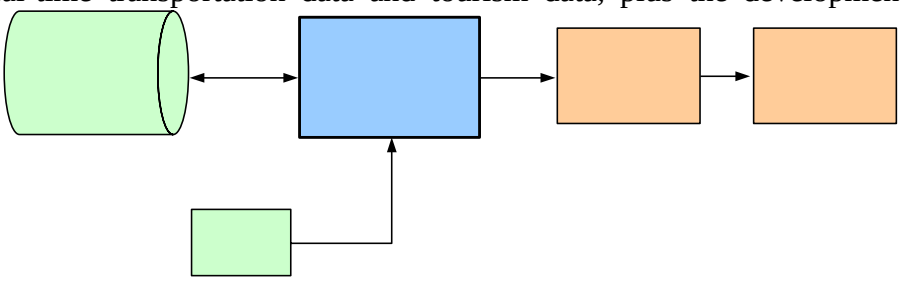


Figure 8 Smart Devices

Several vendors already have deployed tourism service applications and mapping/routing applications for cellular phones in other parts of the country and the world. Partnering may be needed with these and/or other vendors to bring these services in the Corridor, especially in the rural areas.

In the near future, cell phones will also other unique opportunities for financial services in the Corridor. Japan and South Korea are already using cell phones for financial services (basically functioning as digital ATM cards), and these services will soon be available in the US.

BENEFITS

The major benefits of the Smart Devices initiative are:

- It will provide convenient access to transportation and tourism data to cell phone users throughout the Corridor.
- It greatly expands the access to transportation data collected by DOT's.
- It greatly expands the access to tourism service information.
- Partnering with the private sector reduces costs for state agencies, while providing enhanced services to traveling in the Corridor.

ELEMENTS

The main physical elements of Smart Devices will be provided by the private sector. Required institutional elements include developing provisions for sharing information in the data warehouse, partnering agreements with the private sector, and appropriate regulations.

LOCATION

Smart device applications will be initially available around the high activity areas of the Corridor, such as urban areas and major attractions.

PRIORITY

Data Warehouse/
Gateway

P

Smart devices are a second level priority.

SAFETY/SECURITY AND OPERATIONS

OVERVIEW

The Safety/Security and Operations initiative is an important and broad series of activities that covers many of the recommendations from Tech Memo #2. The major recommendations include developing the public sector infrastructure for E911, providing training and developing interagency agreements for enhancing state DOT incident management, Corridor wide implementation for Amber Alerts, and DOT information exchange.

The very nature of creating the data warehouse, with the corresponding information exchange, will enhance the homeland security efforts in the Corridor. The increased level of monitoring of the Corridor will also provide relevant, reliable and real-time information for critical security decisions.

For the DOT's that maintain/operate the Corridor, the additional data and information exchange will foster better coordination and cooperation among maintenance districts bordering adjacent states.

BENEFITS

The major benefits of this initiative are:

- It will improve personal safety in the corridor, through increased cell phone coverage in the corridor and readiness to implement E911.
- It provides for easy access to universally formatted data for homeland security agencies, including state DOT's, state /local police. emergency responders, and the National Guard.
- It increases the level of monitoring and data available on the Corridor.

ELEMENTS

The main physical element of the initiative includes upgrades to Public Safety Access Points (911 call centers). Many of the physical elements necessary in this initiative will be deployed through other initiatives, but utilized to improve safety, security and operations. There are a significant number of required institutional elements, such as training, intergovernmental agreements, and information exchange standards.

LOCATION

Safety/security and operations elements will be deployed throughout the Corridor.

PRIORITY

This initiative is a high priority.

3.3. Linkage of TM #1 and TM #2 Recommendations to Strategic Initiatives

TM #1 and TM #2 both developed a series of recommendations for the Smart Tourist Corridor. All of these recommendations are captured in the strategic initiatives. The following table identifies the recommendations from TM #1 and TM #2, and shows how they fit within the eight strategic initiatives and the Smart Tourist Corridor program.

Table 1. Linkage of Recommendations to Strategic Initiatives

Strategic Initiative Recommendations	1. Data Warehouse	2. Data Gathering	3. Gateway	4. Tourist Center	5. Info Dissemination	6. Communications	7. Smart Devices	8. Safety/ Security/ Operations
TECH MEMO #1								
Visitor Gateway/Clearinghouse	X		X					
Tourist Information Center				X				
Smart Devices and Financial Center							X	
Traffic Management Center	X	X			X	X		X
Multi-modal Center	X	X			X	X		X
Provide structure for addressing institutional issues	X			X				
Develop a broadening program and marketing plan			X					
Identify and manage data to be fused to allow for seamless information	X			X				X
Determine language requirements for Visitor Gateway/Clearinghouse			X		X			
Discuss changing visitation, recreation activity, demographic and trip patterns			X					
Establish monitoring and reservation system requirements for demand			X					

Strategic Initiative Recommendations	1. Data Warehouse	2. Data Gathering	3. Gateway	4. Tourist Center	5. Info Dissemination	6. Communications	7. Smart Devices	8. Safety/ Security/ Operations
forecasts on attractions and services								
Determine the level of discounts that could be created to modify visitor travel behavior			X					
Identify potential members and organizational structure	X			X				
Conduct "roadshow" to determine support level and branding theme			X					
Develop marketing/business plan			X					
Establish and adopt information exchange standard	X							
Confirm agencies/organizations to be linked	X			X				X
Establish real-time data requirements and monitoring	X	X						
Conduct focus groups to determine usability and enticements			X					
Develop prototype for determining organizational requirements	X		X	X				
Develop functional requirements and RFPP	X		X					
Identify infrastructure and portable/fixed traveler info. systems					X			
Identify vehicle-highway system communication systems						X		
Identify attractions/services that collect real-time data	X	X						

Strategic Initiative Recommendations	1. Data Warehouse	2. Data Gathering	3. Gateway	4. Tourist Center	5. Info Dissemination	6. Communications	7. Smart Devices	8. Safety/ Security/ Operations
Identify private sector partners		X		X	X	X	X	
Identify XML opportunities to exchange information	X							
Implement server to exchange info to Visitor Gateway/Clearinghouse	X		X	X				
Identify real-time and static info to be collected		X						
Identify appropriate vendors for smart card system development							X	
Transportation personnel with real-time info to help them make better decisions								X
Real-time warnings and guidance to drivers			X	X	X		X	
Tourist info, based on geographic travel patterns and interests, on attractions across state borders			X	X			X	
Forecasted info to attraction operators, informing them of anticipated demand for facilities and services			X	X				
Data collection capabilities to assist transportation agencies and tourist organizations track O-D, trip patterns, utilization, marketing , and other data	X	X						
TECH MEMO # 2								
Broaden 511 information					X			
Protocols to assure information is compatible and seamless	X							

Strategic Initiative Recommendations	1. Data Warehouse	2. Data Gathering	3. Gateway	4. Tourist Center	5. Info Dissemination	6. Communications	7. Smart Devices	8. Safety/ Security/ Operations
Develop info-exchange procedures between public and private agencies	X						X	
Interagency Incident Response training								X
Formal agreements between agencies to limit litigation								X
MUTCD training for maintenance and operating staff								X
Equal partnerships between states in the management of incidents								X
Determine current cell phone coverage						X		
Additional fund allocation to improve communication for ITS						X		
Modify policies that constrain allocation of funds for telematics and public/private partnerships							X	
Source, processing and dissemination of traveler information through exchange			X	X	X		X	
Broader deployment of ITS infrastructure					X			X
States without a TMC should establish a fixed on or deploy multiple ones								X
Establish a Coordinating Group to deal with issues within the Corridor								X
Improve Corridor communications through modern technology							X	

Strategic Initiative Recommendations	1. Data Warehouse	2. Data Gathering	3. Gateway	4. Tourist Center	5. Info Dissemination	6. Communications	7. Smart Devices	8. Safety/ Security/ Operations
Provide safe travel through technology and resources			X		X		X	X
Improvements for IM and other operational practices								X
States without IM plans should develop one								X
Determine alternate roadways for re-routing traffic								X
States should develop legislation that "holds harmless" emergency responders								X
Governments should allocate resources to agencies practicing IM								X
Appoint "Deputy Coroners" to accelerate clearance of the scene								X
PDA should be used to record incident specifics								X
Post-incident debriefings of IM								X
Availability of professional counseling for responders								X
Develop mechanisms for exchanging "lessons learned"								X
Task forces and working groups to address cross cutting issues	X							X

3.3.1. Physical, Institutional, and Private Sector Elements of Strategic Initiatives

Each of the strategic initiatives has physical, institutional, and private sector elements. The physical elements include tangible objects, such as computer hardware, dynamic message signs, and other devices. Institutional elements include organizational requirements, studies, and maintenance/operations activities. Private sector elements are those physical and institutional elements suggested for implementation as part of a partnership with the private sector.

For several of the initiatives, there are many options to organize and operate some of the elements. For example, the CANAMEX Gateway website could be set-up and operated three different ways:

1. By one CANAMEX agency
2. By contracting with a private sector organization
3. By establishing additional staff for the CANAMEX Corridor Coalition

At the November 13th CCC meeting, the overall organizational structure for CANAMEX will be discussed, in order to provide guidance on the preferred arrangement for establishing some of the initiatives.

The tables below summarize the elements that comprise each of the eight strategic initiatives. Also included in the table are order-of-magnitude costs. The costs are life cycle costs amortized over a ten year period, and where appropriate, include operations/maintenance costs.

Table 2. Multi-State Data Warehouse Elements

MULTI-STATE DATA WAREHOUSE	COST ($K)	COMMENTS
Physical Elements		
Hardware	100	Computers/communications
Software	500	Includes designing/building database
SUB-TOTAL	600	
Institutional Elements		
Processes/Procedures	200	
Operation/Maintenance	275	Assumes programmer support of 0.25 FTE @ $75,000 and 0.25 FTE @ $35,000 for 10 years
Monthly Costs	60	Assumes network connections, utilities, etc at $500/month for ten years
SUB-TOTAL	475	
TOTAL	**1,135**	

Table 3. Real-Time Data Gathering Elements

REAL-TIME DATA GATHERING	COST ($K)	COMMENTS
Physical Elements		
RWIS	4,000	Total life cycle cost from Table 12
CCTV	8,600	Total life cycle cost from Table 12
TMS	7,400	Total life cycle cost from Table 12
TMC Upgrades	1,000	Required for addition of new equipment
SUB-TOTAL	21,000	
Institutional Elements		
Operation/Maintenance	5,610	Total life cycle cost from Table 12
SUB-TOTAL	5,610	
Private Sector Involvement		
Seed Money	1,000	For innovative data collection methods
SUB-TOTAL	1,000	
TOTAL	**27,610**	

Table 4. CANAMEX Gateway Elements

CANAMEX GATEWAY	COST ($K)	COMMENTS
Physical Elements		
Hardware	10	Assumes two dedicated web servers.
Software	50	Assumes two Dell Servers and two Microsoft SQL Servers. Dell Server including Operating System (Windows 2003) and User Access Licenses: $10,000 - $20,000. Microsoft SQL Server Standard Edition w/ 2 Processor Licenses $10,000.
SUB-TOTAL	60	
Institutional Elements		
Branding/Marketing Campaign	250	
Surveys	200	Includes analysis of on-line surveys from website
Operation/Maintenance		
- Systems Admin. Staff	250	0.5 FTE @ $50,000
- Software Development	110	0.5 FTE @ $75,000 (Senior Programmer) plus a 0.5 FTE @ $35,000 (Junior Programmer) for two years
- Ongoing Software Support	275	0.25 FTE @ $75,000 and 0.25 FTE @ $35,000 for 10 years
- Network Connectivity	60	$500 per month for 10 years
SUB-TOTAL	1,145	
TOTAL	**1,205**	

Table 5. Tourist Center Information Exchange Elements

TOURIST CENTER INFORMATION EXCHANGE	COST ($K)	COMMENTS
Physical Elements		
Hardware/software		See data warehouse/gateway
Information Exchange System	110	Assumes those centers desiring information have equipment for internet access/email. Assumes 0.5 FTE @ $75,000 (Senior Programmer) plus a 0.5 FTE @ $35,000 (Junior Programmer) for two years
SUB-TOTAL	110	
Institutional Elements		
Processes/Procedures		See data warehouse/gateway
Operation/Maintenance		See data warehouse/gateway
SUB-TOTAL	0	
TOTAL	110	

Table 6. Information Dissemination Elements

INFORMATION DISSEMINATION	COST ($K)	COMMENTS
Physical Elements		
DMS	25,950	Total life cycle cost from Table 12
HAR	1,830	Total life cycle cost from Table 12
Enhanced 511	2,500	
SUB-TOTAL	30,280	
Institutional Elements		
Processes/Procedures	250	
Operation/Maintenance	10,220	Total life cycle cost from Table 12 for DMS/HAR plus costs of 511
SUB-TOTAL	10,470	
TOTAL	**40,750**	

Table 7. Communications Elements

COMMUNICATIONS	COST ($K)	COMMENTS
Physical Elements		
Communication for Field Devices		Included in device costs
Satellite Phones	100	Includes 50 sat phones
SUB-TOTAL	100	
Institutional Elements		
Satellite Phones	300	Includes 50/month per phone for ten years
SUB-TOTAL	300	
Private Sector Involvement		
Cell Coverage		
SUB-TOTAL		
TOTAL	400	

Table 8. Smart Devices Elements

SMART DEVICES	COST ($K)	COMMENTS
Institutional Elements		
Partnerships	250	Includes studies and agreements
Data Sharing	250	Includes programming and agreements
SUB-TOTAL	500	
Private Sector Involvement		
Seed Money	1000	
SUB-TOTAL	1000	
TOTAL	1,500	

Table 9. Safety/Security and Operations Elements

SAFETY/SECURITY AND OPERATIONS	COST ($K)	COMMENTS
Physical Elements		
AVL	2,270	Total life cycle cost. Assumed 1 vehicle location system and 50 AVL GPS/DGPS units for each state.
Info Exchange		In data warehouse
Amber Alerts		In data warehouse
Mobile TMC	2,500	For each mobile TMC, assumed 1 mobile operations center vehicle, 2 portable DMS, 1 portable HAR, 2 portable CCTV, and 1 support/service vehicle. One mobile TMC for each state.
E-911	800	Total life cycle cost. Assumed upgrades for one PSAP (911 center) in the corridor area for each state. Include hardware, software upgrade for E-911 and Mayday.
SUB-TOTAL	5,570	
Institutional Elements		
Interagency Agreements	250	
SUB-TOTAL	250	
Private Sector Involvement		
E911		
SUB-TOTAL		
TOTAL	**5,820**	

3.4. Relationship of Fundamental Themes to Strategic Initiatives

Table 10 shows the relationship of the five fundamental themes to the eight strategic initiatives. The table demonstrates the effectiveness of the strategic initiatives in meeting the themes fundamental to success of meeting the overall goal of the Smart Tourism Corridor.

Table 10. Relationship of Fundamental Themes to Strategic Initiatives

Theme Initiative	1. Safety & Security	2. Fed/State Partnerships	3. Rural Tourism	4. State Efficiencies	5. Private Partnerships
1. Warehouse	X	X	X	X	X
2. Gateway	X	X	X		X
3. Data Gathering	X		X	X	X
4. Tourism Network		X	X		
5. Info Dissemination	X	X	X		
6. Communications	X	X	X	X	X
7. Smart Devices			X		X
8. Safety/Operations	X	X		X	

4. PROJECTS AND COSTS

4.1. Identification of Projects

Each Department of Transportation in the five CANAMEX states maintains an inventory containing their respective ITS infrastructure. Table 11 shows the existing and planned infrastructure for the CANAMEX states, which were collected and tabulated from meetings with ITS Coordinators.

Table 11. Existing and Planned ITS Equipment Inventory

ITS Device by State	Existing	Planned	Total
Arizona			
DMS	79	31	110
CCTV	92	0	92
RWIS	1	0	1
HAR	0	2	2
HCRS	1	0	1
TMS	512	500	1012
TMC	3	0	3
Nevada			
DMS	4	10	14
CCTV	0	20	20
RWIS	4	1	5
HAR	0	5	5
HCRS	0	0	0
TMS	0	25	25
TMC	1	0	1
Utah			
DMS	60	38	98
CCTV	282	194	476
RWIS	38	0	38
HAR	0	0	0
HCRS	0	0	0
TMS	5	59	64
TMC	1	0	1
Idaho			
DMS	5	21	26
CCTV	0	7	7
RWIS	0	38	38
HAR	3	26	29
HCRS	0	0	0
TMS	0	0	0
TMC	0	0	0
Montana			
DMS	0	6	6
CCTV	5	18	23

RWIS	16	4	20
HAR	19	15	34
HCRS	0	0	0
TMS	0	0	0
TMC	0	0	0
TOTAL	**1131**	**1020**	**2151**

Each meeting, conducted individually from state to state, reviewed initial GIS plots for accuracy and completeness. Needs were identified within the state and additional locations of infrastructure were recorded. Additional infrastructure outside of a state's plan was considered a "wish list" item, meaning that the state does not have it planned or funded, but would like to have if available at no cost. Finally, adjustments were made to the GIS plots and then once again re-distributed for final review. Figures 9 through 13 show each state's GIS map with existing and planned infrastructure. Components within Table 11 represent infrastructure that affects the corridor, which is defined as a fifty mile buffer zone either side of the corridor. However, extensions of the boundaries were made for important tourism venues. For example, even though the location of Yellowstone National Park technically does not lie within the 50 mile buffer zone, it is still considered a part of the Corridor because many of the tourists accessing the park do so through the CANAMEX Corridor.

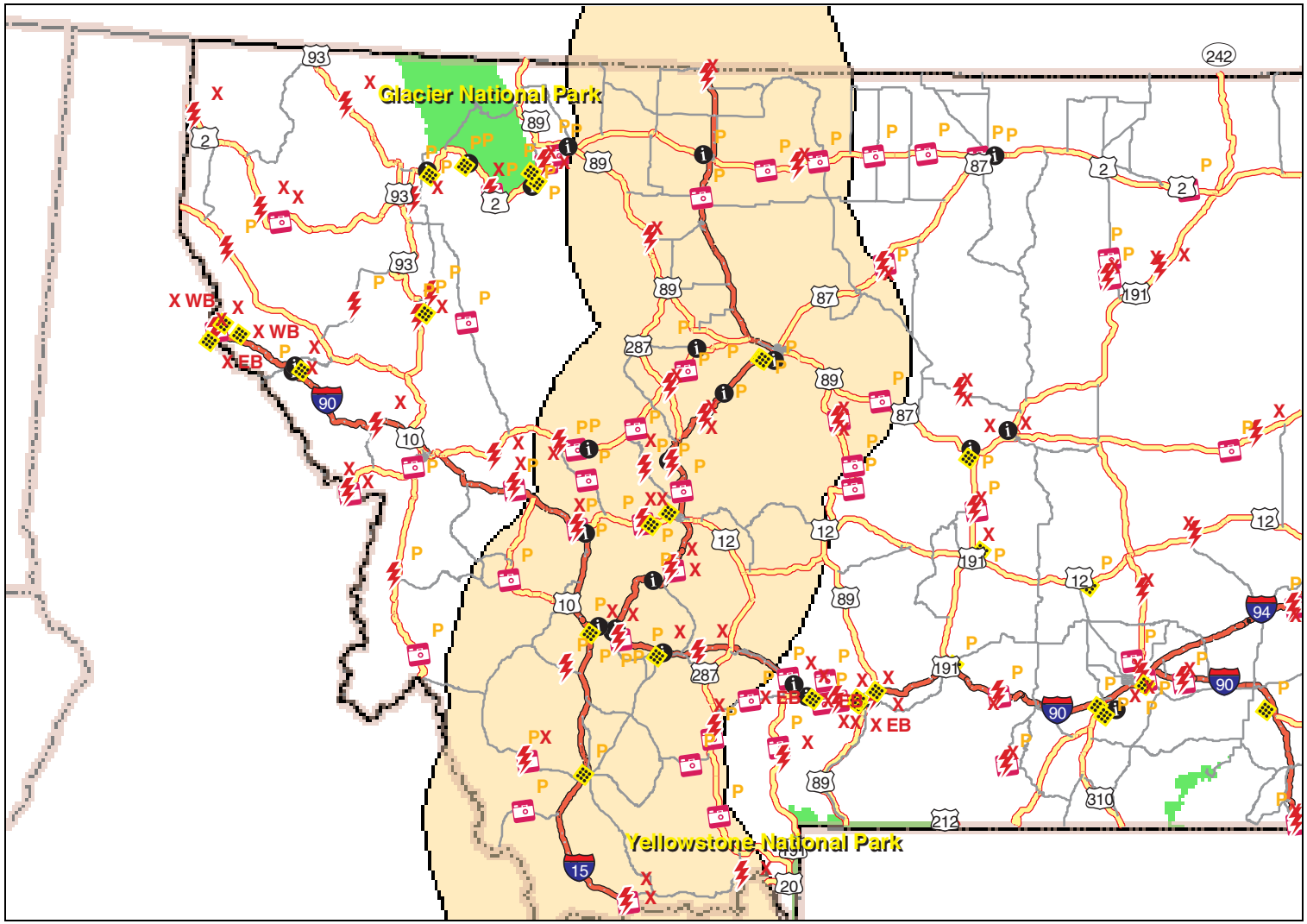


Figure 9: Montana

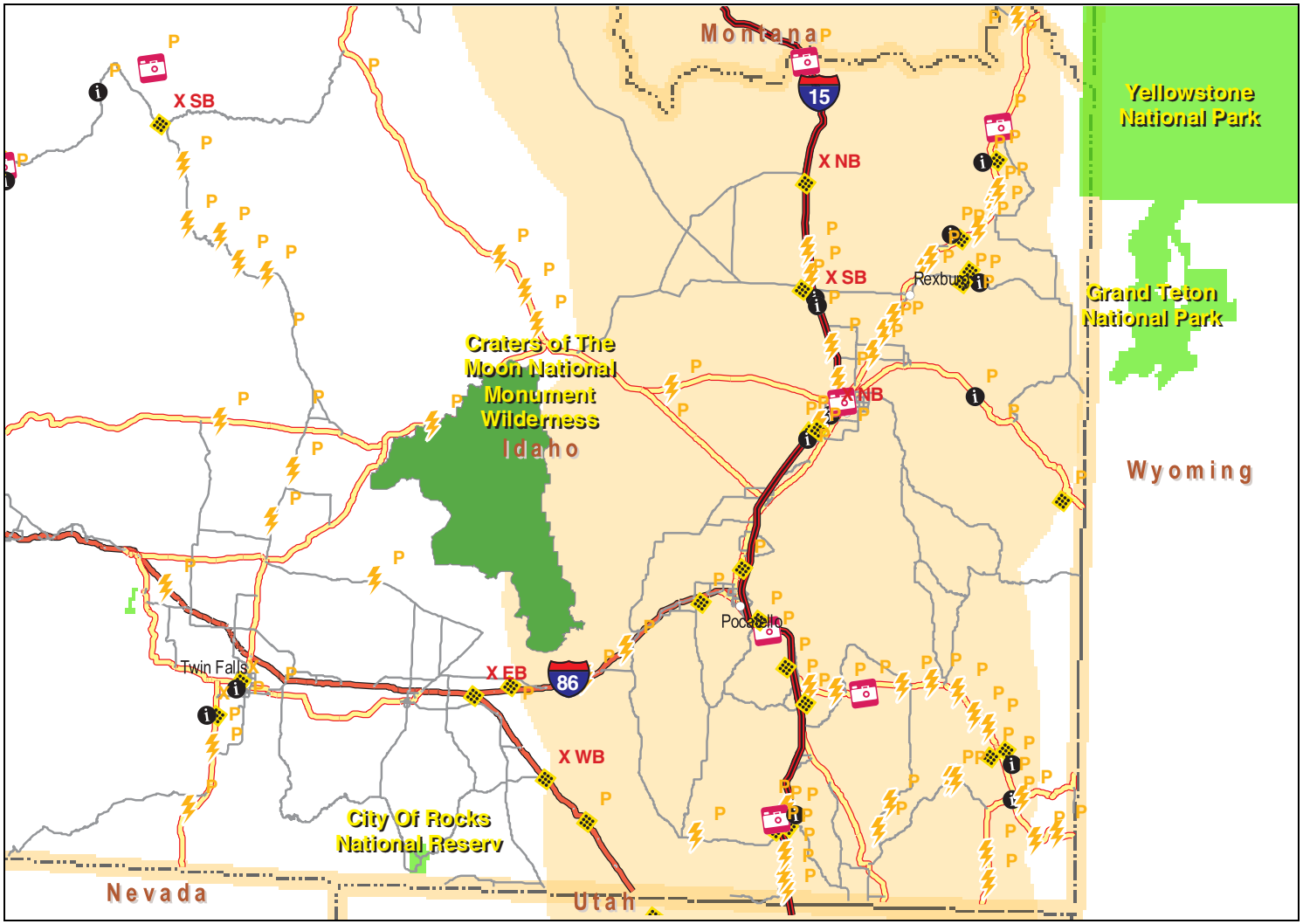


Figure 10: Idaho

Figure 11: Nevada

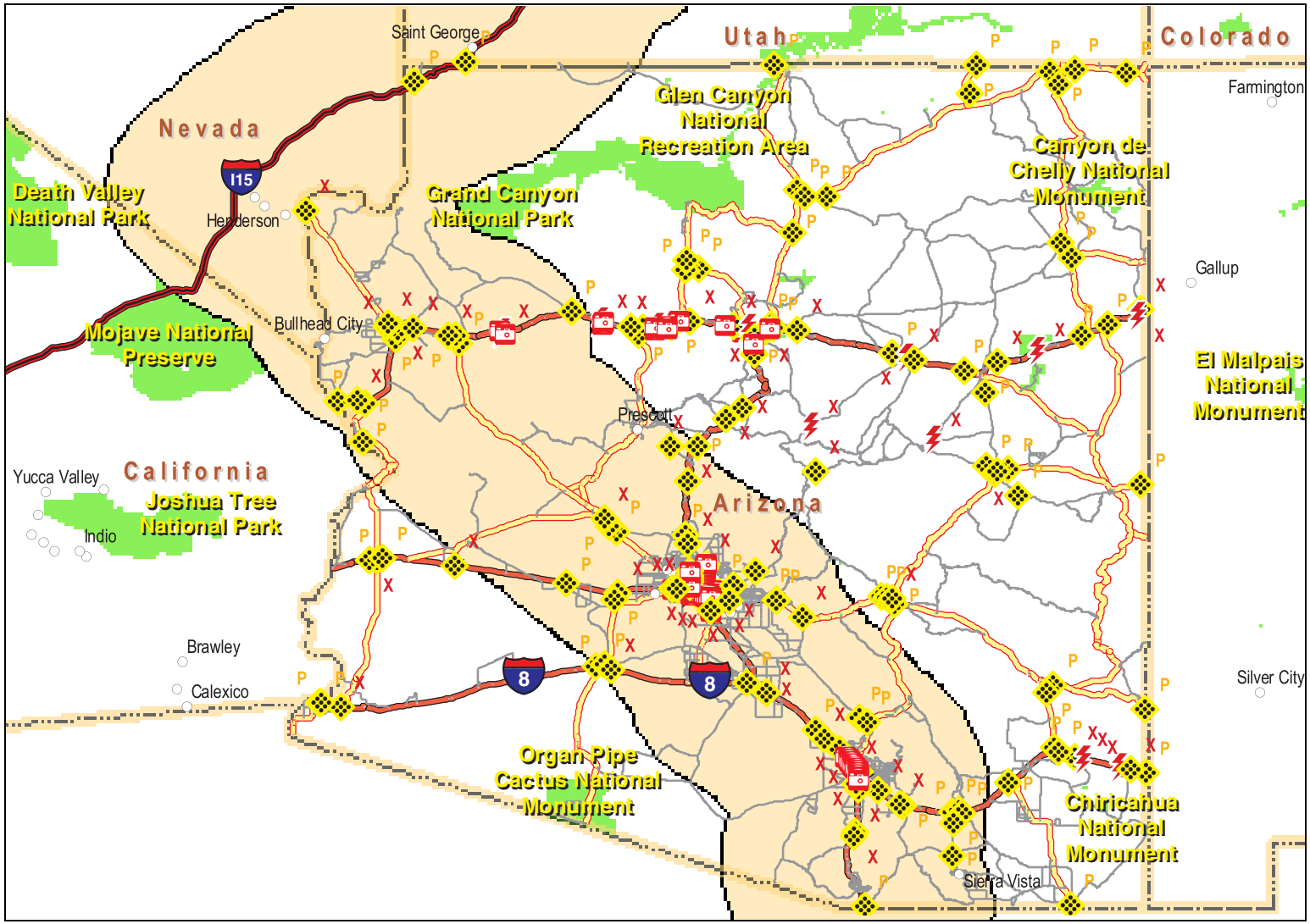


Figure 12: Arizona

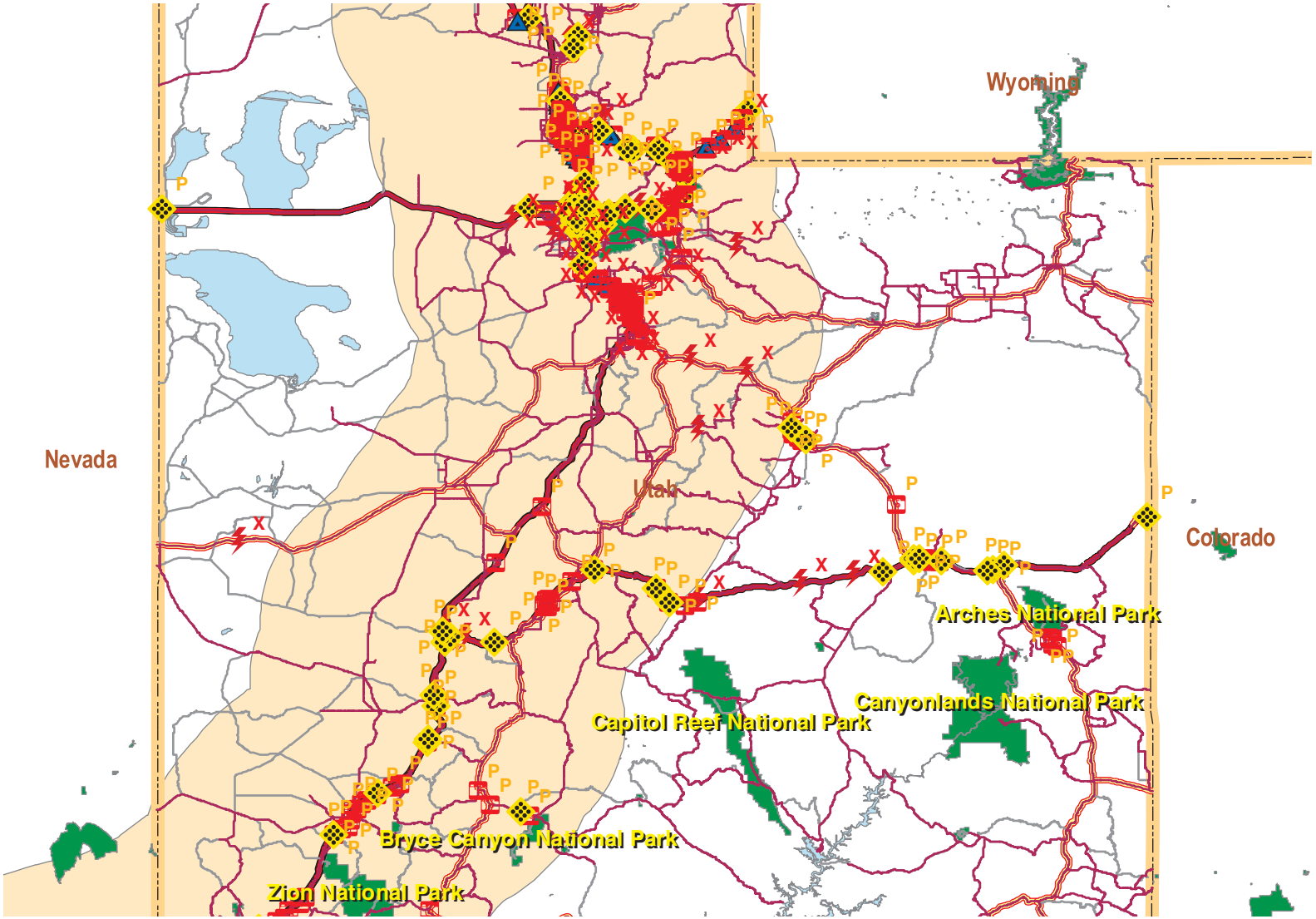


Figure 13: Utah

4.2. ITS Device Costs

Table 12 shows the costs of planned DMS, CCTV, RWIS, HAR, and TMS for the five CANAMEX states, by state and by ITS component, respectively. Given that no additional HCRS and TMC are proposed for the CANAMEX states, their costs are not listed in the table.

For all the ITS components listed in, the data for both the unit capital cost and the unit Operation & Maintenance (O&M) cost were obtained from the ITS Benefits and Costs Database established by the USDOT's Joint Program Office (JPO) for Intelligent Transportation Systems ("ITS Benefits and Costs Database: Cost Data", http://www.benefitcost.its.dot.gov/its/benecost.nsf/ByLink/CostHome, last accessed on Oct. 10, 2003). In the database, most ITS devices have a high and low estimate for the cost; and the average of the two values was used as the approximate estimate.

For DMS, in addition to costs for both Variable Message Sign (RS015) and its tower (RS016), $10,000 for communications and supporting infrastructure is assumed for each unit. For CCTV, in addition to costs for both CCTV video camera (RS007) and its tower (RS008), $50,000 for communications and supporting infrastructure is assumed for each unit. For RWIS, in addition to costs for both the RWIS itself and the associated environmental sensing station (ESS), $10,000 for communications and supporting infrastructure is assumed for each unit. For HAR, costs for both the HAR itself (RS017) and one associated HAR sign are included. For TMS, the costs are considered as those of the Vehicle Location Interface (FM006) under the subsystem of Fleet Management Center.

To convert the annual O&M costs into the present worth, an annual discount rate of 3% and duration of 10 years into the future are assumed. As the annual O&M costs are considered as an ordinary annuity, their present worth is the value of a stream of expected future payments that have been discounted to a single equivalent value today. The Present Worth of the O&M costs (PWOM) could be solved by the following formula.

$$PWOM = AOM\left[\left(1 - \left(1 / (1 + i)^{n}\right)\right) / i\right]$$

Where:

PVOM = Present worth of the annual O&M costs

AOM = Amount of the annual O&M cost

i = Discount rate per year

n = Number of years

Table 12. Costs of Planned ITS Devices for the CANAMEX States, Respectively

ITS Device by State	Planned	Unit Capital Cost ($K)	Unit O&M Cost ($K/year)	Total Capital Cost ($K)	Total O&M Cost ($K/year)	Total O&M Cost ($K, Present Worth)
Arizona						
DMS	31	209	4.2	6479	130.2	1,110.63
CCTV	0	29.25	1.95	0	0	0
RWIS	0	65	4.45	0	0	0
HAR	2	29	1.05	58	2.1	17.91
TMS	500	12.5	0	6250	0	0
SUB-TOTAL				**12,787.0**	**132.3**	**1,128.5**
Nevada						
DMS	10	209	4.2	2090	42	358.27
CCTV	20	19.25	1.95	385	39	332.68
RWIS	1	55	4.45	55	4.45	37.96
HAR	5	29	1.05	145	5.25	44.78
TMS	25	15	0	375	0	0
SUB-TOTAL				**3,050.0**	**90.7**	**773.7**
Utah						
DMS	38	209	4.2	7942	159.6	1,361.42
CCTV	194	19.25	1.95	3734.5	378.3	3,226.98
RWIS	0	55	4.45	0	0	0
HAR	0	29	1.05	0	0	0
TMS	59	12.5	0	737.5	0	0
SUB-TOTAL				**12,414.0**	**537.9**	**4,588.4**
Idaho						
DMS	21	209	4.2	4389	88.2	752.36
CCTV	7	19.25	1.95	134.75	13.65	116.44
RWIS	38	55	4.45	2090	169.1	1,442.46
HAR	26	29	1.05	754	27.3	232.87
TMS	0	12.5	0	0	0	0
SUB-TOTAL				**7,367.8**	**298.3**	**2,544.1**
Montana						
DMS	6	209	4.2	1254	25.2	214.96
CCTV	18	19.25	1.95	346.5	35.1	299.41
RWIS	4	55	4.45	220	17.8	151.84
HAR	15	29	1.05	435	15.75	134.35
TMS	0	12.5	0	0	0	0
SUB-TOTAL				**2,255.5**	**93.9**	**800.6**
TOTAL	**1020**	**N/A**	**N/A**	**37,874.3**	**1,153.0**	**9,835.3**

5. SMART TOURISM CORRIDOR BENEFITS

Implementation of recommendations from TMs #1, #2 and #3 will yield significant benefits to all stakeholders. All Corridor travelers, both private and commercial, will share in significantly increased safety and security. Residents within and in the vicinity of the Corridor will experience not only safety benefits, but also improved viability of the economy within the Corridor resulting from increased tourism and, ultimately, jobs. The 2001 CANAMEX Corridor Plan estimated, through 2030, that the Smart Tourist Corridor Bold Initiative would add 113,000 additional jobs to the Corridor work force; another 201,000 employment opportunities would result from implementation of the Telecommunications Access for Rural Areas Bold Initiative. The Plan also estimated enormous benefits as shown in Table 13.

Table 13. Summary of Smart Tourism Corridor Benefits

TIME PERIOD	BENEFITS ($)	
2005-2010		
Reduction in Vehicle Hours of Travel	18	
Accident Cost Reduction (Incidents)		$ 7.6
Estimated Benefits (Weather)		$ 1.1
Five Year Total	90	$ 43.5
2010-2020		
Reduction in Vehicle Hours of Travel	49	
Accident Cost Reduction (Incidents)		$14.3
Estimated Benefits (Weather)		$ 1.1
Ten Year Total	490	$ 144.1
2020-2030		
Reduction in Vehicle Hours of Travel	123	
Accident Cost Reduction (Incidents)		$ 27.6
Estimated Benefits (Weather)		$ 1.1
Ten Year Total	1,230	$ 287.0
2005 – 2030 TOTAL	7,810 M	$ 474.6 M

VHT in Millions of Hours

Other Benefits in $ Millions

As shown in the Table 13, over a period of twenty-five years (2005-2030) implementation of ITS devices within the Corridor will reduce vehicle travel time by just under 8 Billion hours! In addition, over the same period, an additional $474 Million in benefits from decreases in accident costs and weather delays are expected to accrue to Corridor travelers. The accident reduction of 40 % is attributed to providing timely information to motorists and represents a 5:1 benefit to cost ratio achieved by providing incident information to Corridor travelers

State and federal agencies will be able to exchange essential traffic, safety and security, visitor and other information brought about by the data warehouse and the Gateway concepts. Federal and State Parks will have better coordination with tourism and transportation agencies, improved facility specific amenities and regulations, improved personal safety and the means to address visitor expectations. State Departments of Transportation benefits include: improved coordination with state tourism and law enforcement agencies, more efficient delivery of travel information, improved traveler safety, expansion and improved effectiveness of telecommunications, improved accuracy and timeliness of road and weather information and greater efficiency of providing information to travelers.

Tourists and other visitors to the Corridor will be able to receive real time and archived information about travel and weather conditions, tourism venues, national and state park regulations, parking and a host of concierge services made possible through wider deployment of, and proliferation of, improved communication devices reflecting advances in technology. User organizations, such as AAA, will have more complete and timely information to offer their members. Tourism agencies will benefit from: greater coordination among state and local agencies, more detail by which to address specific demographic based information needs, the means to provide pre-trip/en-route and destination planning, improved collaborative and coordinative information integration, improved information delivery for alternative transportation such as transit and the ability to perform better consumer research.

Local emergency responders will be able to locate incidents quickly and response time will be reduced. Satellite based communication devices will result in wider communication coverage throughout the Corridor.

Public – private partnerships will be developed. Data exchange between public (State) agencies and private sector (e.g., Map Quest) information providers will result in Corridor travelers having a much wider array of real time information upon which informed choices will be made. Moreover, collection, processing and distribution of information will be characterized by significant improvements in efficiency and effectiveness. Integration of information provider resources will result in adjustments to business models so that the private sector will realize increased revenues, and States will have the opportunity to privatize (read: provide the capital, operation and maintenance costs) what might be thought of as public sector roles such as development and operation of the data warehouse and the Gateway.

The United States, Canada and Mexico will see international trade efficiencies spur the economies of all three countries within the Corridor, creating greater employment. Native American tribes derive most of their income from Corridor tourists; thus, they will share in the more viable economy brought about by implementation of Corridor recommendations. The tribes will benefit from: enhanced institutional relationships with public sector tourism and transportation agencies; a means by which to participate in discussions about local, regional and multi-state tourism industry issues and needs; a method by which to make information available to current and potential visitors; and an enhanced market for traveler information services.

Table 14 provides a summary of the anticipated benefits by stakeholder group.

Table 14. Anticipated Benefits by Stakeholder Group

STAKEHOLDER CATEGORY	ANTICIPATED BENEFITS
Departments of Transportation	• Improved coordination with state and local agencies • Expanded and more efficient delivery of traveler information and advisories • Improved traveler safety • Multi-functionality of technology and communications applications • Improved timeliness and accuracy of road and weather information • Enhanced efficiency of communicating key information to the traveling public
Tourism Agencies & Facilities	• Improved coordination with other agencies • Enhanced level of detail to address specific demographic or activity based information needs • Provision of the means for pre-trip, en-route and destination visitor planning • Improved multi-agency and multi-state coordination, collaboration and information integration • Improved information delivery for alternative transportation • Provision of the means to collect visitation and activity patterns for consumer research.
Federal Land Public Agencies	• Improved coordination with tourism and transportation agencies • Improved facility specific descriptions and permitted use information • Improved personal safety • Methods for addressing visitor expectations and assist in managing expectations
Travelers & Tourists	• Provision of the means for pre-trip, en-route and destination planning • Improved travel and personal safety through travel and facility use advisories and emergency service contact information • Improved timeliness and accuracy of information, on road and weather conditions and tourist attractions • Improved visitation experience
Transit Agencies	• Improved coordination with other agencies • Expanded use of alternative transportation modes
Planning Agencies	• Improved coordination with other agencies • Expanded information available for more efficient planning and management of traffic operations
Trucking	• Expanded the information available to commercial freight haulers and business travelers • Enhanced productivity through the timely provision and multiple communication channels for traveler advisories • Improved timeliness and accuracy of road and weather information
Native American	• Enhanced institutional relationships with public sector tourism and transportation agencies • Provision of a mechanism to discuss local, regional, state and multi-state tourism industry issues and needs • Expanded information available to current and potential visitors • Enhanced market for traveler information services

6. NEXT STEPS

The next steps are as follows:

1. Meet with CCC on November 13th to discuss the recommendations of Tech Memo #3, options for the CANAMEX organizational structure, privatization options for certain initiatives, and priorities for implementation.
2. Prepare the Final version of Tech Memo #3.
3. Prepare the Final report in mid-December, which will include:
    - A summary of Tech Memo's #1, #2, and #3
    - Recommendations for the CANAMEX Organizational Structure to implement the Smart Tourism Corridor
        - Identification of agency roles/responsibilities
        - Privatization options for some functions
        - Suggestions for interagency agreements
    - An Action Plan for Implementing the Strategic Initiatives
        - Inclusion of a priority ranking of initiatives
    - A section addressing the uniqueness of the CANAMEX Corridor
    - A Benchmark comparison to other national corridors
    - Suggested funding sources and strategies
4. Prepare a colorful, one page pull-out summary of the recommendations for the Smart Tourism Corridor.