Technical Memorandum 2

Corridor Operations

Prepared by:

John E. Taylor, P.E.

Deputy Director

and

Scott Lee

Research Assistant

of the

Western Transportation Institute

College of Engineering

Montana State University - Bozeman

Prepared for the

CANAMEX Corridor Coalition:

Montana Department of Transportation

Idaho Transportation Department

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ACRONYMS

AVL	Automatic Vehicle Location
CCC	CANAMEX Corridor Coalition
CCTV	Closed Circuit Television
CD	Compact Disk
DSRC	Dedicated Short Range Communication
DOT	Department of Transportation
DMS	Dynamic Message Sign
E911	Enhanced 911
FCC	Federal Communications System
GIS	Geographic Information System
GPS	Global Positioning System
HAR	Highway Advisory Radio
HCRS	Highway Closure and Restriction System
IM	Incident Management
ITI	Intelligent Transportation Infrastructure
ITS	Intelligent Transportation System
IGA	Intergovernmental Agreement
MUTCD	Manual of Uniform Traffic Control Devices
MSU	Montana State University
NSF	National Science Foundation
O & M	Operating and Maintenance
PDA	Personal Digital Assistant
PSAP	Public Safety Answering Point
RWIS	Road Weather Information System
TM	Technical Memorandum
TMC	Transportation Management Center
TMS	Traffic Monitoring System
USDOT	United States Department of Transportation
WTI	Western Transportation Institute

1. EXECUTIVE SUMMARY

1.1. Background

As part of the North American Free Trade Agreement (NAFTA), Congress designated several major trade routes, including one 1500-mile corridor that connects Mexico to Canada via Arizona, Nevada, Utah, Idaho and Montana. The governors of the five states created a CANAMEX Coalition, as well as a CANAMEX Corridor Plan to stimulate economic development along the Corridor.

One of the initiatives contained in the CANAMEX Corridor Plan is the development of a "Smart Tourist Corridor," a principal travel route that uses advanced technologies to improve safety and enhance services. In the fall of 2001, the Coalition voted to focus its initial implementation efforts on the Smart Tourist Corridor Initiative. The purpose of this Technical Memorandum is to present all Corridor Operations including: Information Exchange, Incident Management and Telecommunications/Telematics.

To determine and analyze existing Corridor Operations, an extensive literature search, personal interviews and attendance/proceedings of national seminars, as well as discussions with experts in various fields related to Corridor Operations were conducted. These same sources formed the bases for the numerous recommendations resulting from synthesizing the investigations.

1.2. Information Exchange

Existing Information Exchange in the CANAMEX Corridor, although effective within and around urban areas is, in general, inadequate to meet the needs of, and provide optimum benefits to, Corridor travelers. Tourism information, e.g., en-route and in the vicinity of destinations, usually is not available in real time, frequently not available at all in rural areas, and suffers from inadequate resources and the slow emergence and adoption of new technologies.

While the states have made significant investments in Intelligent Transportation Infrastructure with which to provide important roadway information, more is warranted as evidenced by the great amount of ITI programmed and planned for future deployment.

Many opportunities exist to improve information exchange. For example, the provision of "seamless" information to travelers is just now beginning as a part of institutional coordination. However, it will require significant investment and institutional "buy-in" to improve information coordination and to reap the available benefits for travelers.

An extensive list of specific recommendations, the implementation of which would greatly improve Information Exchange, are summarized at the end of this Section

1.3. Incident Management

The practice of Incident Management (IM) in the Corridor is best characterized by extremely dedicated men and women, often acting under extreme adverse conditions, experiencing personal stress, without adequate equipment or training and drastically

lacking the resources to carry out their (often voluntary) mission. This statement applies much more to rural first responders than to their urban colleagues.

Rural Incident Management usually is organized at the county or regional level of government. The most important part of IM is the ability to communicate effectively. Ironically, first responders in rural areas view this as the most under funded element and serious deficiency of IM. As with Information Exchange, effective Incident Management depends a great deal on institutional coordination.

An extensive list of specific recommendations, the implementation of which would greatly improve Incident Management, is included.

1.4. Telecommunication and Telematics

Improvements to this component of Corridor Operations offer perhaps the most promising opportunity for attaining the greatest benefits for travelers. Telecommunication and telematics are the foundation upon which rests the entire operational concept of effective Information Exchange and Incident Management.

Wire line is the predominant form of effective communication in the Corridor. Unfortunately, this method depends upon the initiative of tourists that they sometimes find time-consuming and inconvenient. Effective wireless communication is sporadic at best and often non-existent due to mountainous terrain and business decisions by carriers not to invest in these areas. As a result, information that would benefit tourists' travel experience often is difficult to obtain. The potential for compromising Corridor safety is high. However, some wireless devices (technologies) such as satellite phones are available now, but their cost often is considered prohibitive.

New telematics technologies such as in-vehicle navigation and communication, as well as the application of ad hoc networking to rural areas, is emerging. As these and other technologies mature and telecommunication companies' business models demonstrate that "downstream" profits will be substantial, greater investment will occur and many more wireless communication devices will proliferate among consumers.

There will be issues that must be addressed before wireless technology will pervade the Corridor. Among them are capital and operating costs, the need for collaborative partnerships between the public and private sectors regarding the concepts of operations, consumer awareness and acceptance, and others.

1.5. Recommendations

Listed below are the primary recommendations for each section. A full list of recommendations is found in Appendix A.

Information Exchange

- The type of information exchanged via the national information number, 511, should be significantly broadened within the limits of each state's statutes and policies.

- Protocols for assuring that Corridor information is compatible and seamless among the CANAMEX states should be developed.
- State (and other) agencies should develop information exchange procedures that foster an ongoing working relationship between Departments of Transportation and state / private sector tourism agencies.

Incident Management

- Corridor states without a Statewide Incident Management Plan should develop on. Proactive and frequent interagency Incident Response training should be realistic and apropos to situations usually encountered by first responders. In addition, each state should partner with local responders to increase coordination and provide training when warranted.
- Agreements among agencies should be formal and documented thus, limiting exposure to litigation.
- All maintenance and operating staff as well as emergency responders should receive training in how to set up traffic control zones in accordance with the Manual of Uniform Traffic Control Devices.
- State Departments of Transportation should insist on being "equal partners" in the management of incidents, particularly due to their substantial resources and geographic dispersion of personnel and equipment.

Telematics and Telecommunications

- A project should be undertaken to determine the limits and quality of current cell phone coverage.
- Additional funds should allocated to capital, operating and maintenance costs for improving communication components of ITS.
- CANAMEX states' policies and statutes that may constrain the allocation of funds for improving telematics, and entering into partnerships with the private sector, should be modified.

2. INTRODUCTION

2.1. Background

The CANAMEX Trade Corridor was established in 1995 as a high priority corridor in the National Highway Systems Designation Act passed by the U.S. Congress. In the United States, the Corridor follows Interstate 15 and travels south through Montana, Idaho, Utah and Nevada. In Arizona, it follows U.S. 93 and Interstates 10 and 19 to Nogales AZ (Figure 1). In 1999, the Governors of the five corridor states signed a Memorandum of Understanding creating the CANAMEX Corridor Coalition with public and private sector representation.

Figure 1: CANAMEX Corridor

The CANAMEX Corridor Plan, developed by Economics Research Associates in 2001, was designed to meet the following objectives that are common to all five states:

- To stimulate economic development and enhance economic opportunity in the communities traversed by the CANAMEX Corridor. The communities are defined to include states, metropolitan areas, counties, cities, towns, and Native American reservations.
- To heighten awareness of the Corridor nationally and internationally and to incorporate the views, concerns and aspirations of key stakeholders from the Corridor communities into the development of the Plan.
- To identify the most critically needed transportation and telecommunications infrastructure (basic installations and facilities) projects within the Corridor, for the purposes of facilitating the safe and efficient movement of people, goods and services for the next 30 years, and to plan for their development.
- To establish the Corridor as a leader in the innovative use of emerging technologies to accelerate economic development and sustain quality growth.
- To enhance the global competitiveness of the CANAMEX Corridor states.
- To prepare a Plan that represents the interest of each state and allows the five CANAMEX Corridor states to present a united front to the Federal Government for the funding of critically needed improvements and action on other initiatives.

The CANAMEX Corridor Plan also highlighted a number of recommendations that are addressed in TM # 2. Among them were:

- Coordinate available travel information throughout the Corridor;
- Coordinate data collection and analyses;
- Incorporate events occurring outside the Corridor that affect travel within the Corridor;
- Provide expanded travel, traffic, Incident Management and Information [Exchange];
- ITS deployment should be able to provide pre-trip, en-route and destination information;
- Address in-vehicle emerging technologies; promote coordination of informational and operational activities among Corridor states;
- Develop “connectivity” software; employ wireless and wire line connections;
- Build traveler information databases for real-time dissemination by private sector information over the Corridor website;
- Coordinate Incident Management;
- Coordinate operational strategies related to construction or re-routing activities that may involve several states; components would include a communications network tying together traffic management, emergency operations, and maintenance operations;

- Provide traveler information over a [Internet based] CANAMEX traveler information website;
- Develop enhanced emergency response infrastructure including universal wireless coverage;
- Eliminate dead spots for cellular coverage with satellite phones; and
- Facilitate wireless coverage throughout the Corridor

The Coalition developed a series of initiatives designed to spur economic development and, in particular, new job creation. The Coalition projects an increase in new jobs of 11% above what the states could otherwise expect during the thirty-year planning horizon. The initiatives are listed below.

- Smart Freight Corridor
- Smart Tourist Corridor
- Telecommunications Access for Rural Areas
- Corridor Highway Improvements
- Smart Process Partnerships

In the fall of 2001 the Coalition decided to focus its initial implementation efforts on the Smart Tourist Corridor Initiative.

2.2. Smart Tourist Corridor Goals and Objectives

The overall goal of the Initiative is to develop a vision to enhance the Corridor's economic growth through tourism development based on advanced technology and communications applications.

The CAMAMEX Corridor Coalition established the following overall objectives for the Smart Tourist Corridor Initiative:

- Provide Corridor travelers with the safest and most convenient travel experience possible within the limits of available technology and resources.
- Identify a wide array of timely information for tourists and other Corridor travelers (including freight), based upon their perceptions of needs; advise Corridor travelers of user friendly outlets that can meet their information and other travel needs.
- Identify incident management and other operational practices within the Corridor and recommend alternative generic concepts for their improvement, including new and upgraded telecommunications, protocols and procedures.
- Identify new and upgraded infrastructure projects within the Corridor required to support implementation of the Smart Tourist Corridor Initiative and Corridor operations.

2.3. Purpose

In May 2002, WTI completed the Smart Tourist Corridor Action Plan, which outlined the scope of services planned for meeting the objectives of the Initiative. The purpose of this

document is to detail all of the elements of the Smart Tourist Corridor, one of the initiatives in the final CANAMEX Corridor Plan published in 2001. Specifically, this technical memorandum will provide:

- The methodology by which needed data were identified, sources of data, data collection methods and how data were used in analyses to reach conclusions and formulate recommendations.
- A description and location of existing ITS infrastructure in each CANAMEX state and how the information was used in analysis.
- A comprehensive discussion and analysis of information exchange needs in the Corridor.
- Operational concepts which, when implemented, will lead to safer and more convenient travel in the Corridor.
- A description of incident management practices within the Corridor and an analysis of how they can be improved for greater Corridor travel safety.
- A description of telematics used in the Corridor, and analysis of telecommunications deficiencies.
- Conclusions drawn from the above analyses.
- Recommendations for implementing Corridor operational concepts, expanded ITS infrastructure, improved telecommunications and institutional relationships in support of tourist and other traveler safety and convenience.

2.4. Stakeholders

A stakeholder is any individual or organization having a unique or general interest in and/or benefiting from implementation of operational concepts within the Corridor. Thus, stakeholders include Corridor travelers, all levels of government, those having an interest in creating new jobs as a result of enhanced economic activity, emergency response agencies and private sector owners of tourist venues.

2.5. Relationship to Other CANAMEX Documents

This is the second Technical Memorandum (TM # 2) produced for the CANAMEX Coalition in a series of three Technical Memoranda for developing the Smart Tourist Corridor concept. The following are summaries of the major components of each Technical Memorandum.

Tech Memo #1 – Tourism includes:

- Background research and data collection to determine tourism issues and needs;
- Interviews of tourism industry stakeholders; and
- Development of potential ITS concepts to meet needs.

Tech Memo #2 – Operations includes:

- Data collection and analysis to determine operations issues and needs;
- Inventory of existing and planned ITS elements;
- Analysis of existing operations, including incident management, information exchange, telecommunications, and telematics;
- Analysis/priority ranking of needs; and
- Development of potential ITS concepts to meet needs.

Tech Memo#3 – ITS Infrastructure includes:

- Listing of needs from Tech Memo #1 and #2;
- Comparison and summary of needs from tourism and operations;
- Summary of relevant research on communications and telematics;
- Presentation of research on other national corridors, and a "benchmark" assessment of CANAMEX compared to other corridors;
- Potential ITS concepts (first presented in TM #1), refined to meet combined needs;
- Gap analysis to ensure all needs are met;
- Correlation of potential ITS concepts to FHWA ITS Architecture User Services/Market Packages;
- ITS concept recommendations;
- Operational Concept/Roles and Responsibilities;
- Functional requirements;
- Interface definitions;
- Agency agreements/standards;
- Action Plan for implementing recommended ITS projects.
- Project priority and phasing; and
- Costs.

Also, considerable research and analysis for the Coalition was conducted and summarized in a series of working papers by Economic Research Associates (ERA). These working papers were prepared in 2000 and 2001, and recommended the Smart Tourist Corridor concept. The research and analysis conducted for these reports form the basis for the research and analysis for this study. Where relevant, WTI has noted (or even included) the key findings and recommendations from the ERA working papers for information/comparison purposes and continuity of all the studies

3. METHODOLOGY

The methodology used to acquire data and related information to support the analyses, summary and recommendations of Technical Memorandum # 2 (TM #2), Corridor Operations, is described below. It consists of the following tasks: defining requisite data, determining the best information sources, collecting and analyzing the data.

3.1. Task 1: Requisite Data

The first task was to determine what data would be needed to support an analysis of current Corridor operations and their adequacy in achieving the anticipated benefits of the Smart Tourist Initiative in TM # 1 ("Stakeholder Group Anticipated Benefits," Table 13, Page 50.)

Examples of requisite data include location of existing ITS infrastructure, characteristics of telecommunications, location and amenities of existing travel information outlets, etc.

3.2. Task 2: Data Sources

There were numerous sources of data and related information from which to structure the analysis of existing infrastructure and telecommunications in TM # 3, and to identify deficits that must be ameliorated to ensure safe and convenient travel in the CANAMEX Corridor. They included a literature search of other corridor information systems (such as the I-95 Corridor in the eastern U. S.); comprehensive interviews with ITS Coordinators of each Corridor state; meetings with local incident managers and review of state Incident Management Plans; a telematics seminar with private sector telecommunications companies; obtaining many photos of key infrastructure elements throughout the Corridor; stakeholders' anticipated benefits as gathered through Stakeholder Outreach interviews described in TM # 1; and a tourism workshop conducted in Las Vegas.

3.3. Task 3: Data Collection

Once necessary data types and sources were identified, data collection began. Electronic files of each state's ITS infrastructure were obtained and key infrastructure components were located on GIS base maps; the data also were arrayed in tabular form. The maps were reviewed with ITS Coordinators, updated and returned for their final review and acceptance. Information considered important by public and private sector tourism organizations (see TM #1) was assembled and organized for use in subsequent analyses.

3.4. Task 4: Data Analysis

The data collected were used directly for analysis of Corridor safety issues (including incident management), adequacy of Corridor information exchange capabilities and telecommunications, and availability of tourist and other traveler "concierge" services. These analyses made possible the development of Corridor Operations concepts and systems, which will ultimately define a recommended capital program, and specific system improvements and refinements (TM # 3). The recommendations will be used to identify "gaps" in Corridor infrastructure, identify telecommunications inadequacies

which must be addressed if Corridor goals are to be realized, and provide a comprehensive and reliable assessment concerning availability of additional traveler support services needed within the Corridor.

4. CORRIDOR OPERATIONS

Corridor Operations are all the activities that, taken together, make possible the safe and efficient movement of people and goods. For the Smart Tourist Corridor Concept, WTI will examine the following aspects of corridor operations:

- Information exchange,
- Incident management,and
- Communications/telematics.

4.1. Analysis of Information Exchange

4.1.1. Introduction

The fundamental premise of information exchange is that timely and accurate information will be available to all interested parties when needed. Provision of real time, near real time, and stored information may be accomplished by wire line or wireless communication as well as through stationary roadside signs.

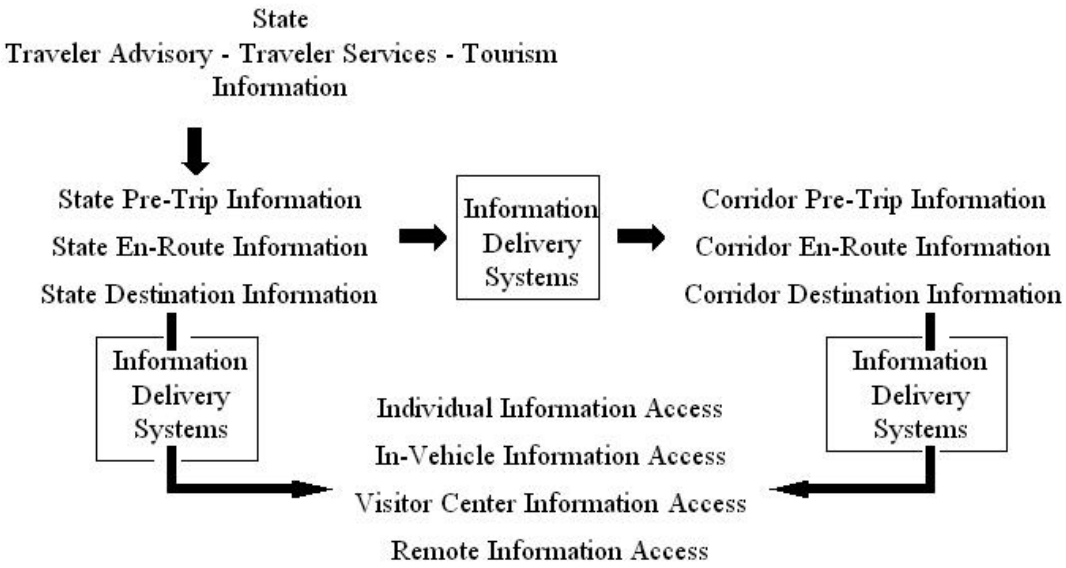

Figure 2: Information Exchange

The purpose of TM # 2, Corridor Operations, is to describe the means by which accurate and timely information can be collected, processed and shared by public and private agencies, and then distributed to the traveling public in a way that will enhance safety and provide convenient access to tourism information within the Corridor. While the purpose may appear straightforward, its accomplishment depends upon a great deal of coordination and cooperation among the CANAMEX states and among members of the tourism community. The states' policies, practices, regulations (and even laws) vary with respect to providing motorists with information they need about where they wish to travel and how to arrive there safely. Figure 2 shows the Information Exchange function.

Information exchanged must be accurate, timely, comprehensive, easily understood, seamless and automated, so tourists and other travelers can make informed decisions about what actions, if any, they choose to take. This is true whether the information is exchanged on a real time or stored basis and whether the exchange medium is electronic or stationary. Exchange of information occurs between:

- Travelers and public agencies,
- Travelers and private sector providers,
- Travelers,
- Intrastate public agencies,
- Interstate public agencies, and
- Travelers and the Internet.

4.1.2. Information Needs

A traveler's need for information is constantly changing. It varies according to the traveler's objectives for the journey, as well as to changing conditions along the route. For example, while some travelers will undoubtedly have a fixed destination in mind, others will search for attractive destinations of opportunity once they begin their trip. Information availability must be coordinated with these changing needs.

The information needs of Corridor travelers can be satisfied either actively or passively. That is, travelers may make inquiries to obtain information or, alternatively, information may be provided to them without any action on their part. For example, travelers may wish to determine the availability of specific amenities at several alternative destinations before making a final decision. Pre-trip or en-route information most likely will be obtained from the public or private venue under consideration. In this case travelers have pro-actively initiated the information "search." Travelers often don't know when a planned route to the selected destination has been closed due to a serious accident. Provision of this information to travelers so that they can make informed decisions regarding alternative routing, or otherwise modify their plans, must be initiated by the public agency responsible for operating the roadway.

As shown in Table 1, Corridor travelers need information before embarking on their trips, en-route to their destinations and even after they have arrived at their destinations (regarding conditions, for example).

Technical Memorandum # 1(Table 12 on page 30) contains a comprehensive assessment of tourism information needs as stated by individuals and organizations interviewed during tourism outreach.

Corridor information directly related to Corridor Operations has been extracted from TM # 1 and is shown in Table 1.

Table 1: Traveler's Information Needs

Information Needs	Pre-Trip	En-Route	Approaching Destination	Destination Area
Personal Safety		X	X	X
Traveler Safety Advisories	X	X	X	
Real Time Information	X	X	X	X
Traffic Problems	X	X		
Incidents	X	X		
Construction and Maintenance	X	X		
Parking			X	X
Tourism Information	X	X	X	X
Directional Signage	X	X	X	
Rules and Regulations	X			X
Access	X			X

4.1.3. Information Linkages

There exist a plethora of means by which information may be exchanged. All travelers within the CANAMEX Corridor (tourists, freight carriers, and those people using it for every day travel) want to avail themselves of up-to-date and accurate information. While some obtain needed information before they begin their journey, others do not. Virtually all travelers benefit from en-route information, whether it is related to tourism and recreation, or to traffic conditions and weather along the way and / or at their destinations. Some information linkages are shown in Figure 3.

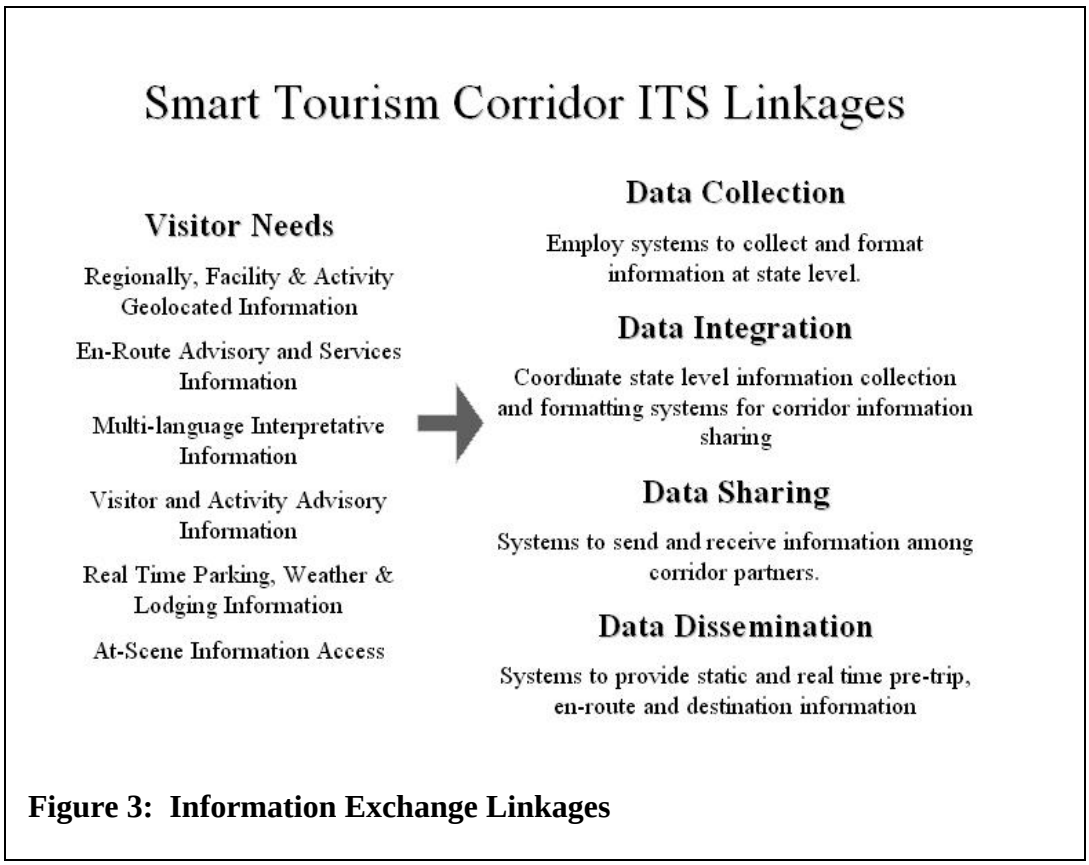

Figure 3: Information Exchange Linkages

Intelligent Transportation Infrastructure (ITI) components are the primary, although not exclusive, means by which public transportation agencies currently communicate with travelers in the CANAMEX Corridor. ITI also is an essential tool for collection of travel, weather, road surface condition and a host of other operational data. The collection and processing of this information enables officials to determine what information to provide to Corridor travelers, as well as how and when it becomes available.

For example, Closed Circuit Television (CCTV) is a reliable means of collecting information on many traffic safety parameters. Also, in-pavement sensors automatically convey road surface data for entry in algorithms that determine if pavement surfaces are likely becoming icy. Road Weather Information Systems (RWIS) monitor weather conditions such as precipitation, wind speed and wind direction in real time. This information is usually displayed on agencies' websites. Often, CCTV is located with RWIS, thus enabling highway maintenance forces to determine actual weather conditions and respond with timely snow removal and de-icing materials.

Virtually all ITS components play a critical role in determining conditions that might compromise Corridor travel safety and provide important and appropriate information to travelers.

4.1.4. ITS Components

To evaluate the number, type, location and operational status of ITS infrastructure components in the Corridor, an inventory was conducted within each CANAMEX state.

ITS components located within the Corridor include Highway Advisory Radio (HAR), Highway Closure and Restriction System (HCRS), CCTV, Dynamic Message Signs (DMS), RWIS, Transportation Management Centers (TMC), 511 and Traffic Monitoring Systems (TMS).

4.1.4.1. Highway Advisory Radio

Figure 4: HAR Sign

The purpose of HAR is to provide traffic alerts to travelers. HAR may broadcast either a pre-recorded travel message at a pre-determined interval, or a "tailored" message specific to an unplanned event, or roadway condition on a specific AM or FM frequency. Signs indicating the applicable radio frequency are located along the roadway within the reception range of the radio signal. Amber lights are located above and below the sign. When there is information the transportation agency wishes to provide the public, the amber lights alternatively flash, alerting motorists that important travel information is currently available. Highway Advisory Radio is currently available in Montana, Idaho, Utah and Nevada.

4.1.4.2. Highway Closure and Restriction System (HCRS)

HCRS is unique to Arizona within the Corridor. Generally similar to HAR and 511, this system requires that inquiries be made by telephone to a toll-free number. The caller receives a timely status report of all state facilities either closed or restricted as a result of maintenance and construction activities, incidents or for many other reasons.

4.1.4.3. CCTV Closed Circuit Television (CCTV)

Figure 5: CCTV

CCTV is usually most cost-effective in urban areas where large volumes of traffic may be monitored simultaneously. Because it is expensive, and very low traffic volumes usually characterize rural travel, CCTV is rarely found in rural areas of the Corridor. Nonetheless, there are many CCTV installations within (predominantly urban) sections of the Corridor.

4.1.4.4. Dynamic Message Signs (DMS)

Figure 6: DMS

DMS display electronic messages for view by Corridor travelers. A wide range of information (usually safety-related) may be displayed, ranging from "downstream" traffic conditions to construction / maintenance activities to incidents that may affect travel safety to Amber Alerts. DMS may be large overhead installations commonly, although not exclusively, located in the vicinity of urban areas, or portable "roadside" ones situated along the shoulder of the roadway. The portable signs are frequently used on two-lane rural roads. The primary advantage of permanent DMS is that all travelers can view them simultaneously; also, they can be viewed from greater distances. The primary advantage of portable DMS is the displayed message may be relocated periodically as needed.

Roadway Weather Information Systems (RWIS)

Figure 7: RWIS Installation

RWIS monitor weather conditions such as precipitation, wind speed, and wind direction in real time. This information is usually displayed on agencies' websites. Often, CCTV is located with RWIS, thus enabling highway maintenance forces to determine actual weather conditions and respond with timely snow removal and de-icing materials.

4.1.4.5. Transportation Management Centers (TMC)

Figure 8: TMC

TMC function as the public sector transportation agency focal point, or hub, for receiving, analyzing, processing and relaying important travel data/information to tourists and other Corridor travelers. Input to TMC may come from law enforcement officers, other public agencies, the traveling public or ITS monitoring components such as CCTV, RWIS, or in-pavement sensors. Outgoing information may be posted on websites, DMS, HAR, HCRS or any other appropriate medium.

4.1.4.6. Traffic Monitoring Systems (TMS)

TMS are predominantly located in urban areas on controlled access facilities; however, a number of states utilize them on rural two lane highways. Data concerning traffic volumes, travel speeds, vehicle classification, etc. are automatically transmitted (wire line) to a TMC for amalgamation, analysis, operations response and planning.

4.1.4.7. Nationwide Traveler Information Number 511

Figure 9: 511 Roadside Sign

In July of 2000, the Federal Communication Commission designated 511 as the national traveler information number. It is easy to recall and provides a clear service to consumers. 511 is a speed dial, or shortcut to a telephone system. Currently, the basic content of 511 in the Corridor is limited to roadway surface conditions and weather. 511 services are route and corridor based provide information that is retrievable by route number and/or name. 511 already is operable in Montana, Arizona and Utah. Nevada's 511 system is anticipated to be rolled out prior to winter. Idaho intends to implement 511, but currently is arranging financing to support it. 511 offers the potential to provide tourism services and the ability for travelers to call the number to report incidents. In Arizona, ADOT is adding the following new content elements or enhancements: full concierge services and segmented road information.

4.1.5. Collecting ITI Component Data

Each CANAMEX state's Department of Transportation maintains an electronic inventory of deployed (and, in some cases, planned) ITI. Preliminary Corridor boundaries were established approximately fifty miles either side of centerline in each state. However, boundaries were extended to include important tourism venues outside the preliminary one hundred mile wide band. A GIS Base Map of the entire Corridor was created and every deployed (and where available, planned) ITI component from each state was plotted on it. These maps greatly facilitated analyses and presentations. The GIS Maps may be viewed on the CD included within TM # 2. Cropped versions of each state's GIS map are shown in Figures 10 through 14.

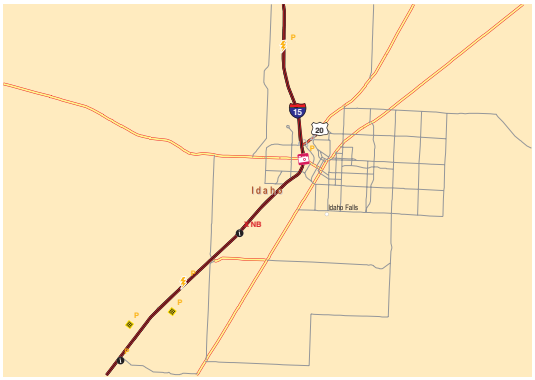

Figure 10: Idaho GIS Map

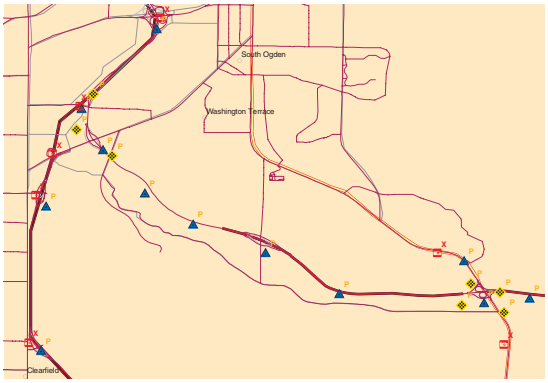

Figure 11: Utah GIS Map

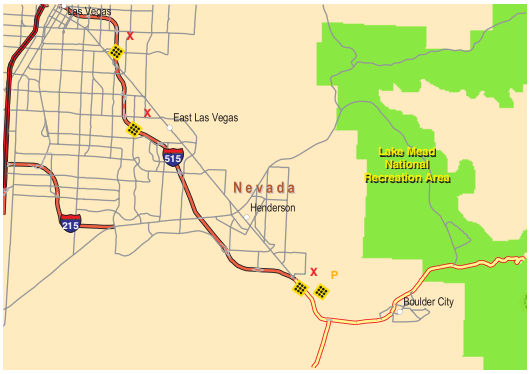

Figure 12: Nevada GIS Map

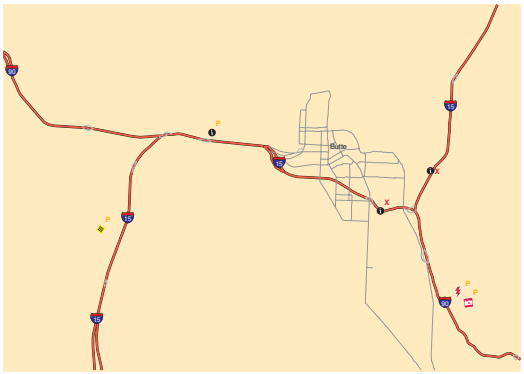

Figure 13: Montana GIS Map

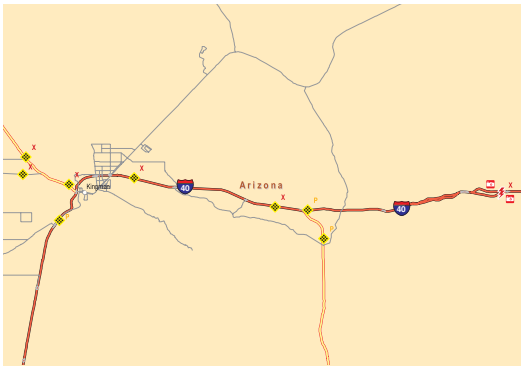

Figure 14: Arizona GIS Map

ITI component data were also collected through numerous on-site meetings held with ITS Coordinators as shown in Table 2.

Table 2: ITS Coordinator Meetings

Meeting Date	State
June 25, 2002	All
August 12, 2002	All
October 29, 2002	All
January 15, 2003	All
February 4, 2003	Montana
April 11, 2003	Arizona
April 14, 2003	Idaho
April 29, 2003	Utah
April 30, 2003	All
May 16, 2003	Nevada

Subsequently, an on-site meeting was held with each state's ITS Coordinator to review the GIS plots of ITI components for accuracy and completeness. In addition, Corridor boundaries were reviewed to assure that major tourism attractions in each state were included within the Corridor. In several cases the boundaries were adjusted. Also, many planned ITI components were added. This process resulted in significant additions to, and modifications of, the GIS Maps.

Finally, the corrected maps were once again sent to ITS Coordinators for final review and sign-off.

Table 3 shows the number of deployed and planned components within the Corridor in each CANAMEX state. Information obtained from the processes and analyses described above will be direct input to developing the recommended ITI capital program in TM # 3.

Table 3: ITI Within the CANAMEX Corridor

	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	64	346
RWIS	0	0	0
HAR	0	0	0
HCRS	0	0	0
TMS	5	58	63
TMC	1	0	1
Idaho			
DMS	5	17	22
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	7	0	7
CCTV	15	0	15
RWIS	60	0	60
HAR	5	0	5
HCRS	0	0	0
TMS	0	0	0
TMC	0	0	0
TOTAL	**1140**	**842**	**1982**

4.1.6. Corridor Information Exchange

The Corridor enjoys a substantial information exchange capability as indicated in Table 3. Many ITI components described earlier already are deployed. However, many more are considered necessary and are planned by each state. As determined by each state's ITS Coordinator, gaps in ITI are the number of planned (unfunded) and programmed (funded). Planned and programmed components are the primary inputs to the recommended capital program that will be found in TM # 3.

4.1.7. Institutional Coordination

As suggested earlier, Corridor travelers seldom care which state they are traveling in when seeking (or wishing to provide) information. As a result, DMS and other electronic media in one state should provide important information about conditions affecting travel at least in abutting states and, preferably, in all Corridor states. Moreover, information that may affect traveler decisions from outside the Corridor should also be available. Therefore, it is incumbent on CANAMEX states to ensure that operating policies, protocols and communication systems are in place so that information available to tourists and other travelers is "seamless." Institutional coordination and operating systems integration are essential to provision of truly comprehensive information.

Examples of information states should exchange include, incidents, weather conditions, roadway surface condition, travel delays, DMS messages, changes to 511 messages, and so forth. Also, it is important to formally document agreements among the states in Intergovernmental Agreements.

The following scenario illustrates the potential capabilities and benefits of full institutional coordination throughout the Corridor.

At 9:00 AM this morning a large truck carrying explosives ran off Interstate 15 just north of the Idaho/Montana state line. Montana officials immediately dispatched appropriate personnel from several state agencies to the scene including the Highway Patrol and the Department of Transportation. Fearing the worst, Montana desperately sought explosives experts who could assess the situation and the likelihood of an explosion. However, the closest Montana crew was eighty-five miles away and would take several hours to arrive after they were notified.

Fortunately, Montana and Idaho have an Intergovernmental Agreement in place whereby each state may provide resources to each other in event of emergencies. Idaho explosives experts were scaling a rock face just south of the state line and were called to the scene.

Realizing how important it would be to advise motorists of the event and suggest alternate routing, Montana officials requested that an Idaho Dynamic Message Sign located well south of the state line be activated and carry an appropriate message. In addition, Idaho officials agreed to augment their 511 message to transmit the same information as Montana's. Idaho officials also added the incident specifics to their website to alert travelers heading north.

Finally, the Idaho and Montana (virtual) Transportation Management Centers collaborated on, and coordinated, all of the above events and used all their resources to notify the traveling public and local transportation agencies in both states.

Actions required in response to the entire scenario described above had been embodied in a bi-state agreement executed two years prior to the incident.

4.1.8. Traveler Benefits

Accurate, comprehensive, real-time and easy to understand information will greatly improve tourist and other traveler safety and convenience and improve the "tourism experience," thus attracting more tourists to the Corridor. Travelers will be able to make travel decisions on a much more informed basis, thus giving them more time to enjoy the Corridor's many attractions and access to services. Information exchange among public agencies will result in more efficient and coordinated use of resources and greater traveler safety.

4.1.9. Summary of Needs

The fundamental purpose of Information Exchange is to assure that tourists, freight carriers, residents using the Corridor for local travel and other travelers and public agencies are equipped with accurate and timely knowledge upon which informed decisions are made. The information needs of Corridor travelers, documented in TM # 1, include pre-trip, en-route and arrival information regarding specific travel destinations as well as changing travel conditions. ITS components in the Corridor states have been identified and include existing and planned/programmed deployments. ITS data were collected and documented through state databases, one-on-one on-site meetings with ITS Coordinators, and GIS mapping of deployed and programmed/planned ITI. Institutional coordination and communication will be essential for seamless provision of information to travelers.

4.1.10. Recommendations

As a result of the findings and information exchange needs discussed above, several preliminary recommendations should be considered. The list is by no means exclusive.

- The type of information exchanged via the national information number, 511, should be significantly broadened within the limits of each state's statutes and policies. For example, travelers should be able to obtain tourism and concierge services similar to Travel Shenandoah (I-81 in Virginia).

- Protocols for assuring that Corridor information is compatible and *seamless* among the CANAMEX states should be developed. For example, Montana's 511 message does not cease at the state line; rather, it offers the traveler the option of directly reaching 511 systems of South Dakota, North Dakota, Idaho, and Wyoming. It is available for travelers crossing state lines so that, from the traveler's perspective, the information provided is seamless.

- State (and other) agencies should consider developing *information exchange* standards and procedures that foster an ongoing working relationship between Departments of Transportation and state/private sector tourism agencies and venues.

- Source, processing and dissemination of useful traveler information through the exchange means should be integrated Corridor wide so as to make the process more efficient, effective and of greatest use for Corridor travelers. TM #3 will expand on this recommendation and provide additional detail.

- Additional and broader deployment of ITS Infrastructure, within the limits of available resources, should be implemented by CANAMEX states to significantly expand coverage for Information Exchange. This will be more fully discussed in TM #3.

- Corridor states without a TMC should establish one either at a fixed location or develop and deploy one or more mobile ones.

- The CANAMEX states should initiate and manage an overall Coordinating Group and establish Working Groups to deal with issues within the Corridor such as in the I-95 Corridor.

- Corridor communications are inconsistent and should be improved though an increased, yet modest, investment in *available* technology, e.g., satellite phones.

4.2. Incident Management

4.2.1. Introduction

An incident is any planned or unplanned event resulting in disruption of normal travel during a particular time and at a specific location along the transportation network.

Figure 15: Roadway Incident

Unplanned incidents occur spontaneously along the transportation network and often threaten the lives of both the public and emergency service providers. However, tourists, long-haul freight carriers and regional residents using the Corridor for everyday travel as well as other Corridor travelers must also be made aware of planned incidents, such as maintenance and construction activities so that they may choose to adjust their travel plans as warranted. These incidents pose more of an inconvenience to travelers and usually do not pose a threat to safety. The focus of Incident Management in TM # 2 is on unplanned incidents.

Most of the CANAMEX Corridor is located in rural areas of the five states. Incident management in any rural area is problematic. Mountainous terrain limits effective cell phone coverage to urban areas; very few rural highways enjoy any coverage at all. In fact, large areas of the Corridor are without wireless coverage. Frequently, motorists reporting accidents or other unplanned incidents requiring emergency response do not know their own location. Moreover, once an incident is located, responders need much more time to reach the scene than their urban counterparts due to the remoteness of rural sections of the Corridor. Preliminary research by WTI indicates that the time to learn of an accident is two to three times longer where no wireless coverage exists. The response times in remote sections of the Corridor often are measured in hours rather than minutes.

Among the travel and tourism information needs, according to current stakeholders, are: travel safety advisories, availability of real time information, personal safety, en-route incidents and en-route construction and maintenance. Section 2.2 identified two objectives of the Corridor study as related to traveler safety:

- Provide travelers with the safest travel experience possible within the limits of available technology and resources, and
- Identify incident management and other operational practices within the Corridor and recommend alternative concepts for their improvement, including new and upgraded telematics, protocols and procedures.

4.2.2. Analysis of Current Incident Management Practice

This section will describe current Incident Management practices in the Corridor states, as well as challenges identified through interviews with local Incident Management officials.

4.2.2.1. Statewide Incident Management

Statewide Incident Management plans are a key part of improving the overall management of incidents on rural (and urban) roadways in the Corridor. The Arizona Plan was developed with “partner response agencies,” because most [rural] incidents are managed at the local level, primarily counties and towns. Idaho’s Plan, in addition to facilitating Incident Management on state highways, “serves as a guide for county and local plans to follow…” “The Plan is designed for use for state or local transportation incidents.” For the most part, Incident Management on state roadways is well planned,

funded and executed. Traffic control at incident sites usually is in accordance with Manual of Uniform Traffic Control Devices standards.

4.2.2.2. Regional Incident Management

A great deal of information was collected with respect to how Incident Management is currently carried out on regional and local roadways. In addition to a comprehensive search of the literature, including national conference proceedings, on-site personal interviews were conducted with a number of incident commanders and other responders in Montana and Idaho.

Despite being under funded, local incident managers are collaborative, well trained and very creative when it comes to making the most out of limited resources. However, the interviews indicate there are numerous opportunities for improvement, most at little cost, including: designation of alternative routing when feasible, vastly improved traffic control at incident sites and investment in better communications systems—notably satellite phones.

4.2.2.3. Coordination

Coordination of resources, policies and practices among the CANAMEX Corridor states is essential if tourists and other travelers are to receive the maximum safety benefits. In other words, the practice of Incident Management must be seamless. At present there are some state and local agreements in place; however, they sometimes are undocumented and informal.

As mentioned in Section 4.2, Information Exchange, successful Incident Management depends upon a great deal of coordination and cooperation among the CANAMEX states [and local agencies]…. The states' policies, practices, regulations vary with respect to providing motorists with information they need to make informed decisions about where they wish to travel and how to arrive there safely. ADOT has facilitated this process by initiating meetings, funding Incident Management workshops and developing local agreements for Incident Managing related issues.

The following scenario illustrates the importance and potential of communication and coordination.

Jeff Rogers had been Fire Marshall of Mountain County for fifteen years. He was looking forward to getting home a little early this day as it was snowing heavily and he wanted to plow his driveway before it became too dark. The telephone rang in his office just as he was reaching for his parka. Sheriff Tom Evans was on the phone; he seemed very tense. Jeff thought this was odd as Tom was a very solid, even quiet, law enforcement officer who had been through a number of stressful events and never showed any signs of being upset. This time was different.

Without the usual exchange of pleasantries, Tom told Jeff that there had been a very serious accident involving a large truck and a car at the intersection of Conifer Road and State Highway 17. One of his deputies had come upon the scene and radioed in the news that there was one fatality, four seriously injured people, and that the intersection was completely blocked by the wreckage. Two of the injured were trapped in the car and he

needed lots of help fast. He also said there were no hazardous materials involved; at least the deputy had seen no placard.

He asked Jeff to activate the County emergency response plan that would involve alerting the one paramedic at the firehouse and calling in the County's other three volunteer emergency medical personnel. In the meantime Tom had called the area Highway Patrol office and requested that Lt. Shagnasty send officers to assist with traffic control. The Lieutenant responded that none of his officers were anywhere near the scene and that the closest unit could not get there for at least 45 minutes. Tom already had summoned his patrol forces, but they would not be able to handle the situation alone because State Highway 17 carried fairly heavy traffic as employees of the Hewitt plant headed home at the end of the day. As the wreck was only a couple of miles from the Bear Rock County line, he hoped that Sheriff Winblat, a good friend, would make some of his officers available under the terms of their recently signed Intergovernmental Agreement. When Tom radioed his colleague, he was pleased to learn that at least two Bear Rock deputies would be on-scene in less than five minutes.

Tom knew that the magnitude of the crash, as described by his deputy, would mean he would also need help from the County's Highway Department and perhaps from the State Maintenance Yard a few miles away. Tom called both agencies and was assured that both agencies' forces would get underway immediately. He was particularly thankful for that because he knew their men and women were having a hard time keeping up with the accumulating snow. He also called the only towing and recovery service with the capability of handling such a large truck. The large vehicle was a hundred miles away and he could not afford to wait until he arrived before making the call. Delay would mean that the wreckage would remain "between the white lines" longer than necessary, thus increasing the probability of secondary collisions.

Tom arrived at the scene of the accident. What a mess! It was even worse than his deputy had described. One of the injured had died about ten minutes prior to his arrival. His deputy appeared about to "lose it." Tom immediately went to him and explained that other emergency responders should arrive very soon. He reflected how wise it had been to arrange for on-call services of a psychologist in the City Hospital. Twice before counseling services had been very effective in helping his officers after they had dealt with particularly emotional circumstances. As a matter of fact the County made counseling services available to any responder, regardless of responsibility or organization.

Soon Tom heard sirens and knew that medical help was on the way. The private ambulance service retained by the County arrived at about the same time as the fire vehicles. As the ranking official on the scene, Tom had initially acted as the de facto Incident Commander. He was surprised to see Jeff emerge from the first truck. As soon as Tom went over the situation with him, Jeff assumed the role of Incident Commander. Without hesitation he instructed the paramedics to begin triaging the victims. Simultaneously, other volunteers started using the "jaws" to extricate victims and enable the medical people to treat them.

Wireless communications were always problematic in the County due to the mountains for which the County was named. The "satphones," as they were called, had solved the

problem. Now, virtually any responder could be contacted. In addition, tracking and communicating with twenty-four emergency vehicles was easier now that they had been equipped with AVL systems.

State highway crews arrived and immediately began clearing the smaller stuff away. Jeff asked them to stand by and be prepared to apply sand to the minor oil spill. He was surprised, but pleased, to see the arrival of the large wrecker so soon. Immediately he asked the driver to assess the scene and give him an estimate of the time it would take to remove the wreckage so that normal traffic could be restored.

Meanwhile, rather than call the County Coroner to officially pronounce death (which would have delayed clearing the scene for hours while he could be located and travel), he asked the lead paramedic to transmit vital information to the Coroner for confirmation that the victims were indeed dead. Because the State Legislature had enacted the necessary laws, the lead paramedic had officially been designated Deputy Coroner and was able to pronounce death, thus saving hours.

Jeff had the foresight to send a state maintenance vehicle down the shoulder and be positioned at the end of the queue of oncoming traffic to alert approaching drivers that traffic was stopped. He also requested that the state's HAR system, 511 and the County website carry updated information about the accident so as to reduce the flow of traffic toward the scene and facilitate drivers' ability to choose alternative routing.

As soon as the victims had been treated and transported and the wreckage had been removed, maintenance workers cleaned up the area and normal traffic was restored.

As Tom was about to leave, Jeff came over and thanked him for all his help. They shook hands and as Tom headed home, he thought about how well the County plan had worked and he actually looked forward to the debriefing that all responders would have in the morning.

4.2.3. Traveler Benefits

Enhanced Incident Management practices throughout the Corridor offer enormous benefits to tourists, freight carriers, and other travelers (such as local residents using it to travel in the region) and public agencies. Most important is that lives may be saved and pain and suffering reduced. Travel delay would be reduced significantly. Availability and notice of alternative routing around incidents offers travelers a choice of whether to continue their journey or "wait it out." Exposure to litigation against public agencies could be minimized. Responder safety would be greatly improved.

4.2.4. Summary of Needs

Few Corridor functions, if any, are of greater importance than Incident Management. When it is performed "right," it is a significant enhancement to traveler safety. When it is done "wrong" the results can be disastrous, as evidenced by the increasing number of deaths and injuries of law enforcement officers as well as other responders, at incident scenes. In addition, there is a growing number of wrongful death lawsuits filed against incident commanders and government agencies alleging mismanagement of incident sites.

Particularly at the local level, current Incident Management practices are sometimes fraught with correctable problems, such as inadequate communication, inadequate training, traffic control and inattention to passing traffic. State Incident Management, on the other hand, generally is well organized, and adequate resources exist within the Corridor.

Cooperation and communication are critical to the successful practice of Incident Management. Corridor travelers and responding organizations benefit from effective Incident Management. Incident Management needs were described in the 2001 CANAMEX Corridor Plan as:

- The need to provide expanded traffic and Incident Management and information functions for rural corridors . . .

4.2.5. Recommendations

Personal interviews with Incident Commanders and other emergency responders disclosed several IM practices that could be implemented with little, or no, capital investment. The fact that Incident Management is focused at the regional and local area is underscored by the following recommendations. They are not all-inclusive nor do they pertain to each locality, or to every CANAMEX state. Rather, they are a compilation of results of the interviews and the literature search.

- Corridor states without a Statewide Incident Management Plan should develop one. Proactive and frequent interagency Incident Response training should be realistic and apropos to situations usually encountered by first responders. In addition, each state should partner with local responders to increase coordination and provide training when warranted.

- DOTs and other emergency responders usually are aware of a number of rural accident "hot spots." A formal effort should be made to determine alternate roadways for re-routing traffic. Traveler safety and convenience would benefit.

- Agreements among agencies should usually be formal and documented to minimize exposure to litigation.

- States and other levels of local government should draft and enact legislation that "holds harmless" emergency responders, absent gross negligence and/or willful misconduct, thus protecting them from litigation as a result of their on-scene actions.

- All maintenance and operating staff as well as emergency responders should receive training in how to set up traffic control zones in accordance with the Manual of Uniform Traffic Control Devices.

- Governments at all levels should consider allocating additional resources to agencies practicing Incident Management.

- State Departments of Transportation should insist on being "equal partners" in the management of incidents, particularly due to their substantial resources and geographic dispersion of personnel and equipment.

- Where laws permit, government agencies may want to consider appointment of "Deputy Coroners" who can pronounce death, thus significantly accelerating clearance of the scene and reestablishment of normal traffic flow.
- Personal Digital Assistants (PDA) should be purchased to record and later download incident specifics; the result will be quicker clearance and reestablishment of traffic flow.
- Post-incident debriefings of incident management to determine what actions, if taken, might be improved (lessons learned) should be conducted after major incidents.
- Professional counseling for responders, after severe traumatic exposure, should be made available to minimize stress.
- Develop mechanisms for exchanging "lessons learned."

4.3. Telecommunication and Telematics

4.3.1. Introduction

Section 4.1, Information Exchange, and Section 4.2, Incident Management, each underscore the importance of telecommunications and telematics. Telecommunications is the science and technology of transmitting information over great distances in the form of electromagnetic signals. Telematics is the science of long-distance transmission of computerized information; in other words it is the intersection of telecommunications and computing. Telecommunications facilitates the effectiveness of telematics. Both terms are used throughout TM # 2; however, the use of telematics is prevalent as it is the more encompassing term.

As mentioned in earlier Sections of TM # 2, the importance of telematics throughout the Corridor cannot be overstated. It is the foundation upon which rests the entire concept of information exchange. Moreover, the primary objectives of enhancing safety and convenience of tourists, freight carriers, local residents and other Corridor travelers cannot be attained without a robust applied telematics system.

TM # 1 highlighted travel and tourism needs as expressed by tourism agencies and individuals as part of Traveler and Tourism Outreach. Among them are:

- Information regarding facility use, regionalized tourism information,
- Pre-trip information delivery, en-route information delivery,
- Information about congestion and parking [at tourism venues],
- Rules and regulations [at venues],
- Access to public lands, and
- The ability to obtain real-time information.
- Public / Private Partnerships
- Availability of technological devices
- Provision of information directly to travelers and other institutional information

outlets

The ability of agencies to be responsive to these expressed needs is entirely dependent on telematics.

In meeting the needs of the traveler it is important to recognize that the information with which they are provided should (1) address the various trip stages (pre-trip, along-the-way, approaching destination, and destination area) thus allowing travelers to make informed decisions regarding routes, travel modes, tourism attractions or services desired; and (2) do so in an accessible and timely (current and forecasted) way.

4.3.2. Wireline and Wireless Communications

Table 4 shows several ITI components by which tourists and other travelers can access information whether the communication medium is wire line and/or wireless.

Table 4: ITI Information Media

Information Exchange ITI	Wire Line	Wireless
HAR		X
511	X	X
HCRS	X	X
Cell Phones		X
Kiosk	X	
Satellite Phones		X
In-Vehicle Systems		X
Ad Hoc Vehicle Network		X
Laptop Computers	X	X
Remote Access Computer Terminals	X	X

The importance of HAR, 511, HCRS, DMS, RWIS, Cellular and Satellite phones, CCTV, in-pavement sensors, DSRC, Laptop computers and PDAs as critical Information Exchange components already has been discussed. However, other components (italicized) in Table 4 warrant elaboration.

In-Vehicle Navigation and Communication Systems: In recent years, more and more vehicle manufacturers are including in-vehicle navigation and communication systems in new autos.

Millions of these vehicles are in use today and their number is anticipated to grow at a greater rate. Moreover, their cost to consumers has dropped approximately 50 percent over the last two years. Notwithstanding their decreasing cost, cellphones currently are much less expensive. Some familiar systems are NAVSTAR and ONSTAR. Safety and concierge services (room availability, amenities, restaurants, tourist venues, etc.) are both available to subscribers via satellite communication.

Ad Hoc Vehicle Network: The need for timely and effective dissemination of traveler information in rural areas is underscored by the disproportionately high percentage of traffic accidents and other incidents, exacerbated by the relatively long trip durations and lack of reliable and comprehensive communications infrastructure along the roadways in these areas. Technical and structural approaches that are prevalent in metropolitan areas simply are not feasible for rural settings. Peer-to-peer communications among vehicles and between vehicles and roadside sensors, using recent advances in wireless technologies and ad hoc networking protocols are emerging. An example of an application of ad hoc networking follows.

Roadway sensors along Interstate 90 in the vicinity of Bozeman Pass (MT) detect that the pavement on one of the curves is potentially icing. That information is automatically sent to the Montana Department of Transportation. MDT immediately composes a message to be displayed on a DMS located approximately three miles from the curve and facing

approaching eastbound travelers. The message states: CAUTION - MAY BE ICY- 3 MILES AHEAD. As soon as the message reaches the DMS, a wireless signal from the DMS is sent out. Because of the mountainous terrain surrounding the DMS, the signal range is limited. As a vehicle approaches the DMS, its in-vehicle navigation and communication system receives the signal and activates an audio message or creates a heads-up display for viewing in the vehicle. The vehicle receives the signal and instantly becomes a mobile repeater, transmitting the signal to other vehicles in its range, but outside the range of the DMS. Depending on the terrain, each vehicle with in-vehicle navigation and communication within several miles receives and transmits the signal, thus alerting most travelers in the area to the potential hazard.

4.3.3. Analysis of Existing Communication in the Corridor

Wire line is currently the most pervasive, effective and reliable means by which to communicate within the CANAMEX Corridor. Wireless communication, however, has the potential to become the dominant form over the next decade. Reference to Table 1 shows that wireless communication is the platform for HAR, 511, cellular telephones, satellite phones, in-vehicle navigation and communication systems, Dedicated Short Range Communication and ad hoc vehicle networks. The latter three communication categories are discussed in Section 4.3.1.

HAR transmits either a “canned” travel message or a “tailored” message specific to an unplanned event, roadway or other condition over AM or FM radio frequency. Signal strength, hence range, is limited. 511 messages are available over both wire line and wireless devices; however, the effectiveness of wireless devices may be limited by terrain. Similarly, cell phone coverage, particularly in rural areas of the Corridor, is greatly compromised due to predominantly mountainous geography. Moreover, telecommunications companies are loath to construct repeater towers in rural areas due to their substantial costs in relation to revenues. In addition, local residents often oppose repeater towers due to their ungainly appearance on the landscape. Thus, mountainous terrain and lack of adequate repeater towers combine to make cell phone effectiveness in the Corridor very problematic. There are extensive “gaps” in cell phone coverage.

Satellite phones, on the other hand, are almost one hundred percent effective in virtually any terrain, with the possible exception of canyons. Unfortunately, the initial and service costs are considered expensive; thus their current use in the Corridor is sporadic. Enhanced 911 (E911) allows emergency dispatchers at PSAPs (Public Safety Answering Points) to determine the cell phone number of the caller (in case of disconnects) and the “exact” location from where the call is made. Finally, most CANAMEX states do not enjoy the safety and convenience features of Enhanced 911 (E911).

Currently, the Corridor’s wireless communication focus is primarily use of voice communication, often in emergency situations.

Wire line is the supporting infrastructure for the Highway Closure and Restriction System in Arizona; Dynamic Message Signs in all states; Road Weather Information Systems in all states; Closed Circuit Television in Arizona, Nevada, Utah and Idaho; kiosks in most states; and remote Access Terminals in all states. It is the medium most often used for interstate communication among Corridor TMCs, between travelers and the Internet,

intrastate communication among public agencies, travelers and public agencies, and between travelers and private sector venues.

4.3.4. Telematics Trends and Emerging Technology

On April 30, 2003 WTI invited representatives from several private sector telematics companies to join MSU faculty, WTI investigators and ITS Coordinators at a telematics seminar in Salt Lake City, Utah. Representatives of QUALCOM and Telcordia attended. The purpose of the seminar was to discuss current telematics applications and to explore potential emerging technologies that might have application in the CANAMEX Corridor, thus greatly enhancing the availability of safety and tourism-related information. Table 5 shows the seminar attendance.

Table 5: Communications Seminar Participants

Participants	Position	Organization
Marcus Pang	Research Engineer	Telcordia
Dan Nopar	Manager, Business Development	QUALCOM
Richard Wolff	Gilhousen Telecommunications Chair	Montana State University
Dian Williams	Program Specialist	UDOT
John Taylor	Deputy Director	WTI
Pat Wright	Senior Research Engineer	WTI
Scott Lee	Student Research Engineer	WTI
Richard Manser	ITS Coordinator	UDOT
Bob Koeberlein	ITS Coordinator	ITD
Tim Wolfe	ITS Coordinator	ADOT

Industry representatives agreed that wireless telematics would be pervasive throughout the Corridor in five to ten years. Vehicles with in-vehicle navigation and communication systems are seen as information portals. For the most part, limitations of existing wireless coverage will be overcome; Internet protocols will be ubiquitous.

CANAMEX states are in various stages of developing and implementing wire line E911. For example, Montana has just recently begun installing the system in one region (Gallatin County). On the other hand, Arizona and Utah have E911 available in numerous areas of each state.

The Federal Communications Commission has mandated that by 2005, all cell phone manufacturers' products must be in compliance with provisions of E911, i.e., automatically identify the number from which the call is placed and determine the location of the caller without any further action on the part of the caller. This may be accomplished by either of two methods: callers' cell phones can be located either by terrestrial triangulation or by satellite.

There is little doubt that when wireless E911 is fully implemented, Corridor travelers will enjoy virtually uninterrupted cell phone communication and have a safer and more convenient travel experience.

The Montana State University (MSU) Department of Electrical and Computer Engineering and the Western Transportation Institute (WTI) have recently been awarded a National Science Foundation/U.S. Department of Transportation grant to conduct basic research in the application of ad hoc networking to a rural roadway environment. This is the first application of ad hoc networking to serve as a basis for enhanced safety in a rural environment.

Phase 1 will address short-range, line-of-sight communications techniques where propagation factors such as terrain and weather will have modest impact. The innovation in the work will be in integrating and work in other domains to fit the particular needs of the rural environment.

An extensive survey of existing technologies will be investigated to determine their applicability to the rural ad hoc network. Emerging protocols will be examined regarding their applicability to this particular problem, and adaptations will be considered to optimize performance under the constraints imposed by the rural, sparse node environment.

The second phase of the grant (not yet awarded) is to plan a field trial that could be conducted in cooperation with members of the CANAMEX coalition. It is not proposed to carry out the trial under this project, but support will be sought from the CANAMEX Coalition and other sources for the trial. The trial will validate the concept and the system model. The CANAMEX Corridor is well suited for rural, ad hoc networking, as there are large geographic domains, even along the major Interstate routes, that are not served by conventional cellular systems. Furthermore, the CAMAMEX Corridor is a broad band that includes many secondary roads in sparsely populated mountainous areas where RF coverage is non-existent. There exists a keen interest in alternative methods of achieving communications coverage due to the lack of adequate conventional coverage in this region.

4.3.5. Future Communication in the Corridor

TM # 1, Section 7.2.3, introduced the concept of the Visitor Gateway/Clearinghouse. This concept will function as a Data Warehouse (CT Main in the 2001 Corridor Plan) for receiving, processing and disseminating Corridor information. Dissemination of tourism and safety information will be through a new Internet-based CANAMEX website. All CANAMEX TMCs will provide both stored and real-time data and, upon processing, will provide a seamless resource for Corridor travelers. Public agencies at all levels of government, private sector venues and travelers themselves will be able to, directly or indirectly, provide information to TMCs, where it will be processed and made available through myriad ITI outlets, such as DMSs, the Internet, HAR, kiosks and other ITI devices described earlier.

The FCC has mandated that all telecommunication companies assure their products can support wireless E911 by 2005. Satellite telephones, as costs drop and business models

are adjusted, will proliferate in the market and wireless E911, accessible through satellite phones, will gradually replace many of today's cell phones. Thus, Corridor travelers will benefit greatly with regard to their safety and ready access to tourism and related venues. In addition to reporting incidents that can be immediately and accurately located, tourists will be able to obtain "concierge" services en-route to their destinations. For example, availability of accommodations, prices, directions to venues, amenities, rules and regulation, parking, etc. will be available on demand.

Ad hoc networking has been the subject of research for several years. Currently, its primary application is in the military. For example, in operation Desert Storm individual soldiers carried equipment that could automatically relay their GPS position to other friendly combatants in the area. This made possible the avoidance of "friendly fire" incidents. The application of ad hoc networking in remote rural areas such as the CANAMEX Corridor will enable vehicles to passively receive critical information not only from ITI devices, but also from other vehicles in the area because every vehicle in the area acts as a mobile repeater. Messages will be received either as "heads-up" displays or as audio messages.

The following scenarios illustrate the benefits of emerging technology and its application in rural portions of the Corridor.

1.) Three days ago, Dick and Jane were traveling north on Interstate 15 with their children; Jane was driving their new Ford sedan. Without warning, the large truck in front of them suddenly applied its brakes and began swerving from lane to lane. Try as she did, Jane was unable to stop the car and grazed the out-of-control truck with the driver's side front door. Within seconds the dust settled; Dick and Jane were able to see that the truck had struck a passenger vehicle and that several people were injured, some seriously.

Before exiting the car, Dick called 911 on their satellite telephone. He explained what had occurred to the dispatcher, but apologized that he had no idea of their location. The dispatcher assured him that she was aware of his exact location. As soon as she had notified emergency service responders, the dispatcher typed the nature and location of the incident into her computer. Simultaneously the information was automatically forwarded to all other Corridor TMCs and to the Corridor Clearinghouse where it was reviewed by supervisor Ron Gibbons. After quickly reviewing the message and scanning the real-time status board for major roadways in the Corridor, Ron transmitted the signal to a DMS located about a quarter of a mile south of the crash.

The DMS immediately displayed the message Ron had sent. It also began transmitting a short-range wireless signal carrying the same message to any vehicle receiver with line-of-site connection. Jim and his wife Mary Kaye were alone in their Hummer when he first saw the DMS. He immediately slowed and cautiously approached the scene. They knew they were going to be delayed for a while, as the roadway was completely impassible due to the wreckage. Jim wished they had known about the wreck earlier as they could have exited and chosen alternative routing.

Three miles behind the Kayes, Al Benton noticed he was within a mile of an exit. Suddenly, an automated voice announcement spoke the exact message displayed on the

DMS. Al didn't know it, but the mobile repeater embedded in the vehicle two miles ahead of him, which he could not see, had relayed the message to him. Al slowed and gradually stopped on the shoulder of the roadway where he contacted, through the computerized communication system in his vehicle, the concierge service offered free of charge by AAA. He queried the service for alternative routing around the wreck; within a minute or two the system displayed the most viable route. It involved exiting at the interchange a mile or so ahead and taking County Road 7 to the next exit where he could reenter the Interstate route.

In the meantime Dick knew they had to have a mechanic look over their damaged car before they traveled much further. He and Jane also subscribed to the AAA concierge service. He simply requested the location of, and directions to, the nearest Ford Dealer. Within seconds he was offered two choices, one of which was only ten miles away. Managers at TMCs in abutting states decided to compose an appropriate message and to display it on selected DMSs.

2.) A Federal Express truck traveling south on Interstate 15 is equipped with advanced sensors that mitigate wheel slippage on icy roads. As the truck crosses an icy spot, the sensors detect and prevent slippage. The sensors also notify the on-board computer, which makes a note of the problem including the time and GPS location. A few miles up the road, the truck's computer senses a DSRC Wi-Fi hot spot and uploads the information. The computer at the hot spot stores the information for notification to other vehicles, and also forwards the information to the regional TMC. The TMC notifies the Department of Transportation field maintenance office of the problem; the DOT responds to deice the roadway.

Clearly, full deployment of ITI in the Corridor will have a major impact on safer and more convenient travel.

4.3.6. Potential Telematics Issues

There are a number of issues that surround continued enhancements to, and implementation of, telematics in the Corridor. They may prove to become factors that limit the potential success of future Corridor communication improvements. Among them are:

Capital Costs

Capital costs will be incurred to establish the new CANAMEX website, and to purchase and install new ITI components, E911 equipment and satellite phones. Manufacturers' costs to provide additional hardware and software may be substantial. However, their business models will drive private sector investments. The consumer market currently is not well defined. Even though the private sector will invest "up-front," the magnitude of that investment will depend on the ability to produce an acceptable positive return on the investment. Consumers will have to be made aware of the availability of new telecommunications systems; hence, marketing costs will be a factor in business decisions. Consumers will also bear the cost of ITI components such as satellite phones and in-vehicle systems. Ultimately they also will incur manufacturers' costs as they are passed along. Public sector investment in E911 systems may be substantial. On the other

hand, significant benefits to travelers and other people within the Corridor will accrue. For example, better telematics will result in fewer injuries (and deaths) from crashes. In addition, benefits will be attained as a result of reduced insurance costs, a reduction in lost employment hours and a host of immeasurable more personal benefits, e.g., reduced driving stress. Finally, as the private sector realizes that Corridor Telematics are resulting in greater economic activity, they likely will adjust their business models thus, enabling them to share their revenues in further Corridor development because of improved access to additional distribution channels for their products. In any event, a determined effort needs to be made jointly by the public and private sectors to define innovative partnerships that will generate additional funds commensurate with increased incremental values transferred between the sectors. Costs are discussed in depth in TM #3.

Operating and Maintenance Costs

The cost of operating and maintaining telecommunication systems is an important factor in decisions to acquire ITI, particularly in government agencies. For example, the annual cost of operating and maintaining an overhead DMS in a rural area can be a substantial addition to agencies' already strained budgets. On more than one occasion some CANAMEX states have indicated their reason for not adding DMS to their ITI was the perceived O & M costs. In addition, CANAMEX states will need to agree on shared costs to operate and maintain the recommended CANAMEX website. Offsetting these concerns are the above benefits to Corridor travelers and to the Corridor economy.

Private Sector Participation

In addition to the above cost observations, revenues derived from private sector tourism venues will be an important source of funding for the project such as the CANAMEX website. It is likely that, at first, campgrounds, restaurants, and owners of other important Corridor conveniences will be reluctant to invest advertising dollars to become part of information exchange on the website until it can be demonstrated that they will receive a reasonable "bang for the buck."

Consumer Awareness & Acceptance

As in the past, consumers have been slow to purchase new technology until its capabilities have been proven and its added value has been demonstrated. For example, cell phones have been available for many years. At first they were very expensive and extremely awkward to dial and hold. It has only been in the last five years or so that they have become so common. Most likely their universal acceptance has resulted from drastic reductions in cost and exceptional technological improvements. Several telecommunications companies offer free phones and charge only a nominal monthly fee. Moreover, consumers may now obtain access to the Internet, receive text messages and send digital photos. Substantial numbers of vehicles (twenty percent for General Motors) "coming off the line" now are equipped with in-vehicle navigation and communication systems, which are critical for ad hoc networking and access to satellite based safety and concierge services in the Corridor. Nonetheless, notwithstanding manufacturer's predictions for use of these systems only a small fraction of consumers has purchased these services, even though the capital cost has been considered in the cost of the vehicle.

A growing percentage of automobile travel is by older drivers. It is arguable that a portion of seniors will be reluctant to purchase available services due to their perception that the systems are too complex for them to use, mistrust of new technology, its cost or because they are perceived as unnecessary.

Business Models

At the telematics seminar in Salt Lake City, public private partnerships were discussed extensively. It was suggested that private sector companies might be amenable to providing real-time and stored tourism information to the Visitor Gateway/Clearinghouse, at no or little cost, if public agencies were to provide traditional data, at no cost, to their private sector partners. The general sense of the ITS Coordinators was that such an arrangement would be unlikely to succeed, due to statutes and policies restricting giving away information, the collection and processing of which had been funded with tax dollars.

Benefits to Travelers and Other Stakeholders

There will be numerous beneficiaries of new telematics technologies. First and foremost will be Corridor travelers. As suggested by several scenarios in previous sections, great amounts of time will be saved in reporting, locating and responding to incidents. The results will be lives saved, substantially reduced pain and suffering and an enormous reduction of time lost by Corridor travelers waiting for roadways to be re-opened or unrestricted after incidents. Moreover, Corridor travelers will have seamless and immediate wireless access to tourism venues where they can receive information about amenities, availability of accommodations, costs, destination weather, en-route travel conditions, directions, parking and much more. Tourism venues will experience greater use as a result of much improved safety and convenience throughout the Corridor. Subsequently, employment opportunities within the Corridor will be much greater as the overall Corridor economy grows as a result of increased tourism expenditures.

All levels of government will benefit through much earlier, efficient and effective deployment of their resources and increased tax revenues. Seamless information exchange will greatly benefit each state's TMCs and other operational responsibilities.

By definition, private sector manufacturers will benefit in terms of increased sales and services, as their businesses would not be participating if their business models did not show an improved bottom line.

4.3.7. Summary of Needs

Telematics is the foundation upon which rests the entire concept of information exchange and, specifically, Incident Management. The CANAMEX Corridor needs a robust telematics system to meet the needs not only of tourists, but of all travelers (including local residents) using the Corridor on a day-to-day basis. It does not yet have one.

Tourism Outreach (TM # 1) to tourism organizations and individuals resulted in the determination of numerous travel and safety needs, all of which depend upon a well-conceived and functioning telematics system that includes emerging technologies.

Existing telematics in the Corridor are primarily wire line; wireless communication within and among the CANAMEX states is very problematic in rural areas due, for the most part, to mountainous terrain and inadequate funding. Cell phone coverage is exceptionally poor and non-existent in much of the Corridor.

However, new telematics technologies are emerging from the development and testing stage. These technologies will supplement and replace the existing systems. Use of satellite phones, ad hoc networking, in-vehicle navigation and communication, are either available now or will be in the next five to ten years. Wireless Internet access to in-vehicle and portable communication devices already exists, as do satellite phones. The rate at which these technologies continue to be developed and to proliferate in the communications market is dependent on: telecommunications companies' business models, capital and operating costs, acceptance of opportunities for government and the private sector to partner and otherwise "share" costs, public acceptance and innovation by the telematics companies.

As improved telematics find their way into increasing use by consumers, Corridor travelers' safety and availability of real-time access to tourism venues will be greatly improved. Communication needs were described in the 2001 CANAMEX Corridor Plan as:

- The need to unify interface and communication standards . . . along with sharing of information . . .

4.3.8. Recommendations

- Cell phone coverage in the Corridor is "spotty" at best and non-existent in many rural areas. A project should be undertaken to determine the limits and quality of current coverage to serve as a baseline from which the increased utility of, e.g., satellite phones, can be measured.

- Additional funds should be allocated to capital, operating and maintenance costs for improving communication components of ITS.

- CANAMEX states' *policies and statutes* that may constrain the allocation of funds for improving telematics, and entering into partnerships with the private sector, should be modified. For example, Montana state law prohibits advertising within the right-of-way. MDT's Legal Counsel has determined that providing wireless information about the availability of private sector services is advertising hence, not permitted.

5. NEXT STEPS

Technical Memorandum # 2 has described existing and future Corridor Operations in terms of the importance of Information Exchange between Corridor users and organizations and how it can be improved; Incident Management as it currently is practiced and opportunities for its improvement; and the importance of existing and future telematics relative to efficient, effective and useful communications in the CANAMEX Corridor. It has built upon and is responsive to expressed priority needs as determined by travelers and tourism organizations. The content and recommendations of TM # 2 and TM # 1 will be direct input to TM # 3, which will develop a recommended multi-year capital program, its Life Cycle Cost and a schedule for implementation when sufficient resources become available.

Each of these sections contains recommendations that, if implemented, will achieve the goals and objectives of the Smart Tourist Corridor. Among them are:

- Aggressively pursue new federal funding with which to underwrite development and deployment of additional ITS components,
- Act on a proposal to determine the limits of existing cell phone coverage in and near the Corridor,
- Encourage emergency responders to adopt and implement the many recommendations, and
- Either independently or as the Coalition, institutionalize a multi state culture of seamless operations.

6. REFERENCES

Manual of Uniform Traffic Control Devices
Incident Management Response Guide
IDT Incident Management Plan
ADOT Incident Management Plan
NSF/USDOT Partnership for Exploratory Research - ICSST: Timely and Effective Dissemination of Traveler Information in Rural Areas
Proceedings of the National Conference on Traffic Incident Management

7. APPENDIX A: RECOMMENDED ACTIONS

Information Exchange

- The type of information exchanged via the national information number, 511, should be significantly broadened within the limits of each state's statutes and policies. For example, travelers should be able to report information, obtain tourism and similar concierge services as are being considered by Arizona.

- Protocols for assuring that Corridor information is compatible and seamless among the CANAMEX states should be developed. For example, a state's 511 message should not cease at the state line; rather, its message and those of abutting states should both be available for travelers crossing jurisdictions so that, from the travelers' perspective, the information provided is seamless.

- State (and other) agencies should develop information exchange procedures that foster an ongoing working relationship between Departments of Transportation and state / private sector tourism agencies.

- Source, processing and dissemination of traveler information through the exchange methods should be integrated so as to make the process more efficient, effective and of greatest use for Corridor travelers.

- Additional and broader deployment of ITS Infrastructure, within the limits of available resources, should be implemented by CANAMEX states to significantly expand coverage for Information Exchange.

- Corridor states without a TMC should establish one at a specific location or develop and deploy one or more mobile Centers.

- Corridor communications are problematic and should be improved through a increased, yet modest, investment in available technology, e.g., satellite phones.

Incident Management

- Corridor states without a Statewide Incident Management Plan should develop one. Proactive and frequent interagency Incident Response training should be realistic and apropos to situations usually encountered by first responders. In addition, each state should partner with local responders to increase coordination and provide training when warranted.

- DOTs and other emergency responders usually are aware of rural accident "hot spots." A formal effort should be made to identify alternate roadways for re-routing traffic. Traveler safety and convenience would benefit.

- Agreements among agencies should be formal and documented thus, limiting exposure to litigation.

- States and other levels of local government should draft and enact legislation that "holds harmless" emergency responders, absent gross negligence and/or willful misconduct, thus protecting them from litigation as a result of their on-scene actions.

- All maintenance and operating staff as well as emergency responders should receive training in how to set up traffic control zones in accordance with the Manual of Uniform Traffic Control Devices.

- Government, at all levels, should allocate additional resources to agencies practicing Incident Management.

- State Departments of Transportation should insist on being "equal partners" in the management of incidents, particularly due to their substantial resources and geographic dispersion of personnel and equipment.

- Where laws permit, government agencies should consider appointment of "Deputy Coroners" who can pronounce death, thus significantly accelerating clearance of the scene and reestablishment of normal traffic flow.

- Personal Digital Assistants (PDA) should be purchased to record, and later download, incident specifics; the result will be quicker clearance and reestablishment of traffic flow.

- Post-incident debriefings of incidents to determine what actions, if taken, might be improved (lessons learned) should be conducted after major incidents.

- Professional counseling for responders after severe traumatic exposure should be available to minimize stress.

- Initiate and manage task forces and working groups to address cross cutting issues.

- Develop mechanisms for exchanging "lessons learned."

Telematics and Telecommunications

- Cell phone coverage in the Corridor is "spotty" at best, and non-existent in rural areas. A project should be undertaken to determine the limits and quality of current coverage.

- Additional funds should be allocated to capital, operating and maintenance costs for improving communication components of ITS.

- CANAMEX states' policies and statutes that may constrain the allocation of funds for improving telematics, and entering into partnerships with the private sector, should be modified.

8. APPENDIX B: TOURISM NEEDS AS DETERMINED BY INERVIEWEES

9. APPENDIX C: ITS COORDINATOR MEETING MINUTES

ITS COORDINATOR MEETING

SALT LAKE CITY AIRPORT

JUNE 25, 2002

The first (kickoff) meeting among WTI staff and State ITS Coordinators took place as indicated above. The meeting began at approximately 1:00 p.m. and ended shortly before 4:00 p.m. (See Tasks 1.3 and 2.5 of the Scope of Services). In attendance were:

Richard Manser, P.E. Utah (representing Martin Knopp)

Bob Koeberlein, P.E. Idaho

Mike Bousliman, Montana

Fred Droes, P.E. Nevada

John Taylor, P.E. WTI

Pat Wright, T.E. WTI

Greg Cross, WTI

Tim Wolfe, P.E. of AZ (was unable to attend due to a family emergency).

The Agenda had been distributed prior to the meeting. In general, the format was followed; however, as expected, some areas were subject to more discussion than others.

Administrative

After brief introductions, administrative matters were discussed. It was noted that the effective date of the WTI – MDT Contract was May 15, 2002. Because some participants were forced to stay in SLC for unreasonably long periods due to airline schedules, the idea of scheduling future meetings earlier in the day was discussed and received favorably. In general, 11:00 am to 12:00 pm seemed to work better. **Action: WTI** will work with its travel agent to determine if more convenient flights can be arranged. It was suggested that future meetings precede CCC meetings by at least two weeks. **Action: WTI** will notify ITS Coordinators well in advance of scheduled CCC meetings and, at the same time, develop a consensus as to whether the meeting should be via teleconference or at SLC. There was no sentiment expressed to select a meeting chairman from among ITS Coordinators; therefore, WTI staff will continue in that role. WTI's reporting and other administrative responsibilities were noted from the Scope. WTI stressed the importance of each ITS Coordinator keeping their state CCC member informed about the project so as to avoid surprises at CCC meetings. Also, a brief summary of the May 25, 2002 CCC meeting was presented. It was agreed that each ITS Coordinator would submit his travel costs to Scott Lee, WTI's Student Aide, at email: subi10@hotmail.com

The Corridor

Discussion pertaining to Corridor definition centered mainly on the importance of including intersecting roadways, potential application of ITS to Homeland Security (at

Sweetgrass, MT and Nogales, AZ), that the fundamental purpose of the project was to enhance the economies of communities (particularly in rural areas) along the Corridor and the fact that tourism is the leading economic indicator of the status of a locale's economy.

Ms. Westphal had requested discussion of Mr. Woog's idea that the spatial definition of the Corridor should be in terms of driving times to various tourist attractions rather than miles. All responded to this concept positively. Also, Ms.Westphal had informed the WTI Principal Investigator that an Oversight Committee was to be formed and it was desired to include an ITS Coordinator. Each Coordinator present indicated willingness to serve on the Committee.

The Corridor Operations Plan was touched upon briefly, but more attention was directed to the subject of "supporting infrastructure." WTI intends to drive the entire Corridor with a state-of-the-art GPS receiver (to be purchased with non-CANAMEX funds), thus gaining the capability of geo-locating any desired Corridor features and presenting them in a GIS format. Each Coordinator present was asked about the status of their state's ability to collect, store and retrieve this type of information now. The response was encouraging and it is likely that coordination among existing databases will not prove problematic.

Information needed by WTI was cited such as: TIPs, Long Range Plans, State ITS Plans, State Incident Management Plans, existing ITS infrastructure, etc. Action: WTI will call each state to schedule data collection visits during July and August. Prior to the call, WTI will compile and forward a list of data collection needs. MT, UT, AZ and NV have all their ITS elements in a GIS format already. ID will have their ITS components geo-located. MDT's ITS Plan is old and currently being updated. NV, UT and AZ have statewide ITS plans. ID does not have any GIS capability at this point.

Accomplishments to date include: development of the Scope of Services, execution of the Contract between WTI and MDT, initiation of a computerized budget and schedule tracking system, initiation of tourism outreach, an outline of the "working document" is nearing completion and the literature search is continuing. Action: WTI will put the Scope of Services in MS Project and send it to all who hold copies of the Scope.

Moving Forward

This section of the Agenda resulted in an expanded discussion of earlier Agenda items. However, it was also explained that the CCC would likely want to collaborate with regard to obtaining *additional* funding to support Corridor improvements via FFY 03-04 appropriations. Requesting "new" money would require identifying and justifying Corridor projects within the five states by mid-February 2003, considerably earlier than had been anticipated when the Scope of Services was written and the Contract executed. **Action: WTI and the ITS Coordinators** will make every effort to define, reach a consensus on, and recommend to the CCC, projects along the Corridor for which additional appropriations may be sought by mid-February 2003.

Next Steps

Action: WTI will prepare draft minutes of the meeting, send them to each ITS Coordinator for review and markup, finalize them and distribute them in accordance with the terms of the Contract. Tourism outreach will continue as determined by WTI staff and the Executive Director. **Note:** Each ITS Coordinator expressed interest in attending selected meetings with their state tourism organizations. As soon as the draft outline of the final document is complete, it will be circulated for review and markup. Writing of the early "context" chapters of the document will begin during July as will collection of existing data needed re: the supporting infrastructure. The next CCC meeting has been confirmed for August 29, 2002 in Butte, MT. **Action: WTI** staff will be prepared to present appropriate and requested information to the Coalition and respond to inquiries. **Action: WTI** will arrange an ITS Coordinators' meeting in early August.

ITS COORDINATORS' MEETING (VIA TELECONFERENCE)

AUGUST 12, 2002 9:00 A.M.

The meeting began at about 9:30 am due to a snafu by QWEST. All ITS Coordinators were present; Pat Wright had a conflict and did not participate.
John began by recapping accomplishments by WTI since the previous "kickoff" meeting in Salt Lake City.
Minutes of that meeting had been prepared and distributed.

- The first Quarterly Report had been prepared and distributed to MDT and FHWA; through an oversight, they had not been sent to the ITS Coordinators. **ACTION:** They will be attached to the same email transmitting these minutes. **(DONE)**

- A preliminary draft of the final document *outline* is complete and is undergoing review at WTI. When it is complete, it will be sent to ITS Coordinators for review and comment.

- Greg Cross explained the status of his outreach efforts to date; he estimated the first round of interviews with tourism organizations would be complete by September 23rd. Montana first round interviews will be complete by August 16th.

- Martin questioned whether Pat Wright still intended to gather field data from a north to south progression; **ACTION**: John will contact Pat and advise re: his game plan. **(DONE)**

- John raised the subject of earmarks, as this had been mentioned at the previous CCC meeting. Although submission of earmarks is six months away, he requested that each ITS Coordinator be thinking about the subject and be prepared to discuss it at the next meeting. He stated that the CANAMEX concept was that the five states would attempt to develop a consensus on a CANAMEX earmark request for upcoming FFY and, in response to Martin's inquiry, stated that a CANAMEX earmark request was in no way intended to preempt any state's individual request for earmarks. Earmarks will be a major agenda item for the next meeting.

- Once there exists consensus on the outline of the CANAMEX document, WTI will begin writing the introductory and context chapters.

- Field data collection will begin in September; WTI has purchased a GPS unit.

- Several documents requested in Pat's August 6th email have been provided; the request was made to forward any remaining information to Pat as soon as possible. **ACTION: ITS Coordinators**

- John mentioned that the need to reach out to WY was on the upcoming CCC meeting agenda. While WY is not a participating CANAMEX state, we need to become aware of their existing, funded and planned ITS infrastructure as it may affect CANAMEX. It will be a CCC decision regarding inclusion of tourism attractions in the project.

- The next meeting of the ITS Coordinators has been scheduled for Tuesday, October 29th at the Salt Lake City Airport. **ACTION: WTI** will determine what flights are available so that the meeting can begin in the morning. **(DONE)**

- WTI will develop a draft agenda and circulate it prior to the meeting. **(PENDING).** The time of the meeting is yet to be determined. **(DONE 10:00 AM)**

ITS Coordinator Meeting

October 29, 2002, Salt Lake City

Attendees:

Fred Droes	Nevada
Martin Knopp	Utah
Mike Bousilman	Montana
Bob Koeberlein	Idaho
Jeanne Westphal	CANAMEX
Steve Albert	Western Transportation Institute
Pat Wright	Western Transportation Institute

The following is a summary of the key meeting discussions and results:

Introduction

Pat Wright introduced the purpose of the meeting and provided an overview of the agenda. John Taylor could not participate in the meeting due to illness.

Project Status

Pat provided an overview of activities since the last meeting:

Initial data collection trips had been made for both the northern and southern portions of the corridor.

Tourism data/meetings have been conducted in Montana and Utah.

Jeanne provided an overview of the CCC meeting of August 29, 2002. Minutes of the meeting were handed out

Jeanne will be representing the CANAMEX Corridor with a presentation at the upcoming Western State Tourism Policy Council meeting.

Jeanne mentioned that the CCC is considering expansion of the committee to include a public land manager's representative. The addition of Wyoming to the CCC is still under consideration.

The next CCC meeting is on November 13, in Salt Lake City. The subsequent meeting will be in February 2003, in Las Vegas.

Preliminary Tourism Results

Steve Albert presented a slide show summary of the tourism data collection. Key discussions and comments included:

Steve handed out the questionnaire that was used in the outreach meetings.

Jeanne stated that we still needed to meet with coalition tourism groups, e.g., MTRI.

Steve handed out a matrix that summarized the results of the meetings for Montana. The matrix showed each organization visited, and their responses to the questions.

Bob suggested that some wildlife organizations should also be contacted, such as the Nature Conservancy and Watchable Wildlife.

Martin Suggested that even though trucking is not the focus of this study, that the trucking organizations should still be contacted as part of the study.

Jeanne mentioned "GeoTourism", a new tourist profile that is the focus of the US Forest Service.

Jeanne mentioned that the Arizona Office of Travel has received a grant to develop virtual tours of scenic roads, and place them on their website.

Mike mentioned that Waterton Park in Canada has a good radio system for tourists.

Jeanne stated she would like to have Steve's presentation done at the CCC meeting in November.

ITS Earmarks

Pat presented the preliminary earmark concepts that were developed by WTI. A handout of the concepts was given to each participant. The earmark descriptions were based on the tourism needs assessment and patterned after the USDOT Infostructure elements. It was mentioned that initial ideas will be voted on by ITS coordinators as well as criteria and weighting. Key discussions and comments included:

Jeanne mentioned that the top 3-4 earmarks will be provided to the CCC for approval and processing.

A discussion of the cellular coverage and the need to collect accurate data was discussed. Based on Pat traveling the corridor coverage was good, but it was requested that more detail analysis be performed

Martin raised the issue it is important to recognize that this will not be the only DOT earmarks and they need to be realistically sized.

It was also discussed that the earmarks will be moved through the political process rather than USDOT solicitation for earmarks.

The preliminary earmarks were organized by data collection, data integration/ processing, data sharing and data dissemination.

The concepts to be voted on are corridor wide and not in a single state. This concept was endorsed by the ITS coordinators because it provides for sharing rather than single state interests.

Steve raised the issue of importance and trade-offs of near-term vs. long-term projects and building political support.

Martin raised the issue of including O&M in the project cost, or consider how to tap into what organizations are doing already.

Martin discussed homeland security, and that we should look for the appropriate opportunities.

Martin suggested the name of CANAMEX Corridor Data Warehouse concept description should be changed from "central" to "networked".

Jean felt that the earmarks should be near-term focused and be more highway (vs. tourism) oriented to build political support. Tourism organization and funding is being impacted by budget cuts and lacks political support.

Martin suggested that cooperative agreements with radio traffic information stations be considered.

Ranking Criteria – Pat provided an overview of the six criteria. Other criteria that the group recommended to include were public/ private partnerships and building political support. All members recognized that weighting was critical and to make sure that the CCC votes on their priority earmark. The weighting for the ranking criteria were as follows:

- Technical feasibility 3,
- Institutional feasibility 8,
- Regional benefit 7,
- Tourism benefit 5,
- O&M 8,
- Cost/ schedule 10,
- Political support 10,
- Public – private partnership 6.

WTI would put the ranking criteria and the concepts in a spreadsheet, and send it to each ITS Coordinator. The ITS Coordinators would then rank each of the earmark concepts, and send back to WTI. The ITS Coordinators agreed to have the rankings back by Monday, November 4. This would give WTI time to prepare the presentation to the CCC on November 13.

Closing

The next meeting for the ITS Coordinators was not set. However, it was recognized that it would most likely occur before the next CCC meeting in February.

ITS Coordinator Meeting

January 15, 2003, Washington D.C.

Attendees:

Bob Koeberlein	Idaho
Tim Wolfe	Arizona
Martin Knopp	Utah
John Taylor	Western Transportation Institute
Pat Wright	Western Transportation Institute
Greg Cross	Western Transportation Institute
Scott Lee	Western Transportation Institute

The following is a summary of the key meeting discussions and results:

John Taylor introduced the purpose of the meeting and provided an overview of the agenda. The main purpose of the meeting was to discuss the ITS earmark proposal and project status.

John opened the floor to discussion and suggestions in order to improve the earmark for submittal. The following are discussions and comments:

- Tim opened up by saying that 18 million over six years may be light over a six-year period, considering there were five states involved. He felt that the length of the earmark was fine, but there appeared to be a lot of qualification statements. Pat responded that this was more for the CANAMEX people and that it will be used as a building block for final recommendations.

- Bob suggested that the focus be changed to communication infrastructure, especially wireless Pat responded by saying that for all devices a communication plan was going to be included, and that it will be emphasized more in the revised document

- Martin thought that it was good that the data warehouse does not have to be a center. Instead the network can be accessed from any location. In addition he feels that the network/communications discussion should stand out stronger.

- Martin stated that the states along the corridor should not be nervous about this joint earmark, and it should be pointed out that they can still have there own earmarks.

- All three coordinators agreed that the earmark does fit with their states current interests in ITS.

- Martin commented that other funding sources should be examined, such as tourism, economic development, and others.

- It was brought up that it is unknown what is going to happen with the new TEA act, and if changes are going to be made to the existing architecture. For example urban areas focusing on integration and rural areas focusing on deployment.

- Martin suggested that more buzzwords, such as amber alert, be included.
- John felt that our "charge" is ITS, not policy. Martin responded by saying that policy would make it easier to get money from different pots.
- Tim asked if it would be worthwhile to send a draft to FHWA Division Reps for comments.
- Martin explained that if he had to put on his "Fed" hat that there would need to be a better description of the devices going into rural areas, and such buzzwords as rural deployment and urban integration would be good to have. Tim added some other buzzwords, such as NAFTA, security, and CVO.
- Tim brought up the issue that if given the funds, the distribution could become parochial between states, and how do we keep this from happening. Pat responded by saying that distribution should be done on a needs basis,
- John felt that the money should be distributed on a needs basis, but at the same time funds need to be equally distributed so that the states feel that they are getting there fair share.
- Martin suggested that an executive summary be written and made as a stand-alone document. All agreed to this and Pat said that he would add it.
- Tim asked if tourism was really an appropriate title for this document.
- Martin suggested that in the Anticipated Benefits section the benefits for the entire corridor be enhanced. Tim added that we should show some stats on why this corridor is so important. These stats can be accessed from the previous studies.
- Pat asked if the section on Standards and Guidelines needed anything else. John replied that the readers of this section would not know much about architecture. Tim added that the division people would look for this type of information.
- Martin commented that the notion of this document is that we are integrating the states along the corridor and it needs to be shown that information is getting out to the commercial sector in addition to helping the economy.
- Tim suggested that we show why the CANAMEX Corridor is so important for trade. Could make claim that the corridor is the north-south connection.
- Pat asked if anyone felt that there was anything that should not be in the document. Martin questioned the drive for mobile ops. Martin was concerned whether or not the mobile ops would be used or even in the right location when needed.
- Tim explained that there is a push for mobile ops in Arizona, and felt that if CANAMEX bought one, then Arizona would likely buy another. He added that mobile ops would have been a great help with the forest fires they experienced last year.
- Martin suggested that if mobile ops are to be included then it needs to be shown what types of activities and incidents they will be used for, in order to show that they won't be used just a couple of times per year.

- Bob commented that at this time he doesn't see a need for mobile ops in Idaho or Montana.

- Scott showed an example of the style of GIS map that would be used to show the corridor.

- Martin added that there was not a lot of input and contact with other countries (i.e. Canada and Mexico). He felt that it might strengthen our argument if we tie in the other countries and border security. John added that both countries will be represented at the February CCC meeting.

John provided an update on some of the other ongoing project activities. Pat concluded with a summary of everything that was discussed during the meeting. The next meeting for the ITS Coordinators was not set.