

CANAMEX CORRIDOR PLAN WORKING PAPER

**TASK III: TRANSPORTATION STRATEGIES
AND ECONOMIC IMPACT ANALYSIS**

Prepared for

THE CANAMEX CORRIDOR COALITION

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INTRODUCTION

The CANAMEX Corridor Coalition was established by the governors of Arizona, Nevada, Utah, Idaho and Montana. Recognizing the shared challenges and opportunities presented by the region's principle north/south transportation corridor, the governors of these five Western states signed a memorandum of understanding to prepare a corridor plan. The CANAMEX Corridor Plan will be a bold, forward looking document designed to guide strategic transportation and other infrastructure investment. The Plan will aim to enable the five-state region to more fully harness the benefits of a changing national economy. This Task III Working Paper identifies five Initiatives for the Corridor, discusses transportation conditions along the CANAMEX Corridor, identifies transportation and Intelligent Transportation Systems (ITS) strategies for the CANAMEX Corridor, and assesses the economic impact of each of the Initiatives.

Section I, **Executive Summary**, provides a brief summary of the five Initiatives, transportation demands and issues, transportation and ITS strategies, and the results of the economic impact analysis by geographic area and by Initiative.

Section II, **Description of Initiatives**, presents a description, along with background information, for each of the five Initiatives.

Section III, **Transportation Demands and Issues**, analyzes existing conditions and identifies key transportation issues for the CANAMEX Corridor.

Section IV, **Transportation Investment Strategies**, present transportation and ITS strategies for the CANAMEX Corridor, quantifies the investment level required for each strategy, and assess the efficiencies gained as a result of each strategy.

Section V, **Economic Impact of Initiatives**, presents the results of an economic impact analysis of the five Initiatives. The economic impact of each Initiative for each state and for the five-state region are included.

Section I EXECUTIVE SUMMARY

OVERVIEW OF INITIATIVES

The first four initiatives are related to the highway Corridor, and four of the five Initiatives are termed “Bold Initiatives,” because their implementation requires a new level of cooperation among these five states and/or a new multi-state organization that does not currently exist.

Initiative No. 1 – Smart Freight Corridor (Bold)

This initiative would use ITS to provide service information oriented to commercial vehicle operators and motor carriers, either over the Web at strategically located truck stop kiosks, or through in-vehicle systems that may be implemented as a result of public/private partnerships. Examples of information provided include location of rest stops and truck stops, international crossing requirements and hours, locations and facilities for conducting electronic commerce and processing international shipments, agriculture inspection requirements at border crossings, and information on required permits. Real time information including weather conditions, hazardous road conditions, construction delays, highway incidents, lane closures, and congestion delays would also be provided.

Initiative No. 2 – Smart Tourist Corridor (Bold)

The National Parks, National Recreation Areas and State Parks in the CANAMEX states form an obvious critical mass of well-established attractions. Like the natural attractions, Las Vegas is a world class tourism destination that benefits the Corridor by bringing people into the region. With growing demand for tourism products driven by fewer barriers to international travel and rapid regional population increases, the CANAMEX states have an opportunity to develop some new tourism themes and products along the Corridor. The Smart Tourist Corridor Initiative has five elements:

- The use of ITS technology and investment to enhance the safety and quality of the tourist experience.
- Outreach to local tourism and economic development officials to integrate local products into regional marketing programs.
- The development of a new common branding concept.
- The development of new tourism products in support of that branding concept.
- The cooperative marketing campaign in part based upon those products and the concept.

Initiative No. 3 – Telecommunications Access for Rural Areas (Bold)

Due to the many lucrative opportunities in densely populated urban areas and the relatively poor investment to return relationship in sparsely populated smaller towns and rural communities, telecom companies have been slow to provide broadband access to these smaller communities in all of the CANAMEX states. Since the essential infrastructure for economic growth for the early part of the 21st century is telecommunications infrastructure and broadband access and the rural areas are lagging in access, this Bold Initiative has three basic elements:

- Use the state agencies' and other governmental jurisdiction's need for and procurement of telecommunication services to strongly encourage and promote private telecom companies extend broadband service, most likely fiber optic trunk lines, to smaller towns and rural communities.
- Encouraging the deployment of fiber optic and other telecommunications cable lines along the CANAMEX Corridor
- In sparsely populated rural areas, the "last mile" access to advanced telecommunications capability will rely in part on the deployment of Wireless Local Loop (WLL) technology such as Multichannel Multipoint Distribution Service (MMDS) and Local Multipoint Distribution Service (LMDS). The certification of additional WLL carriers as Eligible Telecommunications Carriers (ETCs), per the requirements of the 1996 Telecommunications Act, would accelerate the deployment of WLL technology. The Corridor states should review the status of WLL carriers with the objective of increasing the deployment of wireless technology in rural areas.

Initiative No. 4 – Corridor Highway Improvements

The CANAMEX Corridor states have committed over \$3.8 billion for future highway capacity improvements for the corridor, mostly in urban areas. This *programmed* or *planned* investment along the corridor is estimated to be \$2.27 billion in Arizona, \$368 million in Nevada, \$600 million in Utah, \$341 million in Idaho, and \$234 million in Montana. Many of the *planned* projects require significant funding outside of resources presently available to state agencies.

Initiative No. 5 – Smart Process Partnerships (Bold)

Each of the five CANAMEX states is moving to advance e-commerce and e-government within its own jurisdiction. However, there are some areas where a partnership of the five states would reduce barriers to economic integration, allow each part of CANAMEX region to concentrate on its own strengths, and allow the region to be a more significant player in the global economy. As communications speed and infrastructure improves in the years ahead, the opportunities for Smart Process Partnerships will increase. This initiative advances three ideas initially to facilitate the building of these partnerships. The ideals include:

- The common registration of professionals and the common posting of disciplinary actions and citations against professional license holders.
- The sharing of e-government processes and techniques.

- The development of an interoperable Digital Signature program.

TRANSPORTATION AND ITS STRATEGIES

A complete transportation analysis of highway, freight, rail, port of entry and Intelligent Transportation System (ITS) conditions is presented in Section III. This analysis has identified several common themes, including the following:

- The CANAMEX Corridor is an emerging corridor. As growth continues in the CANAMEX states, there is the potential to support economic development by ensuring that the corridor provides users three key elements – capacity, connectivity and communication.
- The CANAMEX Corridor is a complex network of multi-state movements. With committed improvements in place, there will be sufficient interstate capacity to accommodate future flows. Pinchpoints, however, will occur in major urban areas. There is the need to address urban mobility needs, especially for trucks.
- The CANAMEX Corridor is a connection in many east-west routes. Enhancing connectivity during the planning of improved urban capacity could improve connectivity and encourage use of the CANAMEX Corridor.
- The CANAMEX Corridor serves more out-of-corridor travel (through trips or CANAMEX Region to/from other regions) than just in-corridor travel (strictly between CANAMEX states). Information about conditions ahead and on major cross-routes would enhance the corridor and encourage tourists and trucks to use this Smart corridor.

The evaluation of current and future transportation conditions in the CANAMEX Corridor points to three potential transportation investment strategies that address the need for capacity, connectivity and communication, including highway improvements, especially in urban areas, a tourist-oriented ITS program, and a commercial vehicle ITS program.

Highway Improvements

Based on the highway deficiencies identified in the transportation analysis, projected segment improvements are recommended along the corridor. These alternatives are not meant to dictate a specific route, but merely that additional lane capacity is required to accommodate the projected growth in traffic volumes. Other recommendations are based on upgrading the CANAMEX Corridor to stated minimum criteria.

ITS Strategies

The CANAMEX Corridor ITS projects revolve around three primary elements:

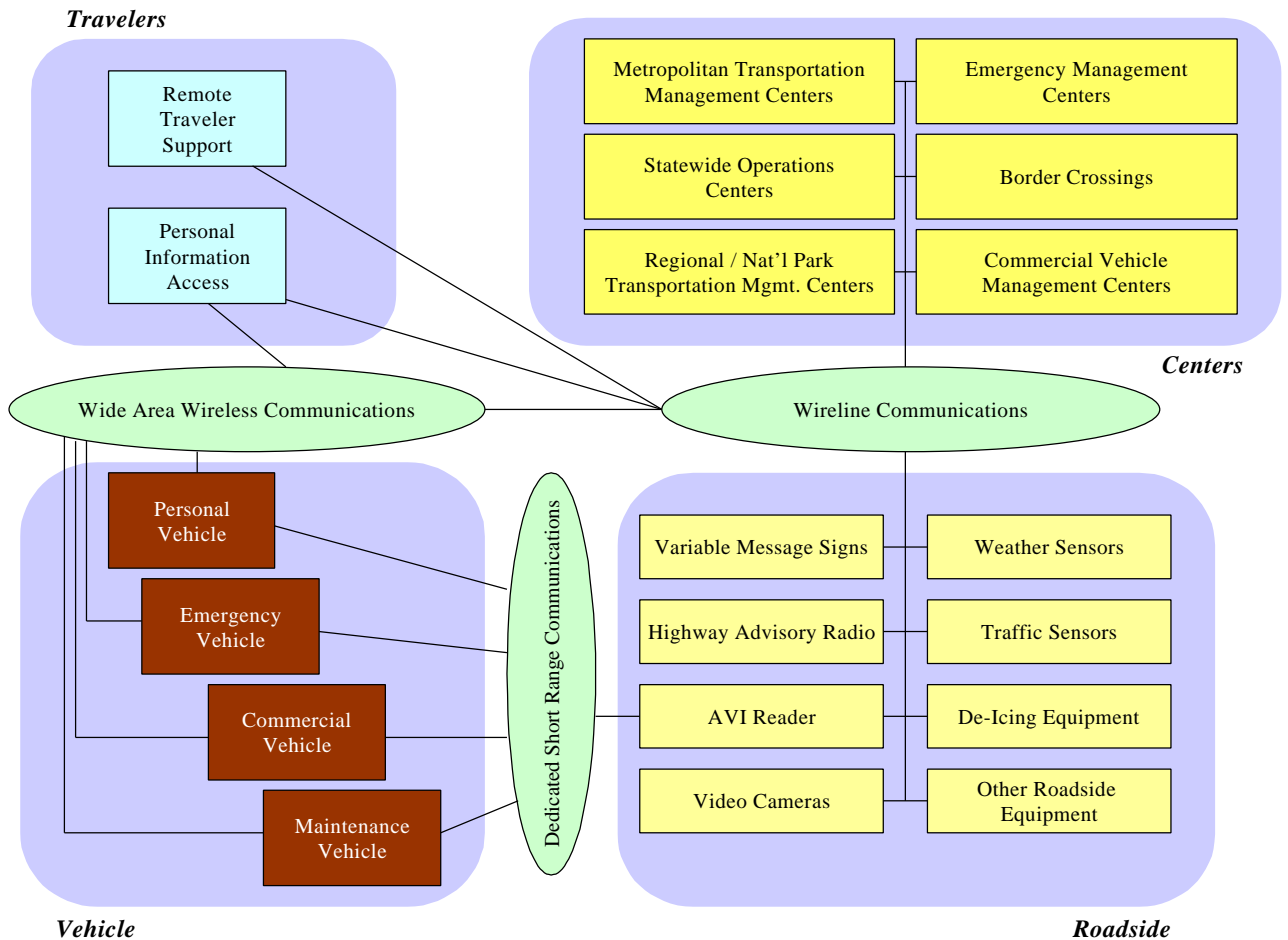
- CANAMEX Corridor Transportation Management and Information Network (CT-MAIN)
- CANAMEX Smart Tourist System
- CANAMEX Smart Freight System

The first ITS project for the Corridor will be the development of a Corridor ITS Architecture. This will set the foundation for the development and design of the other ITS projects for the corridor in a fashion that will provide open system designs, reduce costs, and provide consistency with the National ITS Architecture, which is required for federally-funded projects. A draft conceptual ITS system architecture for the Corridor was developed in order to determine preliminary cost estimates for the system. The CANAMEX Corridor conceptual ITS system architecture is depicted in Figure I-1.

The CANAMEX Corridor ITS will be organized around the central MAIN component, which will feature the databases and web server for all Corridor ITS elements. Each of the other two ITS elements, Smart Tourist and Smart Freight, will feature integration with a number of existing agencies (and their databases) as well as national databases/information clearinghouses. Specific descriptions of the CANAMEX Corridor ITS elements follow.

Figure I-1 CANAMEX Corridor Conceptual ITS Architecture

CANAMEX Corridor Transportation Management and Information Network (MAIN)



The CT-MAIN program would include the following elements:

- Data sharing and coordination between all five CANAMEX states for transportation planning purposes.
- Traveler information database for real-time dissemination by private sector information providers as well as over Corridor Web Site. This includes connectivity to ATIS and ATMS activities in metropolitan regions as well as initiatives at National Parks and other attractions.
- Coordination of incident management and commercial vehicle operations activities across the five states as well as with Canada and Mexico.
- Coordination of strategic operational strategies related to construction or rerouting activities that may involve multiple states (e.g. construction work on US 89 in northwest Arizona may have implications for travelers headed from Nevada to Arizona).

Components would include a communications network (either Internet-based or a private network) tying together traffic management, emergency operations and commercial vehicle systems centers, and may include a “central” CANAMEX Management Center if deemed to be of value through the Corridor ITS Architecture development process. Such an architecture-development process, in addition to providing a link between current ITS activities throughout the five states, will establish the most cost-effective, institutionally acceptable and efficient means of providing transportation management and information services not currently being addressed on a Corridor-wide basis.

CANAMEX Smart Tourist System

This system would create a “branded identity” for a route system throughout the CANAMEX Corridor that supports the needs of recreational travelers (tourists). Associated with this network would be traveler information services supported by the coordination activities in the CT-MAIN program. The Smart Tourist System would support public-private partnering activities in order to provide tourist-oriented real-time information services at strategically-located kiosks at rest areas and tourist centers. One means of defraying the cost of deployment will be through the integration of Traveler Services Information activities. Traveler information in general for the Smart Tourist program would be provided over a CANAMEX traveler information web site.

Traveler information may include static and real-time information, per the following:

Examples of static information

- location of rest areas
- location of national parks and other landmarks
- international border crossings
- traveler services information (hotels, gas stations, restaurants, hospitals, etc.)
- hunting, fishing license information

Examples of real-time information

- weather conditions (current and forecast)
- highway blockages and anticipated delays due to construction
- highway incidents and lane closures
- congestion locations

Also included would be specific en-route information elements such as variable message signs (VMS) and highway advisory radio (HAR) that would support real-time information and demand management activities. Provision of parking facilities and transit shuttle services to and from national parks and other attractions would be supported through the Smart Tourist program. ***The system would also support open standards for communication to in-vehicle and wireless Internet devices through partnerships with private sector services.***

CANAMEX Smart Freight System

The Smart Freight System would provide the mechanism to: 1) integrate and standardize state and provincial commercial vehicle administrative processes to the greatest extent practicable; 2) support interoperability and integration with federal trade movement data systems; and 3) provide better traveler information and facilities for conducting electronic commerce and coordination between commercial carriers and intermodal facilities. It would also provide a “branded identity” that would also be expanded to physical travel routes for commercial vehicles throughout the corridor.

The system is to provide service information oriented to commercial vehicle operators and motor carriers, whether over the Web at strategically located truck stop kiosks, or through in-vehicle systems that may be implemented as a result of public-private partnerships.

Traveler information may include static and real-time information. This might include:

Examples of static information

- location of rest stops
- location of truck stops
- international crossing requirements and operating hours
- locations and facilities for conducting electronic commerce and processing of international shipments
- agriculture inspections facilities at border crossings
- information on obtaining permits

Examples of real-time information

- weather conditions (current and forecast)
- highway blockages and anticipated delays due to construction
- congestion information
- highway incidents and lane closures

Included would be en-route information elements such as variable message signs (VMS) and highway advisory radio (HAR) that would support real-time information associated with commercial operations and advisories along Smart Freight Corridor routes.

Hazardous Materials (HazMat) activities would be served through use of automated roadside inspection and vehicle tracking schemes that would permit states to track HazMat shipments. International Trade Processing (ITP) Centers and Intermodal Centers would be incorporated into this network. In particular, the development of ITP Centers is to be encouraged by the CANAMEX Corridor as a method to reduce delays with respect to credentials and administrative processes, and will permit direct transportation of containers across international borders with reduced delay.

ECONOMIC IMPACT ASSESSMENT

To evaluate the economic impact of the five major Initiatives on the CANAMEX Corridor states, ERA leased an economic model developed by Regional Economic Models, Inc. (REMI). The REMI model uses hundreds of equations developed over the past two decades and is based on data from the Bureau of Economic Analysis, The Bureau of Labor Statistics, the Department of Energy, the Census Bureau, and other public sources. The REMI model was customized for the five CANAMEX states – Arizona, Idaho, Montana, Nevada, and Utah, and provides the mechanism for identifying impacts at the individual state and five-state regional levels.

The REMI model is operated by defining a policy question based upon a policy change, selecting a baseline forecast, then generating an alternative forecast using an external variable set that includes changes in the external values, which are affected by the policy issue. For each Corridor Plan Initiative, ERA identified major categories of impacts and corresponding REMI policy variables, quantified these changes, and then applied these changes to the REMI model.

When developing the alternative regional forecast for the CANAMEX Initiatives, ERA made many specific, detailed assumptions that are described in Section V. However, there are several overall principles that the entire economic analysis is based upon:

- Every economic impact analysis is based upon a specific geographic region. The analysis of the CANAMEX Initiatives examined the economic impact of these initiatives on each of the five CANAMEX states as well as the entire five-state region as a whole.
- The time period analyzed was between the year 2000 and the year 2030.
- To establish a baseline economic forecast, ERA primarily relied upon REMI's economic forecast for the five CANAMEX states and the five-state region, but adjusted the population growth assumptions to correspond with the individual state's population projections.
- Each REMI forecast predicts the difference between the growth that would normally have occurred in the Base Case and the growth with the Initiative being analyzed.

The five major Initiatives recommended in this document will accelerate economic development and employment growth within the five-state region. The economic impact assessment assumes that the five states implement the five Initiatives in a harmonious and compatible manner. Clearly some of the advantages provided by joint ITS, tourism promotion or digital signature implementation, would be lost if the five states pursued systems that were not compatible. Assuming effective and cooperative implementation, the estimated impact is in the vicinity of one million additional jobs over the Base Case forecast by the year 2030.

Impact of Five Major Corridor Plan Initiatives	Net Job Gain by 2030
Arizona	343,000
Nevada	240,000
Utah	237,000
Idaho	117,000
Montana	72,000
Total CANAMEX Corridor States	1,009,000

Using modest assumptions about the reduction in across the board business transaction cost in these five states, the Smart Process Partnerships Initiative has the greatest impact in accelerating job growth. However, because the REMI model compares the relative employment attractiveness of the CANAMEX states to the other states in the nation, the CANAMEX Corridor job attraction impact of this Initiative would not be as powerful if all states in the entire nation simultaneously adopted similar initiatives. Therefore, speed of implementation of key partnerships, common standard and interoperable systems for the CANAMEX Corridor region is of critical importance to accelerating job growth. The same need for speed of implementation is true for the Rural Telecommunications Initiative. The competitive advantage provided by Initiative is relative to other state and likely temporary in nature.

Impact of Plan Initiatives on All Five States	Net Job Gain by 2030
Smart Freight	120,000
Smart Tourist	113,000
Rural Telecommunications Access	201,000
Transportation Improvements	110,000
Smart Process Partnerships	466,000
Total CANAMEX Corridor States	1,009,000

When dealing with long term forecasts, the precise numbers are less important than the magnitude of the change from the Base Case. *The million additional jobs represent an eleven percent increase in job growth for the five-state region by the end of the 30-year period.* This

magnitude of additional job growth indicates that the recommended Initiatives will enhance the already strong economic performance of the region.

The distribution of this additional job growth is similar to the overall job distribution in the five-state region. The largest absolute job gain is in the service sector, but the highest percentage job gain is in the transportation, communications and public utilities sector. Since the Initiatives are concentrated in this sector, its disproportionate job gain is not surprising. The other two sectors that had noticeable above average percentage job gains were the construction and the agriculture and forestry sectors, in which the additional highway construction and the rural telecom Initiatives had their impact (see Table I-1 for details).

In terms of average per capita wages, the REMI model did not indicate a significant difference between the Base Case and the scenario including all the Initiatives. The Initiatives accelerate the growth of this five-state region but do not significantly alter its income structure. However, they probably allow a higher percentage of the population to remain in the lower cost rural communities of the region.

Table I-1
DISTRIBUTION OF JOBS ADDED BY INITIATIVES

	Base Case Jobs in Region in 2030		Jobs Added by Initiatives by 2030		Percentage Growth by Sector
	Jobs in Thousands	Percentage Distribution	Jobs in Thousands	Percentage Distribution	
Total Employment	9,237	100.0%	1,009	100.0%	10.9%
Manufacturing	525	5.7%	63	6.2%	11.9%
Non-Manufacturing	7,235	78.3%	802	79.5%	11.1%
Mining	20	0.2%	2	0.2%	9.1%
Construction	504	5.5%	62	6.2%	12.3%
Trans. & Pub. Util.	368	4.0%	103	10.2%	27.9%
FIRE	566	6.1%	43	4.3%	7.6%
Retail Trade	1,418	15.3%	158	15.7%	11.2%
Wholesale Trade	350	3.8%	33	3.2%	9.3%
Services	3,841	41.6%	381	37.7%	9.9%
Agri/For/Fish Services	168	1.8%	21	2.0%	12.3%
Government	1,405	15.2%	145	14.3%	10.3%

Source: ERA using REMI

Smart Freight	Smart Tourist	Rural Telecomm	Hwy Investment	Smart Process
120.33	112.93	97.73	110.00	568.50
3.75	3.20	3.52	7.58	44.47
98.73	93.44	77.08	80.00	453.10
0.09	0.08	0.09	0.22	1.38
5.16	4.64	5.35	7.94	39.05
33.81	32.98	2.15	14.31	19.47
3.43	3.08	5.54	4.95	26.16
19.22	18.30	17.40	13.58	89.99
2.23	1.97	2.31	3.76	22.40
33.38	31.11	42.58	33.34	240.30
1.41	1.29	1.67	1.90	14.31
17.84	16.28	17.12	22.41	70.93

70.77922078

0.006493506

707.8

184.35

12.71

134.08

0.37

13.30

23.98

8.30

22.76

6.30

55.88

3.18

37.55

Section II DESCRIPTION OF INITIATIVES

Flowing from the transportation, telecommunications and economics analysis summarized in the preceding working papers, this section proposes five Initiatives for the CANAMEX Corridor. The first four Initiatives are related to the highway corridor, and four of the five Initiatives are termed “Bold Initiatives,” because their implementation requires a new level of cooperation among these five states and / or a new multi-state organization that does not currently exist. This section briefly discusses each initiative’s goals, objectives, strategies, and program components. The five Initiatives are as follows:

- Initiative #1 – Smart Freight Corridor (Bold)
- Initiative #2 – Smart Tourist Corridor (Bold)
- Initiative #3 – Telecommunications Access for Rural Areas (Bold)
- Initiative #4 – Corridor Highway Improvements
- Initiative #5 – Smart Process Partnerships (Bold)

INITIATIVE NO. 1 – SMART FREIGHT CORRIDOR (BOLD)

Both the highway and freight analyses indicated the need for enhanced communications to improve the flow of people and goods, especially in urban areas. State boundaries are artificial borders and seamless communication throughout the CANAMEX Corridor via a comprehensive “interoperable” system is needed. Such an operation, termed Intelligent Transportation Systems (ITS), refers to projects that improve the efficiency of personal or freight mobility utilizing communications and electronics technologies in lieu of new roadway construction.

ITS programs create benefits that include increased travel safety, reduced roadway delay, and improved connectivity between different travel modes and services. Some practical benefits include reductions in total time for incident detection, response and clearance, providing advanced warning of inclement weather or accidents, providing improved real-time route information and improved traffic signal operations, and reduced delay to trucks through electronic pre-clearance and weigh-in-motion systems. ITS is typically divided into the following elements:

- Advanced Traffic Management Systems (ATMS)
- Advanced Traveler Information Systems (ATIS)
- Advanced Public Transportation Systems (APTS)
- Commercial Vehicle Operations (CVO)
- Advanced Vehicle Control and Safety Systems (AVCSS)

This Initiative would use ITS to provide service information oriented to commercial vehicle operators and motor carriers, either over the Web at strategically located truck stop kiosks, or through in-vehicle systems that may be implemented as a result of public/private partnerships. Examples of information provided include location of rest stops and truck stops, international crossing requirements and hours, locations and facilities for conducting electronic commerce and processing international shipments, agriculture inspection requirements at border crossings, and information on required permits. Real time information including weather conditions, hazardous road conditions, construction delays, highway incidents, lane closures, and congestion delays would also be provided.

The ITS Investment strategy involves the following steps:

- Development of CANAMEX Corridor ITS Architecture that guides the development and design of the other ITS projects and will also satisfy eligibility requirements for Federal funding.
- Design and implementation of CT-MAIN system to integrate state and regional ITS programs throughout Corridor in a consistent fashion with the Corridor ITS Architecture.
- Design and implementation of Smart Tourist program to provide tourist-specific information and support services in the Corridor.
- Design and implementation of Smart Freight program to provide commercial vehicle-specific information and support services in the Corridor.

This Initiative could promote the usage of alternative fuel heavy-duty vehicles along the CANAMEX Corridor through coordination of alternative fuel infrastructure efforts among the states and the provision of region-wide information base on financial and tax incentives. Currently, the five CANAMEX states differ in the alternative fuels that they promote and consider for financial and tax incentives. A key issue will be developing consensus concerning the specific types of fuels promoted.

INITIATIVE NO. 2 – SMART TOURIST CORRIDOR (BOLD)

The Smart Tourist Corridor Initiative has four elements:

- The use of ITS technology and investment to enhance the safety and quality of the tourist experience.
- Outreach to local tourism and economic development officials to integrate local products into regional marketing programs.
- The development of a new common branding concept,
- The development of existing natural or historical assets into new or improved tourism products in support of that branding concept,
- The cooperative marketing campaign in part based upon those products and the concept, and

The National Parks, National Recreation Areas and State Parks in the CANAMEX states form an obvious critical mass of well-established attractions. Like the natural attractions, Las Vegas is a world class tourism asset that benefits the Corridor by bringing people into the region. With growing demand for tourism products driven by fewer barriers to international travel and rapid regional population increases, the CANAMEX states have an opportunity to develop some new tourism themes and products along the Corridor.

One theme that would have great international appeal and appears to be relatively under exploited outside the region is the “History of the American West.” The images evoked include cowboys, Native American life, buffalo hunts, wagon trains, outlaws, early explorers, mining towns and Mormon Pioneers. In Arizona at the southern end of the Corridor points of interest include the likes of Tombstone (Wyatt Earp, Doc Holliday and the shootout at OK Corral) and Wickenburg, which has a fine Western Museum. In Nevada along the Corridor, the history of Hoover Dam construction is a tourist destination of national and international repute; and Boulder City, created to build Hoover Dam, is on the National Registry of Historic Places. The new Hoover Dam bypass will make these attractions safer and more popular. Utah has the site of the first Church of Latter-Day-Saints (LDS) Temple in St. George and much LDS history in the Salt Lake area. Idaho has historic attractions like Massacre Rocks State Park, significant portions of the Oregon Trail and the Old Fort Hall Replica. In Montana at the northern end of the Corridor there is Bannack State Park (a well preserved main street of the town that had Montana’s first gold strike in 1862 and the State’s first territorial capital) and the Butte Historic Landmark District (old mining town with 4,000 buildings on the National Historic Registry). Most of these and numerous other similar points of historical interest are in smaller rural communities that would derive considerable economic benefit from increased tourism.

All five states, could cooperate in a new marketing campaign. The domestic marketing strategy could be directed at the numerous historical societies and organizations to promote off-peak season travel. The foreign marketing campaign could take advantage of the romantic images of the American West conveyed by landscape painters and generations of Hollywood movies.

The ITS investments and services in support of a Smart Tourist Corridor are detailed in Section II. In summary, the key elements are as follows:

- Develop state of the art rest stops.
- At these rest stops, provide access to traveler information services such as tourist attractions (hours, location, and reservation information), border crossing (hours, required documents), hospitality services (choices and location), and hunting and fishing licenses.
- Develop enhanced emergency response infrastructure - universal wireless coverage, a single emergency number along the CANAMEX Corridor, emergency phones, and network of service patrols.
- Eliminate dead spots for cellular coverage.

Currently cellular coverage along the Corridor is complete with the exception of four specific highway segments: 1) the 130 mile section of U.S. 93 between Wickenburg and Kingman AZ, 2) the 103 mile section of U.S. 93 between Kingman AZ and Las Vegas NV, 3) the 200 mile section of I-15 between St. George and Spanish Fork UT, and 4) the 200 mile section of I-15 between Idaho Falls ID and Butte MT.

INITIATIVE NO. 3 – TELECOMMUNICATIONS ACCESS FOR RURAL AREAS (BOLD)

The Federal Telecommunications Act of 1996 and Federal Communications Commission (FCC) rulemaking have increased competition in local telephone and high-speed data services. Telecommunications companies are now racing to establish upgraded transmission systems in key, high-demand areas in order to provide the highest speeds possible in the increasingly competitive market for communications services. These high-speed, broadband transmission systems take a number of forms, each offering a different balance of service levels for users and costs of implementation for telecom companies. The four principal broadband technologies are DSL (copper wire), coaxial cable, wireless, and fiber optics cables.

In practice, broadband networks generally utilize a combination of these technologies—with the highest capacity fiber optic lines serving as the “backbone” of the network, and other technologies linking dispersed end-users to this central spine. As networks undergo continual upgrades, many of the changes affect the type of links connecting end-users to the backbone. We refer to this final connection as the “last mile,” the costly link which must find its way to millions of individual homes and businesses in order to complete the network connection.

Due to the many lucrative opportunities in densely populated urban areas and the relatively poor investment to return relationship in sparsely populated smaller towns and rural communities, telecom companies have been slow to provide broadband access to these smaller communities in all of the CANAMEX states. Since the essential infrastructure for economic growth for the early part of the 21st century appears to be telecommunications infrastructure and broadband access and the rural areas are lagging in access, this Bold Initiative has three basic elements:

- Use the state agencies’ and other governmental jurisdiction’s need for and procurement of telecommunication services to strongly encourage and promote that private telecom companies extend broadband service, most likely fiber optic trunk lines, to smaller towns and rural communities.
- Encouraging the deployment of fiber optic and other telecommunications cable lines along the CANAMEX Corridor.
- In sparsely populated rural areas, the “last mile” access to advanced telecommunications capability will likely rely in a substantial part on the deployment of Wireless Local Loop (WLL) technology such as Multichannel Multipoint Distribution Service (MMDS) and Local Multipoint Distribution Service (LMDS). WLL technology deployment may be facilitated through certification of WLL carriers as Eligible Telecommunications Carriers (ETCs) per the requirements of the 1996 Telecommunications Act. The Corridor Plan should review the status of WLL carriers

in the Corridor states with a view of facilitating deployment of wireless technology in rural areas.

INITIATIVE NO. 4 – CORRIDOR HIGHWAY IMPROVEMENTS

The CANAMEX Corridor states have committed over nearly \$3.8 billion for future highway capacity improvements for the corridor, mostly in urban areas. *Programmed* projects are near-term projects with funding identified and committed. *Planned* projects are projects that have been identified and have had some preliminary work completed, but which do not have complete funding allocated. The *programmed* or *planned* investment along the corridor is estimated to be \$2.27 billion in Arizona, \$368 million in Nevada, \$600 million in Utah, \$341 million in Idaho, and \$234 million in Montana. Many of the *planned* projects require significant funding outside of resources presently available to state agencies.

As indicated in Section II of this report, the Hoover Dam Bypass Project is included as a *planned* project because it has some committed funding. Because this project is such a vital component of the ultimate CANAMEX Corridor, it must be constructed, and is included in the “Base Case” conditions. This project is a vital, key element to the remedy this deficient portion of the corridor and to improve safety and efficiency.

In addition to improvement projects, it must be remembered that the existing infrastructure of the CANAMEX Corridor is the vital component of this strategic trade link. The focus on maintaining and reconstructing older portions of the corridor will become more acute as routine maintenance and improvement costs increase. This is especially true in Idaho and Montana, the link to Canada, where more severe weather can be harsher on the interstate. Substantial, on-going investment will be required to meet these basic needs of the Corridor.

Even with this level of investment, congestion is still expected, as we look 30 years into the future. The rapid population growth projected for the metropolitan areas of the three southern CANAMEX states indicates the need for additional highway improvements. Most of these metropolitan areas also represent crossroads or entry point into the Corridor for east-west traffic. Therefore, the ability to travel through these areas is as important for not only north-south traffic, but east-west traffic as well.

Based on the highway capacity deficiencies analyzed in Section II, this Plan recommends over \$2 billion in additional highway improvements along the Corridor over and above the currently *planned* and *programmed* projects. As these *proposed* projects are new to the states’ plans, they are unfunded. These recommended improvements breakdown as follows:

- \$427 million in Arizona, essentially all in the Tucson and Phoenix metropolitan areas.
- \$220 million in and around Las Vegas in Nevada.
- \$893 million in Utah in two stretches, one from the Arizona State Line east of Mesquite, Nevada to Cedar City and the other along the Wasatch Front from Provo to Brigham City, north of Ogden.

- \$478 million for interstate widening and interchange enhancement between Pocatello and Idaho Falls. (This figure summarizes projects which were based on traffic growth rate projections provided by Idaho, for this study. If actual growth rates are lower, some of these projects may not be deemed necessary.)
- Based on the conservative traffic growth rates used in this study, no additional capacity constraints were expected along the CANAMEX Corridor in Montana, which were not accommodated by planned projects. The Plan does not recommend any proposed highway projects in Montana. However, Montana will also incur the substantial on-going investment to maintain and reconstruct existing interchanges and older portions of I-15.

As this report was conducted at a very “macro” level, some shorter segments of the CANAMEX Corridor in and around urban areas, and local improvements, including interchanges, may need expansion and improvement in the planning horizon. The cost estimates were typically based upon average cost per center lane mile used by the Federal Highway Administration. State level estimated might be substantially higher due to the need for additional right-of-way acquisition or for upgrading the existing roadway that is not up to standard.

The focus of the Corridor Plan has been on the identification of projects that promote intra-regional efficiency, as opposed to local highway needs. It was never the intention of the plan to establish local alignments or project priorities within the participating states. The states recognize that projects identified as part of the Corridor Plan have continued to evolve during the development of this document. The current list of projects presented in this document should be considered "place holders" used to estimate local needs and funding.

INITIATIVE NO. 5 – SMART PROCESS PARTNERSHIPS (BOLD)

Each of the five CANAMEX states is moving to advance e-commerce and e-government within its own jurisdiction. However, there are some areas where a partnership of the five states would reduce barriers to economic integration, allow each part of CANAMEX region to concentrate on its own strengths, and allow the region to be a more significant player in the global economy. As communications speed and infrastructure improves in the years ahead, the opportunities for Smart Process Partnerships will increase. This Corridor Plan advances three ideas initially to facilitate the building of these partnerships. The ideals include:

- The common registration of professionals and the common posting of disciplinary actions and citations against professional license holders.
- The sharing of e-government processes and techniques.
- The development of an interoperable Digital Signature program.

The five CANAMEX states are sufficiently similar that one set of professional licensing standards for professionals, like architects, real estate agents, certified public accountants, contractors, electricians, engineers and pharmacists, would facilitate the creation of a “borderless economy” among these five states.

The five states differ in the level of resources allocated to moving government services and requirements on line like renewal of automobile registration, filing of annual reports with the department of corporations and renewal of insurance company licenses. If the states would pool their knowledge and experience, the region would accelerate the implementation of e-government. The result would be a more efficient and more competitive regional economy.

E-commerce poses a number of challenges to our traditional legal framework because most of our laws were written paper was the only realistic medium for sending notices, delivering information and recording terms of final agreements. Each national, state or local law or regulation that requires a written signature or the production of an original record impairs e-commerce. The efficiencies of e-commerce are lost if laws that recognize binding agreements require written signatures on paper copies.

In response to this constraint to e-commerce, many state legislatures passed electronic signature laws and far fewer have passed digital signature laws. A “digital signature” is distinct from an electronic signature in that it uses information security measures, most commonly cryptography, to ensure integrity, authenticity and nonrepudiation of the corresponding information. Cryptography is the field of applied mathematics that transforms digital information into code and later transforms that information back to its original form.

The digital signature component of this Bold Initiative should have the following basic elements:

- Digital signatures should be treated as the equivalent of traditional signatures.
- The Corridor states should identify and eliminate barriers to electronic transactions that arise from uncertainties related to the recognition of digital signatures.
- The five states should harmonize laws regulating the use and recognition of digital signatures.
- The states should avoid the erecting unnecessary barriers or impeding processes that delay the recognition of digital signatures originating in other jurisdictions.

According to the Internet Law and Policy Form (ILPF) posting on the Internet dated September 24, 1999, “There is still no uniformity among the states’ approach to electronic authentication. ...The trend in the law is toward technology neutral statutes that afford other new and existing technologies some means of equivalent recognition. Finally, standards for cross-border recognition continue to be largely ignored in all but the prescriptive initiatives, and even those provisions pose barriers to electronic commerce by not recognizing or giving lesser legal significance to electronic signatures made in other states.

At the end of June 2000 the President signed into law the Electronic Signatures in National and Global E-Commerce Act (E-Sign). E-Sign grants electronic signatures and electronic records the same legal weight as their paper counterparts. It promotes the harmonization of divergent electronic commerce laws already passed by most of the states and provides Congress with a mandate to promote global legal harmonization of electronic commerce. E-Sign provides state regulatory agencies with the authority to create specific criteria for electronic record

accuracy, integrity and accessibility – even to the extent that an agency may override the technology neutrality provision of this law. It provides the legal framework but leaves open the specific opportunity for the five CANAMEX states to act in concert to develop a common system and a single set of standards for secure electronic commercial transactions.

Section III

TRANSPORTATION DEMANDS AND ISSUES

PURPOSE AND OVERVIEW

Purpose

The 1998 *THE CANAMEX TRADE CORRIDOR: Economic Opportunities Associated With Transportation Improvements* report concluded that the logic for undertaking development of the CANAMEX concept is to stimulate economic development. The economic logic of transportation improvements in the Corridor would result from greater transport efficiency, the possible attraction of additional tourists and new businesses, and the overall improved ability of the Corridor region to compete for economic activity.

The purpose of this section is to document the background information and analysis that was performed to identify potential transportation-related improvement strategies for the Corridor. As part of this assessment, rail, freight and port of entry opportunities are reviewed. Section IV of this report presents the viable transportation investment strategies, as well as the costs and benefits that will be used as inputs to the economic model.

Overview

This current CANAMEX Corridor Plan study looks beyond traditional highway improvements in order to stimulate economic growth in the Corridor region. The intent of this current study is to identify potential strategies that might be appropriate for the Corridor, and then to assess the economic impact of such strategies.

The CANAMEX Initiatives outline five potential strategies:

- Smart Freight Corridor
- Smart Tourist Corridor;
- Rural Telecommunications Access
- Highway Improvements
- Smart Process Partnerships.

The *Task IV: Emerging Technologies* Working Paper highlights emerging intelligent transportation system (ITS) transportation technologies. When these two work streams are combined with a traditional highway assessment, complemented with an initial freight and multimodal assessment, the product is a comprehensive review of potential transportation strategies for the Corridor.

The *Task I: Existing Infrastructure* Working Paper contained information on existing highway, airport, rail, and intermodal facilities. This section of the Task III working paper presents information on future highway conditions, existing and future freight movements, as well as rail and port of entry issues.

FUTURE HIGHWAY FLOWS AND CONDITIONS

The *Task I: Existing Infrastructure* Working Paper included a detailed assessment of existing transportation conditions in the Corridor. Of the 1,504-mile route, only 247 miles are not of interstate standard. The Corridor currently serves major urban areas with a combined population of slightly less than 7 million people. For the most part, the rural sections beyond the urban areas have acceptable Levels of Service (LOS), the exception being the rural section between Ogden and Brigham City in Utah. Conversely, many urban sections are highly congested. These urban locations include Tucson and Phoenix in Arizona; Las Vegas, Nevada; as well as Provo/Orem and Salt Lake City/Ogden in Utah.

Methodology for Future Traffic Demands

The existing traffic volumes used in the *Task I: Existing Infrastructure* Working Paper were obtained directly from each of the five CANAMEX states. In order to determine future traffic volumes along the Corridor, growth projections were calculated for the years 2010, 2020 and 2030. HPMS (Highway Performance Monitoring System) data were analyzed for the states of Arizona, Nevada, Utah, Idaho and Montana to obtain projections of future annual growth rates in traffic volumes. The HPMS data contain 1998 Average Daily Traffic (ADT) volumes for sample sections of highway for the CANAMEX states, except for Arizona, which has data for all state highways. The data also contain future year ADT estimates. The annual growth rate for each section of highway was calculated from the 1998 and future year ADTs¹. The projected annual growth rate for each Corridor segment in the “rural” locations were obtained by averaging growth rates for all rural HPMS samples on the highway shown, such as I-15, in the county and state indicated. Similarly, growth rates for “urban” segments were based on urban HPMS samples.

The year of the future year projection in HPMS is not the same for all states. Within the CANAMEX Corridor, the HPMS future year used are 2015, 2017 or 2020. These HPMS future years were used to determine average growth rates for the different Corridor segments. These growth rates were applied to the 1998 traffic volumes to determine the Year 2010, 2020 and 2030 projected traffic volumes. Table III-1 shows the average growth rate at rural CANAMEX locations by state.

**Table III-1
HPMS Future Years and Average Growth Rates by State**

State	Future Year in 1998 HPMS Data	Average Rural Growth Rate
Arizona ⁽¹⁾	2015/2020	2.01%
Nevada	2015	3.43%
Utah	2020	3.42%
Idaho	2015	2.85%
Montana	2017	3.21%

(1) Future year varies by highway location.

¹ Average Annual Growth Rate = EXP (LN(x/y)/z)-1

Where: EXP = e raised to the calculated exponent, LN = natural log of the number
x = Final Year ADT, y = Initial Year ADT, z = Number of Years

Since 1970, vehicle-miles of travel (VMT) have increased on rural highways at an average annual rate of 2.24 percent per year through 1998, nationwide and 2.23 percent in the Western Region.² The average projected growth rates at rural CANAMEX locations exceed the historical growth rates in all states, except Arizona. The rate of growth for the CANAMEX states has increased dramatically in recent years. Four of the five CANAMEX states (NV-1, AZ-2, UT-4, ID-5) rank among the top five fastest growing states in the nation, as tabulated in the 2000 census. The traffic growth projections for the 30-year period are conservative projections based on long-term past growth rates (1970 –1998). Should the recent growth rates continue for a significant period, the Levels of Service on CANAMEX Corridor segments will be lower than represented in the following tables, and needed improvements will be needed sooner or even exceed those set forth in this study. The CANAMEX Corridor will be sensitive to traffic growth rate fluctuations.

To obtain an estimate of ADT at each selected location in the study’s horizon year of 2030, traffic is assumed to grow from 1998 levels at the HPMS growth rate until the HPMS future year, (2015, 2017 or 2020). If the HPMS growth rate exceeds the historical growth rate of 2.24 percent per year, then for subsequent years growth in travel is assumed to moderate to 2.24 percent. If the HPMS growth rate is less than the historical growth rate of 2.24, then the HPMS growth rate is assumed to continue until 2030.

Two of the selected rural locations show annual average growth rates in excess of 5 percent. Despite assuming lower growth between 2020 and 2030, traffic volumes at these locations are projected to increase by a factor of four. As shown in Table III-2, if traffic grew at the historical rate of 2.24 percent throughout the period from 1998 to 2030, volumes at these locations would increase only by a factor of 2. The calculated future ADT (high values in Table III-2) are used in evaluation of deficiencies and opportunities. The difference between the high and low values is illustrated only to identify the significant difference in traditional and forecasted growth rates.

**Table III-2
Projected Ranges at High Volume Rural Locations**

Location	1998 ADT	Projected 2030 ADT	
		High ¹	Low ²
I-19 between Nogales and Tucson, AZ	22,600	88,600	45,900
I-15 between NV/UT line and Cedar City, UT	14,865	61,400	30,200
I-15 between Salt Lake City/Ogden and Brigham City, UT	38,540	91,000	78,300

- (1) See Table III-1.
- (2) Growth in traffic at the historical rate of 2.24 percent per year from 1998 to 2030.

Projections by State

Tables III-3 and III-4 present existing and projected traffic volumes for selected rural and urban locations, respectively. Figure III-1 shows the project Corridor.

Arizona – Projected growth rates at rural locations vary widely by location. A comparatively low rate of growth in ADT of 0.68 percent per year is projected for Pinal County between Tucson and Phoenix, while a growth rate of 5.34 percent is shown in Pima County

² Western Region – Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming.

south of Tucson. At other selected urban locations growth rates range from 1.55 to 3.79 percent per year.

Table III-3
CANAMEX Corridor Existing and Projected Traffic Volumes in Rural Sections

Urban Area or Landmark ¹	Highway	County	1998 ADT	1998 Percent Trucks ²			HPMS Annual Growth Rate ³	HPMS Future Year	2010 ADT	2020 ADT	2030 ADT	2030 ADT at 2.24% Growth
				Single	Comb.	Total						
Nogales, AZ to												
Tucson, AZ	I-19	Pima	22,600	5	10	15	5.34%	2020	42,200	71,000	88,600	45,917
Casa Grande, AZ	I-10	Pinal	32,429	12	16	28	0.68%	2015	35,200	37,600	40,200	65,887
Phoenix, AZ	I-10	Pinal	41,122	11	24	35	0.68%	2015	44,600	47,700	51,000	83,549
Kingman, AZ	US 93	Yavapai	7,778	6	22	28	1.24%	2015	9,000	10,200	11,500	15,803
AZ / NV Stateline	US 93	Mohave	8,571	8	17	25	2.13%	2015	11,000	13,600	16,800	17,414
Las Vegas, NV	US 93	Clark	14,000	3	9	12	3.76%	2015	21,800	29,300	36,500	28,444
NV / UT Stateline	I-15	Clark	14,985	3	18	21	3.11%	2015	21,600	28,200	35,200	30,446
Cedar City, UT	I-15	Washington	14,865	2	18	20	5.59%	2020	28,600	49,200	61,400	30,202
Salt Lake City/Ogden, UT	I-15	Juab	10,990	3	18	21	2.22%	2020	14,300	17,800	22,200	22,329
Brigham City, UT	I-15	Box Elder	38,540	3	7	10	2.94%	2020	54,600	72,900	91,000	78,303
UT / ID Stateline	I-15	Box Elder	8,480	4	10	14	2.94%	2020	12,000	16,000	20,000	17,229
Pocatello, ID	I-15	Oneida	7,900	4	22	26	2.82%	2015	11,000	14,200	17,700	16,051
Idaho Falls, ID	I-15	Bingham	16,000	4	22	26	2.75%	2015	22,200	28,400	35,400	32,508
ID / MT Stateline	I-15	Jefferson	2,600	4	22	26	2.98%	2015	3,700	4,800	6,000	5,283
Butte, MT	I-15	Beaverhead	4,030	4	25	29	4.03%	2017	6,500	9,100	11,400	8,188
Helena, MT	I-15	Jefferson	4,690	4	10	14	3.54%	2017	7,100	9,700	12,100	9,529
Great Falls, MT	I-15	Clark ⁴	3,520	4	16	20	3.00%	2017	5,000	6,600	8,200	7,152
Sweetgrass, MT	I-15	Pondera	3,070	3	22	25	2.25%	2017	4,000	5,000	6,300	6,237

(1) See Figure III-1 for locations.

(2) HPMS provides data on the Average Daily percentage of Single Unit Commercial Vehicles (classes 4-7, busses through 4 or more axle, single-unit trucks) and Combination Commercial Vehicles (classes 8-13, 4 or less axle, single-trailer trucks through 7 or more axle, multi-trailer trucks).

(3) Growth Rates estimated from 1998 HPMS Data, by averaging over all rural records for the highway, county and state indicated.

(4) Growth rate based on average in all counties in Montana on I-15, as 1998 HPMS data contained no samples on I-15 in Clark County.

(The growth rate for the Pima County area is projected at only 0.68% for the 30 year period. This is significantly lower than each of the other segments. The information used to project traffic volumes was obtained from the HPMS database. The information is provided to HPMS from the individual states. This growth is apparently low in general and significantly low for the study area. However, volumes are high, which can result in low growth rates.)

(Growth rates along US 93 in Arizona, and for US 93 to the Hoover Dam are projected at 1.24% and 2.13%. These rates are below the 2.24% average for the nation and western region. With the completion of the Hoover Dam Bypass more traffic would be expected because of improved mobility between Kingman and Las Vegas. The relatively low volumes in this section make the difference between using the HPMS and the nationwide average growth factors for 2030 no more than 3,200 vehicles per day – not a significant amount. Therefore, for consistency, HPMS growth factors are used.)

Nevada – In Nevada the CANAMEX Corridor is located entirely within Clark County. Annual projected rural growth rates range from 3.11 to 3.76 percent. Urban growth rates around Las Vegas range from 1.30 to 2.31 percent.

Table III-4
CANAMEX Corridor Existing and Projected Traffic Volumes in Urban Sections

Urban Area and Highway ¹	County	1998 ADT	1998 Percent Trucks ²			HPMS Annual Growth Rate ³	HPMS Future Year	2010 ADT	2020 ADT	2030 ADT	2030 ADT at 2.24% Growth
			Single	Comb.	Total						
Tucson, AZ											
I-19	Pima	48,537	4	5	9	3.79%	2020	75,800	110,000	137,300	98,614
I-10	Pima	121,895	7	15	22	1.95%	2020	153,700	186,500	226,300	247,658
Phoenix, AZ											
I-10 NB/SB	Maricopa	140,000	5	5	10	1.55%	2015	168,400	196,500	229,200	284,443
I-10 EB/WB	Maricopa	236,387	5	5	10	1.55%	2015	284,400	331,700	387,000	480,276
U.S. 60	Maricopa	30,496	7	8	15	2.69%	2015	41,900	53,500	66,800	61,960
Las Vegas, NV											
US 93 / US 95	Clark	37,900	2	1	3	2.31%	2015	49,800	62,400	77,800	77,003
US 93/US 95/I-515	Clark	122,765	1	2	3	2.31%	2015	161,400	202,000	252,100	249,426
I-15	Clark	110,710	1	2	3	1.30%	2015	129,300	147,100	167,400	224,933
Provo / Orem, UT											
I-15	Utah	81,185	2	11	13	3.37%	2020	120,800	168,300	210,100	164,946
Salt Lake City / Ogden, UT											
I-15	Salt Lake	175,000	1	9	10	3.70%	2020	270,800	389,600	486,200	355,553
I-15 (Bountiful)	Davis	112,705	2	5	7	3.59%	2020	172,200	245,100	305,900	228,987

(1) See Figure III-1 for locations.

(2) HPMS provides data on the Average Daily percentage of Single Unit Commercial Vehicles (classes 4-7, busses through 4 or more axle, single-unit trucks) and Combination Commercial Vehicles (classes 8-13, 4 or less axle, single-trailer trucks through 7 or more axle, multi-trailer trucks).

(3) Growth Rates estimated from 1998 HPMS Data, by averaging over all urban records for the highway, county and state indicated.

Utah – HPMS data indicate a high growth rate of 5.59 percent per year for traffic on I-15 in Washington (St. George) County. At other selected rural locations growth rates range from 2.22 to 2.94 percent. Growth rates at urban locations range from 3.37 to 3.70 percent.

Idaho – In Idaho HPMS data indicate a narrow range of growth rates for the three selected rural locations along the CANAMEX Corridor (2.75 to 2.98 percent per year).

Montana – Growth rates at selected rural locations in Montana decrease as one travels north. They range from 4.03 percent in Beaverhead County in the south to 2.25 percent in Pondera County in the north.

Truck Volumes

HPMS data provide information on the percentage of single unit and combination trucks on sampled highway sections for existing conditions (1998). Tables III-3 and III-4 show truck percentages at selected locations along the CANAMEX Corridor. Where the selected location did not correspond to an HPMS sampled section, average truck percentages were used from all sampled sections for the highway, county and state indicated.

Observed truck percentages are highest in Arizona (35 percent) and Montana (29 percent). All states in the Corridor include locations where trucks exceeded 20 percent of ADT

in rural areas. As expected, trucks generally account for a smaller share of total traffic in urban areas, falling as low as 6 percent near Las Vegas, Nevada.

Although the truck percentages may be high in the rural sections of Nevada, Utah, Idaho and Montana, the truck volumes are relatively low compared to flows in Arizona. The actual truck volumes in the CANAMEX Corridor currently range from 14,400 per day on I-10 south of Phoenix to less than 700 on I-15 between Idaho Falls and the Montana Stateline. The highest truck volume in each state on a CANAMEX Corridor segment is:

- Arizona 14,400 I-10 between Casa Grande and Phoenix
- Nevada 3,100 I-15 between Las Vegas and Utah Stateline near Las Vegas
- Utah 3,900 I-15 between Ogden and Brigham City
- Idaho 4,160 I-15 between Pocatello and Idaho Falls
- Montana 1,200 I-15 between Montana Stateline and Butte

Future Base Case Conditions

Capacity Assumptions

Volume/capacity ratios were used to evaluate the performance of segments along the Corridor. For the purpose of calculating volume – capacity (v/c) ratios, 24-hour, two-way capacities were established for the CANAMEX Corridor. The same roadway capacity volumes and v/c ratios as used in Task I are used for evaluation in this portion of the study. These are shown in Table III-5. The capacities were based on traffic characteristics in the Corridor and developed in accordance with the 1994 Highway Capacity Manual.

**Table III-5
Estimated Highway / Interstate 24-Hour Capacities**

Area	Number of Lanes¹	Estimated 2-Way Capacity²
Rural	2-Lane (Highway)	15,000
	4-lane	50,000
	6-lane	75,000
Urban	4-lane	80,000
	6-lane	125,000
	8-lane	165,000
	10-lane	205,000

(1) Total through lanes in both directions combined.
(2) Highway Capacity Manual, 1994

The volume – capacity (v/c) ratio is a determination of roadway conditions based on the volume of annual average daily traffic divided by the theoretical capacity of the road to accommodate traffic. The closer the resulting ratio is to 1.0, the closer the road is getting to its ability to accommodate the traffic. The volume-capacity ratio is correlated to a Level of Service. The level of service (LOS) ranges associated with the volume to capacity ratios in rural areas are presented in Table III-6. The Levels of Service are found in the 1994 Highway Capacity Manual. Levels of Service depict traffic as fully free operation (LOS A) to some deterioration of movement (LOS C) to complete hindrance of operation (LOS F).

**Table III-6
Levels of Service**

LOS	Volume/Capacity Ranges
A	0.00 - 0.25
B	0.26 - 0.40
C	0.41 - 0.60
D	0.61 - 0.80
E	0.81 - 1.00
F	> 1.00

Source: Highway Capacity Manual, 1994

Projects in Base Case

In addition to existing infrastructure, projects programmed and planned through Year 2020 have been identified and included as part of a Future Base Case conditions scenario. *Programmed* projects are near-term projects with funding identified and committed. *Planned* projects are projects that have been identified and have had some preliminary work completed, but which do not have complete funding allocated. Many of the *planned projects* require significant funding outside of resources presently available to state agencies. These projects will compete for funding with other significant highway needs within each state, but off the CANAMEX Corridor. The programmed and planned projects, shown in Table III-7, were obtained by a review of each state’s and MPO’s Transportation Improvement Program (TIP) for FY 2000-2004; Long Range Plans; and by a review of special studies such as Arizona’s *South US 93, Phoenix – Tucson Corridor Profile Analysis* and Nevada’s *Boulder City / U.S. 93 Corridor Study*. These projects, along with existing infrastructure conditions will establish the “Base Case” for the study. The projects listed show roadway widening, truck lanes, and interchange construction or reconstruction projects. Projects that replace existing conditions such as resurfacing, reconstruction, rehabilitation, joint repair and striping are not listed.

Table II-7 uses cost figures obtained from the individual states’ Transportation Improvement Programs. If a specific cost was not provided, a generic, per mile cost (note 3 of Table II-7) was used. These costs were based on average nationwide construction cost (adjusted 1997 FHWA data) and similar construction projects in the CANAMEX states. The particularity of individual projects was not evaluated due to the broad scope of this study. Individual projects, particularly in urban areas, can increase significantly in cost, based on local conditions. Cost inflations can arise from Right-of-Way acquisition, number of required interchange and overpass reconstruction and the degree of upgrading required on certain segments (US93). *These project cost tables are intended to provide potential, order of magnitude costs for the CANAMEX Corridor, rather than detailed cost estimates for each project.* As indicated in Table II-7, the Hoover Dam Bypass Project is included, even though it is not fully funded. Because this project is such a vital component of the ultimate CANAMEX Corridor, it must be constructed, and is included in the “Base Case” conditions. This project is a vital, key element to the remedy this deficient portion of the Corridor and to improve safety and efficiency.

**Table III-7
Programmed and Planned CANAMEX Corridor Projects
By Decade**

Year	Type	State	Route ¹	County	Segment	Action	Reason ²	Miles	Cost ³ (Millions)	New Capacity
2010	Program	AZ	I-10	Maricopa	Sky Harbor Expressway	Freeway	I	1	\$ 25.4	n.c.
		AZ	US 60	Maricopa	Deer Valley - Morristown	Widen to 4 Lanes	M	21	\$ 35.8	80,000
		AZ	US 93	Mohave	Santa Maria - Wikieup	Widen to 4 Lanes	M	37	\$ 220.0	50,000
		ID	I-15	Bonneville	Sunnyside	Interchange	M	1	\$ 16.8	n.c.
		ID	I-15	Bonneville	Riviera	Interchange	M	1	\$ 1.8	n.c.
		MT	I-15	Cascade	Gore Hill Interchange	Expand	C	1	\$ 1.0	n.c.
		MT	I-15	Lewis&Clark	Cedar Street Interchange	Expand	C	1	\$ 3.8	n.c.
2010	Planned	AZ	I-10	Pima	Tucson MP 260-256	Widen to 8 Lanes	C	4	\$ 43.0	160,000
		AZ	I-10NB	Maricopa	MP 160 -163	San Tan, S.Mtn TI	I	3	\$ 129.7	n.c.
		AZ	US 60	Maricopa	Grand Expressway	Freeway	M	12	\$ 161.4	80,000
		AZ	US 93	Yavapai	Wikieup Bypass	Bypass	M	4	\$ 38.7	50,000
		AZ	US 93	Yavapai	at I-40	Interchange	M	1	\$ 135.0	n.c.
		AZ	US 93	Mohave	Wikieup - I-40	Widen to 4 Lanes	M	34	\$ 220.0	50,000
		AZ	US 93	Mohave	MP 17-Hoover Dam	Widen to 4 Lanes	M	17	\$ 37.5	50,000
		AZ	US 93	Mohave	To Hoover Dam	New Bridge	M	2	\$ 51.0	50,000
		NV	US 93	Clark	Hoover Dam Bypass	New Bridge	M	4	\$ 198.0	50,000
		NV	US 93	Clark	Boulder City US 93 Corridor	Corridor Improve	M	13	\$ 170.0	50,000
		UT	I-15	Salt Lake	Salt Lake City	Widen to 12 Lns**	C	10	\$ 100.0	250,000
		UT	I-15	Weber	3100 South - 2700 North	Widen to 6 Lanes	C	8	\$ 80.0	125,000
		MT	I-15	Lewis&Clark	Capitol Interchange	Expand	C	1	\$ 9.0	n.c.
		MT	I-15	Lewis&Clark	Capitol to Cedar Interchange	Widen to 6 Lanes	C	1	\$ 11.0	125,000
		MT	I-15	Lewis&Clark	Helena	New Interchange	C	1	\$ 8.0	n.c.
		MT	I-15	Cascade	Northwest Bypass Interchange	Expand	C	1	\$ 8.0	n.c.
		MT	I-15	Toole	Coutts-Sweetgrass POE	New Port of Entry	C	1	\$ 30.0	n.c.
2020	Planned	AZ	I-19	Pima	Tucson MP 91-100	Widen to 6 Lanes	C	9	\$ 90.0	125,000
		AZ	I-10	Pima	Tucson MP 256-248	Widen to 8 Lanes	C	8	\$ 69.4	160,000
		AZ	I-10	Pima	Cortaro - Red Rock	Widen to 6 Lanes	C	13	\$ 21.0	75,000
		AZ	I-10	Pinal	Phoenix MP 248-163	Widen to 6 Lanes	C	85	\$ 223.0	75,000
		AZ	US 60	Maricopa	Grand Expressway	Freeway	M	12	\$ 352.0	80,000
		AZ	US 93	Maricopa	Wickenburg Bypass	Bypass	M	2 +	\$ 200.0	50,000
		AZ	US 93	Yavapai	SR 71 - Santa Maria	Widen to 4 Lanes	M	20	\$ 140.0	50,000
		AZ	US 93	Mohave	I-40 - MP 17	Divided Highway	M	33	\$ 75.0	50,000
		UT	I-15	Salt Lake	Salt Lake City	Widen to 14 Lns**	C	10	\$ 100.0	290,000
		UT	I-15	Davis	Farmington - Ogden	Widen to 8 Lanes	C	18	\$ 180.0	160,000
		UT	I-15	Davis	Bountiful, UT	Widen to 10 Lns**	C	14	\$ 140.0	205,000
		ID	I-15	Bannock	Pocatello	Interchange Improv	C	1	\$ 70.0	n.c.
		ID	I-15	Bannock	Inkom - Chubbuck	Widen to 6 Lanes	C	18	\$ 177.0	125,000
		ID	I-15	Bannock	Idaho Falls	Widen to 6 Lanes	C	8	\$ 75.0	125,000
		MT	I-15	Silver Bow	Between Butte and Elk Park	New Interchange	C	1	\$ 8.0	n.c.
MT	I-15	Cascade	Great Falls	New Interchange	C	1	\$ 8.0	n.c.		
MT	I-15	Cascade	Great Falls Bypass	Bypass	C	7	\$ 56.0	50,000		
2030	Planned	MT	I-15	Silver Bow	Nissler to East Butte TI	Widen to 6 lanes	C	8	\$ 56.0	125,000
		MT	I-15	Cascade	Gore Hill to Emerson TI	Widen to 6 lanes	C	5	\$ 35.0	125,000
									\$ 3,810.3	

1 See Figure III-1 for locations.

2 M=Minimum CANAMEX Standard, C=Capacity, I=Improvement

3 If not provided by state plans, following costs used : Widening \$7M/mi/2lanes; New Interstate \$15M/mi;

Widening Rural Interstate \$7M/mi/2lanes; Widen Urban Interstate \$10M/mi/2lanes

n.c. = no significant change in capacity

** = Most likely achieved by bypass alternatives. Cost for bypass can double

These projects will provide 141 more miles of four-lane divided, access control highway for US 93 in Arizona. Additionally, 13 miles of US 93 in Nevada will be upgraded to interstate standards. Sixteen miles of I-15 in Salt Lake City will be reconstructed and widened.

In addition to improvement projects, it must be remembered that the existing infrastructure of the CANAMEX Corridor is the vital component of this trade link. The focus on maintaining and reconstructing older portions of the Corridor will become more acute as

routine maintenance and improvement costs increase. Substantial, on-going investment will be required to meet these basic needs of the Corridor.

Tables III-8 and III-9 show the resulting v/c ratios for selected rural and urban locations, respectively. The number of lanes in urban areas along the CANAMEX Corridor varies from four-lanes to ten-lanes with High Occupancy Vehicle (HOV) lanes. The highest traffic volumes in each section of the urban Corridor were selected for the table. The v/c ratios are provided for three scenarios: 1998 existing; future years without any improvements; and future years with committed improvements. This final scenario, the Existing Plus Committed scenario, is the Base Case.

Based on existing conditions and committed improvements, the following lane configurations were used to calculate capacity and v/c ratios for the following urban segments:

- 6-Lanes - Tucson, Las Vegas, Provo / Orem, Salt Lake City (Bountiful)
- 8-Lanes – Phoenix I-10 NB
- 10-lanes – Phoenix I-10 EB, Salt Lake City

Rural Base Case Conditions

For rural segments, a v/c ratio benchmark of 0.90 (LOS E) was deemed at capacity and in need of expansion. Urban segments were evaluated and those segments with v/c ratios above a benchmark of 1.20 (LOS F) were deemed as needing increased capacity. A v/c ratio of 1.20 was used for urban areas because of increased delays that are generally expected and anticipated in urban conditions. Several urban CANAMEX Corridor segments are currently near the 1.20 v/c ratio.

The v/c ratios were calculated in the year of evaluation, e.g. 2020. If the v/c ratio exceeded the rural or urban benchmark, this segment of roadway met capacity some time in the previous 10 year period. Therefore, improvements to the segment should be in place by the year that it was deemed to exceed the benchmark in order to eliminate the LOS F condition.

Whereas currently all rural sections operate at a v/c of less than 0.8, in the future two segments in Arizona and two in Utah will exceed capacity without any improvements. Congestion builds gradually, with I-15 between Ogden and Brigham City in Utah exceeding capacity by 2010. By 2020, I-19 between Nogales and Tucson will be severely congested, while I-10 between Casa Grande and Phoenix in Arizona and I-15 between Utah Stateline and Cedar City in Utah will be just over capacity. Table III-10 summarizes rural segments expected to reach capacity in the future. Figures III-2 through III-4 present Base Case conditions for years 2010, 2020 and 2030, respectively.

Table III-8
CANAMEX Corridor Existing and Future Traffic Conditions in Rural Sections

To City ¹	Highway	Capacity		Volume-Capacity Ratio							
		Existing	Programmed and Planned	Existing	No Improvements			Programmed and Planned			
				1998	2010	2020	2030	2010	2020	2030	
Nogales, AZ to											
Tucson, AZ	I-19	50,000	n.c.	0.28	0.84	1.42	1.77	0.84	1.42	1.77	
Casa Grande, AZ	I-10	50,000	75,000	0.41	0.70	0.75	0.80	0.47	0.50	0.54	
Phoenix, AZ	I-10	50,000	75,000	0.51	0.89	0.95	1.02	0.59	0.64	0.68	
Kingman, AZ	US 93	15,000	50,000	0.52	0.32	0.36	0.41	0.18	0.20	0.23	
AZ / NV Stateline	US 93	15,000	50,000	0.57	0.39	0.49	0.60	0.22	0.27	0.34	
Las Vegas, NV	US 93	50,000	n.c.	0.28	0.44	0.59	0.73	0.44	0.59	0.73	
NV / UT Stateline	I-15	50,000	n.c.	0.30	0.43	0.56	0.70	0.43	0.56	0.70	
Cedar City, UT	I-15	50,000	n.c.	0.30	0.57	0.98	1.23	0.57	0.98	1.23	
Salt Lake / Ogden, UT	I-15	50,000	n.c.	0.22	0.29	0.36	0.44	0.29	0.36	0.44	
Brigham City, UT	I-15	50,000	n.c.	0.77	1.09	1.46	1.82	1.09	1.46	1.82	
UT / ID Stateline	I-15	50,000	n.c.	0.18	0.24	0.32	0.40	0.24	0.32	0.40	
Pocatello, ID	I-15	50,000	n.c.	0.16	0.22	0.28	0.35	0.22	0.28	0.35	
Idaho Falls, ID	I-15	50,000	75,000	0.19	0.57	0.77	0.96	0.57	0.51	0.64	
ID / MT Stateline	I-15	50,000	n.c.	0.12	0.07	0.10	0.12	0.07	0.10	0.12	
Butte, MT	I-15	50,000	n.c.	0.08	0.13	0.18	0.23	0.13	0.18	0.23	
Helena, MT	I-15	50,000	n.c.	0.09	0.14	0.19	0.24	0.14	0.19	0.24	
Great Falls, MT	I-15	50,000	n.c.	0.07	0.10	0.13	0.16	0.10	0.13	0.16	
Sweetgrass, MT	I-15	50,000	n.c.	0.06	0.08	0.10	0.13	0.08	0.10	0.13	

any v/c equal to or greater than 0.9 shown in bold, indicating potential congestion

¹ The city on line with the Level of Service, is the end point of the segment. The Level of Service provided is at a midpoint between that city and the previous city., eg. The LOS of 0.89 in 2010 occurs between Casa Grande and Phoenix, AZ.

² Refer to Table III-7 for programmed and planned projects

n.c. = no significant change in capacity

Table III-9
CANAMEX Corridor Existing and Projected Traffic Conditions in Urban Sections

Urban Area ¹	Highway	Programmed Plus Planned ²		Volume-Capacity Ratio							
		Lanes	Capacity	Existing	No Improvement			Programmed Plus Planned			
				1998	2010	2020	2030	2010	2020	2030	
Tucson, AZ											
	I-19	6	125,000	0.60	0.95	1.38	1.72	0.61	0.88	1.10	
	I-10	8	160,000	0.97	1.23	1.49	1.81	0.96	1.17	1.47	
Phoenix, AZ											
	I-10 NB/SB	8	160,000	0.86	1.05	1.23	1.43	1.05	1.23	1.43	
	I-10 EB/WB	10	205,000	1.15	1.39	1.62	1.89	1.39	1.62	1.89	
	U.S. 60	4	80,000	0.38	0.52	0.67	0.84	0.52	0.67	0.84	
Las Vegas, NV											
	US 93 / US 95	4	80,000	0.47	0.62	0.78	0.97	0.62	0.78	0.97	
	US 93/US 95/I-515	6	125,000	0.98	1.29	1.62	2.02	1.29	1.62	2.02	
	I-15	6	125,000	1.38	1.62	1.84	2.09	1.03	1.18	1.34	
Provo / Orem, UT											
	I-15	6	125,000	0.65	0.97	1.35	1.68	0.97	1.35	1.68	
Salt Lake City/Ogden											
	I-15	14	290,000	0.46	1.32	1.90	2.37	0.93	1.34	1.68	
	I-15 (Bountiful)	10	205,000	0.70	1.08	1.53	1.91	0.84	1.20	1.49	

any v/c equal to or greater than 1.2 shown in bold, indicating potential congestion

¹ See Figure III-1 for locations.

² Refer to Table III-7 for rural segment projects.

**Table III-10
Congested Rural Segments in Future Base Case (Existing Plus Committed)**

Segment	Route	V/C Ratio Above 0.90		
		2010	2020	2030
Nogales to Tucson, AZ	I-19	---	1.42	1.77
Casa Grande to Phoenix, AZ	I-10	---	0.95	1.02
Nevada Stateline to Cedar City, UT	I-15	---	0.98	1.23
Salt Lake City/Ogden to Brigham City, UT	I-15	1.09	1.46	1.82

Urban Area Base Case Conditions

Table III-11 illustrates entirely different conditions in the urban areas. All major urban areas will experience severe congestion on CANAMEX Corridor segments by 2020, and many by 2010. Planned improvements in the Las Vegas area will reduce I-15 congestion, but more improvements will be needed by 2030.

**Table III-11
Congested Urban Segments in Future Base Case (Existing Plus Committed)**

City	Route	V/C Ratio Above 1.20		
		2010	2020	2030
Tucson, AZ	I-19	---	1.38	1.72
	I-10	1.23	1.49	1.81
Phoenix, AZ	I-10 NB/SB	---	1.23	1.43
	I-10 EB/WB	1.39	1.62	1.89
Las Vegas	US 93/US 95/I-515	1.29	1.62	2.02
	I-15	--	--	1.34
Provo / Orem	I-15	---	1.35	1.68
Salt Lake City / Ogden	I-15	1.32	1.90	2.37
	I-15 (Bountiful)	1.38	1.96	2.45

Summary

CANAMEX Corridor states have committed to over \$3.8 billion of highway improvements. Even so, congestion is still expected, primarily in the urban areas. Most urban areas also represent a major crossroads or entry point into the Corridor for east-west traffic. Therefore, the ability to travel through these areas is as important for not only north-south traffic, but east-west traffic as well.

FREIGHT ISSUES

A criteria for being a North American Free Trade Agreement (NAFTA) trade corridor in the United States is the volume of trade trucks annually between the United States and Mexico or Canada. Currently, CANAMEX does not meet the criteria for a major trade corridor, but it is viewed as a “corridor of importance to binational trade.”³ This freight assessment supports the importance of the corridor to national as well as binational trade.

Reviewing current freight activity associated with CANAMEX states also provides insight into the characteristics of truck traffic in the CANAMEX Corridor. As previously indicated, daily truck volumes range from 700 to 14,400 along the CANAMEX Corridor. A better understanding of where freight is travelling to and from, as well as what type of freight it is, will be beneficial in determining the need or importance of improved highway and rail links.

The source of this freight assessment is 1998 commodity flow data extracted from the TRANSEARCH commodity flow database by Reebie Associates. Reebie Associates also provided potential growth factors.

Terms

Several terms are repeated throughout the freight assessment. These include:

- **CANAMEX states** – Arizona, Nevada, Utah, Idaho and Montana
- **CANAMEX Region** – multi-modal flows to, from, within or across the CANAMEX States;
- **CANAMEX Corridor flows** – freight by truck using the CANAMEX road corridor;
- **Domestic CANAMEX freight** – origin and destination within U.S., with one endpoint being a CANAMEX state
- **International CANAMEX freight** – origin and/or destination in Canada or Mexico, with other endpoint being a CANAMEX state
- **Internal CANAMEX flows** – both origin and destination in a CANAMEX state
- **Intrastate Internal flows** – both origin and destination within a single CANAMEX state
- **Interstate Internal flows** – origin and destination in different CANAMEX states
- **External CANAMEX flows** – origin or destination in a CANAMEX state, with other endpoint being a non-CANAMEX state
- **Through freight** – freight moving by rail or truck that has an origin or destination in states west of CANAMEX, with other endpoint being east of CANAMEX – hence, the freight passes across or through the CANAMEX states

For ease of reference, the U.S. was divided into several sectors. The information presented in this report refers to the following sectors:

- **CANAMEX** – Arizona, Nevada, Utah, Idaho and Montana

³ Binational Border Transportation Planning and Programming Study, Task 2: Inventory of Existing and Programmed Binational Transportation Facilities, March 1998, pg. 5.

- **West** – Washington, Oregon and California
- **Immediately East** – Wyoming, North Dakota, South Dakota, Nebraska, Colorado and New Mexico
- **Other East** – remaining continental states
- **Other** – Alaska and Hawaii

Figure III-5 depicts this terminology graphically while Tables III-12 through III-21 present an overview of germane characteristics. Additional detail is provided in tables included in Appendix A.

Existing CANAMEX Region Freight Flows

Total Flows

Table III-12 indicates that over 427 million tons of freight travel to, from and within CANAMEX states, but that an additional 259 million tons travels across the CANAMEX Region. As a result, the CANAMEX Region is a true crossroads, with two-thirds of the freight travelling outside the US or to other regions of the US. Only a small portion of the freight is to or from Canada or Mexico.

Table III-12
CANAMEX Region Freight Flow Summary By Movement

Total Flow			1998 Volume		
			Tons	Percent of	
				CANAMEX States	Total
Domestic	Internal	Intrastate CANAMEX States	203,150,719		
		Interstate CANAMEX States	23,543,687		
		Subtotal Internal	226,694,406	53.0%	33.0%
	External	To CANAMEX States	82,585,533		
		From CANAMEX States	103,413,469		
		Subtotal External	185,999,002	43.5%	27.1%
	Subtotal Domestic			412,693,408	96.5%
International	Canada	To Canada From CANAMEX States	3,787,104		
		From Canada To CANAMEX States	6,795,729		
		Subtotal To/From Canada	10,582,833	2.5%	
	Mexico	To Mexico From CANAMEX States	1,952,189		
		From Mexico To CANAMEX States	2,633,362		
		Subtotal To/From Mexico	4,585,551	1.1%	
	Subtotal International			15,168,384	3.5%
Total CANAMEX States			427,861,792	100.0%	
Through			258,897,636		37.7%
TOTAL FREIGHT TO, FROM, WITHIN CANAMEX STATES AND ACROSS CANAMEX REGION			686,759,428		100.0%

- Internal = Origin and Destination Within 5 CANAMEX States
 External = Origin or Destination in One or More of 5 CANAMEX States
 Intrastate = flows with origin and destination in same state
 Interstate = flows with origin and destination in different CANAMEX states
 Through = flows across CANAMEX Region

Table III-13 presents more detail on the flows associated with the CANAMEX states (i.e. excludes through flows). The largest percentage of CANAMEX Region freight movements (32.5 percent) originate or end in Arizona. Utah accounts for one-fourth of the freight movements. Idaho, Montana and Nevada account for 18.3 percent, 15.2 percent and 9.2 percent, respectively.

**Table III-13
CANAMEX Region Freight Flow Summary By Movement By State**

CANAMEX State	1998 CANAMEX Freight Volumes (Millions of Tons)						Percent
	Internal			External	International	Total	
	Intrastate	Interstate	Subtotal				
Arizona	70.248	4.362	74.610	59.473	5.048	139.131	32.5%
Nevada	18.465	2.018	20.483	18.500	0.545	39.528	9.2%
Utah	52.465	9.094	61.559	42.874	1.568	106.001	24.8%
Idaho	36.268	4.308	40.576	35.896	1.730	78.202	18.3%
Montana	25.704	3.762	29.466	29.256	6.277	64.999	15.2%
Total	203.150	23.544	226.694	185.999	15.168	427.861	100.0%

CANAMEX State	1998 CANAMEX Freight Volumes (Percent of Each State)						Total
	Internal			External	International	Total	
	Intrastate	Interstate	Subtotal				
Arizona	50.5%	3.1%	53.6%	42.7%	3.6%	100.0%	
Nevada	46.7%	5.1%	51.8%	46.8%	1.4%	100.0%	
Utah	49.5%	8.6%	58.1%	40.4%	1.5%	100.0%	
Idaho	46.4%	5.5%	51.9%	45.9%	2.2%	100.0%	
Montana	39.5%	5.8%	45.3%	45.0%	9.7%	100.0%	
Total	47.5%	5.5%	53.0%	43.5%	3.5%	100.0%	

Internal = Origin and Destination Within 5 CANAMEX States
 External = Origin or Destination in One or More of 5 CANAMEX States
 Intrastate = flows with origin and destination in same state
 Interstate = flows with origin and destination in different CANAMEX states

Seventy percent of CANAMEX freight moves by truck and 27 percent by rail, as depicted in Table III-14. Truck is the primary mode of intrastate freight movements (90.6 percent) as well as interstate (69 percent) movements. The mode share of rail increases as the travel distance increases, as reflected in the rail mode share of 44.7 percent of external traffic.

When reviewing international trade, it is important to remember that pipelines move gas and barges move coal. Although these two modes are not primary modes for domestic freight movements, they become key modes for international freight travel to and from CANAMEX states.

**Table III-14
CANAMEX Region Freight Flow Summary By Movement By Mode**

CANAMEX Flows By Mode	1998 CANAMEX Freight Volumes (Millions of Tons)						
	Internal			External	International	Total	Percent
	Intrastate	Interstate	Subtotal				
Rail	18.442	7.236	25.678	83.117	5.048	113.843	26.6%
Truck	184.073	16.254	200.327	100.933	0.545	301.805	70.5%
Air	0.010	0.054	0.064	0.829	1.568	2.461	0.6%
Water	0.625		0.625	1.120	1.730	3.475	0.8%
Other					6.277	6.277	1.5%
Total	203.150	23.544	226.694	185.999	15.168	427.861	100.0%

CANAMEX Flows By Mode	1998 CANAMEX Freight Volumes (Percent of Each Movement)					
	Internal			External	International	Total
	Intrastate	Interstate	Subtotal			
Rail	9.1%	30.7%	11.3%	44.7%	33.3%	26.6%
Truck	90.6%	69.0%	88.4%	54.3%	3.6%	70.5%
Air	0.0%	0.2%	0.0%	0.4%	10.3%	0.6%
Water	0.3%		0.3%	0.6%	11.4%	0.8%
Other				0.0%	41.4%	1.5%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

CANAMEX Flows By Mode	1998 CANAMEX Freight Volumes (Percent of Each Mode)					
	Internal			External	International	Total
	Intrastate	Interstate	Subtotal			
Rail	16.2%	6.4%	22.6%	73.0%	4.4%	100.0%
Truck	61.0%	5.4%	66.4%	33.4%	0.2%	100.0%
Air	0.4%	2.2%	2.6%	33.7%	63.7%	100.0%
Water	18.0%		18.0%	32.2%	49.8%	100.0%
Other					100.0%	100.0%
Total	47.5%	5.5%	53.0%	43.5%	3.5%	100.0%

Internal = Origin and Destination Within 5 CANAMEX States
 External = Origin or Destination in One or More of 5 CANAMEX States
 Intrastate = flows with origin and destination in same state
 Interstate = flows with origin and destination in different CANAMEX states

Internal Freight Flows

Tables III-15 and III-16 look similar but depict two different characteristics of internal traffic. Table III-15 lists the top 10 commodities moving within a CANAMEX state or between CANAMEX states, regardless of mode or specific origin or destination. Table III-16 lists the top trade links, defined as the heaviest specific origin-destination pattern by mode.

Table III-15
CANAMEX Region Internal Domestic Commodity Flows

Top 10 1998 Commodity Movements (Millions of Tons)										
Intrastate Flows					Interstate Flows					
Commodity	Volume By				Total	Commodity	Volume By			
	Rail	Truck	Air	Water			Rail	Truck	Air	Water
1 Clay, concrete, glass or stone	0.808	57.950	0.000		58.758	1 Coal	3.970	0.420		4.390
2 Secondary traffic		48.366			48.366	2 Food or kindred products	0.157	3.608	0.000	3.765
3 Petroleum or coal products	0.772	28.474			29.246	3 Lumber or wood products	0.183	3.526	0.000	3.709
4 Lumber or wood products	0.398	26.076	0.000		26.474	4 Chemicals or allied products	1.513	1.391	0.007	2.911
5 Coal	10.371	5.287			15.658	5 Secondary traffic		2.827		2.827
6 Food or kindred products	0.248	8.248	0.000		8.496	6 Primary metal products	0.098	1.400	0.000	1.498
7 Chemicals or allied products	0.116	5.144	0.001		5.261	7 Clay, concrete, glass or stone	0.383	1.063	0.000	1.446
8 Metallic ores	2.009				2.009	8 Petroleum or coal products	0.337	1.059		1.396
9 Nonmetallic minerals	1.513				1.513	9 Machinery		0.299	0.004	0.303
10 Waste or scrap materials	0.713			0.625	1.338	10 Pulp, paper or allied products	0.177	0.107	0.000	0.284
Above represents 97% of total intrastate flows					Above represents 96% of total interstate flows					

Table III-16
CANAMEX Region Internal Domestic Trade Links

Top 10 1998 Internal Trade Links (Millions of Tons)									
Intrastate Flows					Interstate Flows				
Commodity	O-D	Mode	Volume	Commodity	O-D	Mode	Volume		
								1 Clay, concrete, glass or stone	AZ-AZ
2 Petroleum or coal products	AZ-AZ	truck	21.1	2 Lumber or wood products	MT-ID	truck	1.6		
3 Secondary traffic	AZ-AZ	truck	17.4	3 Food or kindred products	AZ-NV	truck	1.5		
4 Lumber or wood products	ID-ID	truck	16.8	4 Primary metal products	UT-NV	truck	1.2		
5 Clay, concrete, glass or stone	UT-UT	truck	13.7	5 Chemicals or allied products	UT-NV	rail	0.7		
6 Secondary traffic	UT-UT	truck	11.7	6 Lumber or wood products	NV-UT	truck	0.6		
7 Coal	UT-UT	rail	10.4	7 Secondary Traffic	AZ-NV	truck	0.6		
8 Clay, concrete, glass or stone	MT-MT	truck	10.1	8 Chemicals or allied products	UT-ID	rail	0.6		
9 Secondary traffic	ID-ID	truck	8.5	9 Food or kindred products	ID-UT	truck	0.5		
10 Clay, concrete, glass or stone	NV-NV	truck	7.5	10 Lumber or wood products	ID-UT	truck	0.5		
Above represents 68% of total intrastate flows				Above represents 49% of total interstate flows					

Trade Link is a specific commodity by movement by mode

Intrastate flows are generally commodities associated with construction or distribution of goods (secondary traffic is traffic associated with warehouses and distribution centers, rail intermodal and air freight drayages). In terms of tonnage, more clay, concrete, glass or stone is moved intrastate than any other commodity. Coal moving by rail from Utah to Nevada represents the number one interstate trade link (a specific commodity by mode by origin-destination pair).

External Freight Flows

Table III-17 depicts the direction of flow of external CANAMEX Region flows, which represent 27 percent of total flows (including through flows. Roughly 55-60 percent of external freight flows are to states immediately adjacent to the CANAMEX Region. The remainder are to states farther east.

Tables III-18 provides information on commodity movements for external freight. In terms of tonnage coal is the most frequent commodity to and from CANAMEX states.

Through Flows

As previously noted, 38 percent of total CANAMEX Region flows pass through the Region. Along with the 27 percent of external freight flows, this makes the CANAMEX Region a vital connection to other parts of the US. As shown in Table III-19, rail and truck have fairly equal mode shares of the through flows.

Table III-20 indicates the origin-destination of through flows. There appears to be as much through traffic in the northern part of the CANAMEX Region as in the southern part. For west to east travel, approximately 37 percent of freight tonnage is from Southern California to eastern states. Tonnage from Washington and Oregon to eastern states represents one-third. Similar proportions occur in the opposite direction (east to west).

As reflected in Table III-21, there is a variety of commodity types moving across the CANAMEX Region. Food and farm products are among the top commodities.

Commodity Types

The CANAMEX Corridor accommodates a variety of commodities, some heavy materials such as coal and other bulky materials such as food products. What is interesting is to identify the major movements by state to determine if there are major differences that may be pertinent to ruck size/weight issues (discussed in subsequent section). The top movements by truck from each state are:

- Arizona food volume-based
- Nevada lumber weight-based
- Utah primary metals weight-based
- Idaho food products volume-based
- Montana lumber weight-based

Table III-17
CANAMEX External Domestic Origin-Destination Patterns

1998 External Origin-Destination Patterns (Millions of Tons)						
To CANAMEX States			From CANAMEX States			
	From	Volume	Percent	To	Volume	Percent
West	Washington Oregon, California	27.628	33.5%	West Washington Oregon, California	41.708	40.3%
Immediately East	Wyoming, North Dakota, South Dakota, Nebraska, Colorado, New Mexico	22.125	26.8%	Immediately East Wyoming, North Dakota, South Dakota, Nebraska, Colorado, New Mexico	14.037	13.6%
Other East	Remaining continental states	32.822	39.7%	Other East Remaining continental states	47.66	46.1%
Other	Alaska, Hawaii	0.011	0.0%	Other Alaska, Hawaii	0.008	0.0%
Total	All Non-CANAMEX States	82.586	100.0%	Total All Non-CANAMEX States	103.413	100.0%

Table III-18
CANAMEX Region External Domestic Commodity Flows

Top 10 1998 Commodity Movements (Millions of Tons)												
To CANAMEX States						From CANAMEX States						
Commodity	Volume By			Total	Commodity	Volume By				Total		
	Rail	Truck	Water			Rail	Truck	Air	Water			
1 Coal	13.083	0.033		13.116	1 Coal	19.246	0.314		19.560			
2 Food or kindred products	3.098	8.517	0.007	11.622	2 Food or kindred products	2.235	9.478	0.000	11.860			
3 Chemicals or allied products	2.558	6.172	0.027	8.757	3 Farm products	6.228	4.370	0.001	11.093			
4 Petroleum or coal products	1.945	4.000	0.000	5.945	4 Lumber or wood products	2.490	7.979	0.000	10.854			
5 Lumber or wood products	1.903	3.894	0.000	5.797	5 Chemicals or allied products	4.726	5.621	0.043	10.390			
6 Clay, concrete, glass or stone	1.597	3.848	0.002	5.447	6 Petroleum or coal products	2.239	5.722		7.961			
7 Primary metal products	1.606	3.033	0.000	4.639	7 Clay, concrete, glass or stone	1.833	4.885	0.001	6.719			
8 Secondary traffic		4.189		4.189	8 Secondary traffic		5.998		5.998			
9 Pulp, paper or allied products	1.304	1.781	0.009	3.094	9 Primary metal products	2.457	3.491	0.000	5.948			
10 Transportation equipment	1.041	1.999	0.03	3.065	10 Pulp, paper or allied products	0.444	1.692	0.002	2.138			
Above represents 80% of external flows to CANAMEX states						Above represents 90% of external flows from CANAMEX states						

**Table III-19
Domestic Freight Flows Across CANAMEX Region By Mode**

Through Flow	1998 External Domestic Volume By Mode (Millions of Tons)					
	Rail	Truck	Air	Water	Total	Percent
West to East	52.954	53.144	not applicable		106.098	41.0%
East to West	83.187	69.612			152.799	59.0%
Total Through	136.141	122.756			258.897	100.0%
Percent	52.6%	47.4%			100.0%	

CANAMEX Corridor Freight Volumes

The previous discussions focused on freight movements associated with the CANAMEX Region (the five CANAMEX states). These regional flows, especially the intrastate flows, may not use the CANAMEX highway corridor. To provide more insight into the role of the highway corridor in moving freight, Reebie Associates was able to identify what freight movements by truck were routed on the CANAMEX corridor. Four separate segments of the highway corridor were defined :

- I-19 between Tucson and Nogales
- I-10 between Phoenix and Tucson;
- US 93 between Phoenix and Las Vegas; and
- I-15 between Las Vegas and the Canadian border.

Figures III-6 through III-9 indicate the origin-destination of the freight flows on each of the four links, respectively. Pertinent observations by link include:

- I-19 between Tucson and Nogales
 - This link is the gateway for CANAMEX trade to Mexico. As such 70 percent of the freight volume is freight between CANAMEX states (primarily Arizona) and Mexico
 - This link also serves international freight movements between Mexico and Southern California.
- I-10 between Phoenix and Tucson
 - The volume of international trade on this link is greater than on the I-19 link, indicating that freight is using another port of entry (assumed to be in Texas) and using this I-10 link to access the CANAMEX Region as well as California.
 - Although the volume of international trade is greater than on the I-19 link, the domestic flows, including through flows, are significantly greater. This link serves as a vital connection for east-west travel from Mexico and the eastern half of the United States to the CANAMEX Region as well as California.

Table III-20
Origin-Destination Patterns of Domestic Freight Across CANAMEX Region

1998 Through Origin-Destination Patterns (Millions of Tons)						
Through CANAMEX Region Travelling West to East			Through CANAMEX Region Travelling East to West			
From	To	Volume	Percent	From	To	Percent
Washington and Oregon	Wyoming, North Dakota	1.116	1.1%	Wyoming, North Dakota	Washington and Oregon	16.012
	South Dakota, Nebraska			South Dakota, Nebraska	Northern California	4.510
Northern California	Colorado and New Mexico	2.507	2.4%	Colorado and New Mexico	Southern California	2.854
	Remainder of Eastern States	35.105	33.1%		Washington and Oregon	
Southern California	Wyoming, North Dakota	0.554	0.5%	Northern California		1.102
	South Dakota, Nebraska			Southern California		2.414
Total West-East Through Movements	Colorado and New Mexico	1.171	1.1%	Remainder of Eastern States	Washington and Oregon	33.476
	Remainder of Eastern States	23.950	22.6%		Northern California	
Total East-West Through Movements	Wyoming, North Dakota	0.451	0.4%	Southern California		62.269
	South Dakota, Nebraska					
	Colorado and New Mexico	1.686	1.6%			
	Remainder of Eastern States	39.558	37.3%			
		106.098	100.0%			
				Total East-West Through Movements		152.800
						100.0%

Table III-21
Domestic Commodity Flows Across CANAMEX Region

Top 10 1998 Commodity Movements (Millions of Tons)									
Through CANAMEX Region Travelling West to East					Through CANAMEX Region Travelling East to West				
Commodity	Volume By			Total	Commodity	Volume By			Total
	Rail	Truck	Total			Rail	Truck	Total	
1 Miscellaneous mixed shipments	26.783		26.783	1 Food or kindred products	9.889	17.680	27.569		
2 Food or kindred products	6.316	9.057	15.373	2 Miscellaneous mixed shipments	22.146		22.146		
3 Lumber or wood products	7.304	6.015	13.319	3 Chemicals or allied products	9.094	9.812	18.906		
4 Farm products	1.140	9.575	10.715	4 Farm products	18.307	0.556	18.863		
5 Transportation equipment	1.475	2.998	4.473	5 Transportation equipment	4.316	5.295	9.611		
6 Chemicals or allied products	1.376	3.036	4.412	6 Primary metal products	2.533	6.099	8.632		
7 Primary metal products	1.689	3.088	4.777	7 Pulp, paper or allied products	2.080	4.677	6.757		
8 Pulp, paper or allied products	1.238	2.534	3.772	8 Lumber or wood products	1.635	4.070	5.705		
9 Electrical equipment	0.088	2.473	2.561	9 Petroleum or coal products	1.385	2.548	3.933		
10 Fabricated metal products	0.060	2.448	2.508	10 Clay, concrete, glass or stone	0.977	2.335	3.312		
Above represents 88% of flows through CANAMEX Region travelling west to east					Above represents 83% of flows through CANAMEX Region travelling east to west				

- US 93 between Phoenix and Las Vegas
 - This link also serves as a connection for domestic flows travelling through the CANAMEX Region. Over half of the freight volume on this link is between Southern California and Eastern states.
- I-15 between Canada and Las Vegas
 - This link serves a variety of movements. One-third of the freight volume is contained within the CANMEX Region while 22 percent is between CANAMEX states and other US regions. The remaining 45 percent is through flows, with the principal movement being between Washington/Oregon and Eastern states.

These observations translate into the following general characteristics of the CANAMEX freight corridor:

- The CANAMEX Corridor is essentially a “mixing bowl” of freight activity. Freight from CANAMEX states use portions of the corridor to access other regions of the U.S. North of Phoenix, through traffic represents from 45 to 76 percent of the freight movements on a corridor segment. Hence, east-west flows use a portion of the Corridor.
- International freight dominates immediately north of the Mexico border, but then quickly dissipates, using I-10 to travel to and from California.
- There is more international freight on the I-10 segment than on the I-19 segment, indicating that Nogales is not the most popular entry location for international freight traveling to, from or through the CANAMEX Region. However, Nogales is the most important crossing for Mexican goods.

These observations point to the following freight planning directions:

- The corridor does not accommodate one single continuous freight movement, but rather several overlapping long-distance freight movements. Information on travel and weather conditions on east-west as well as CANAMEX corridor segments will be critical in how much of the CANAMEX highway corridor to use to access alternative east-west routes. This suggests that the ITS initiatives oriented towards commercial vehicles are appropriate.
- Urban area conditions will be important in providing good crossroads for the CANAMEX Region to other US states and through freight movements. This suggests that the highway focus on urban area improvements is also appropriate for improving corridor freight mobility.
- Although Canada and Mexico are not major origins or destinations of CANAMEX Corridor freight flows, NAFTA changes may provide more opportunity for additional trade activity. Highway conditions to the Canadian port of entry have more than adequate capacity to accommodate additional activity. The planned improvements to US 93 and the Hoover Dam Bypass are important in adding the capacity necessary to accommodate any additional trade activity.
- There are potentially many reasons why more Mexican freight on the corridor uses international ports other than Nogales as the port of entry. Congestion at Nogales is one possibility. This indicates that the planned improvements at Nogales are justified. It could also be that the freight is originating on the east coast of Mexico

and the lack of a good east-west connector in Mexico is causing freight not to use Nogales. This suggests that coordination and support of road planning efforts in Mexico are warranted.

Future Freight Movements

Reebie Associates also provided national growth factors (for changes between 1998 and 2020) for commodities by mode (see Appendix Table A-10). The percentage growth increases ranged from between 125 percent for instruments and photo equipment (good paying jobs), to a decline in tobacco and apparel shipments (declining economic sectors).

The CANAMEX external and through flows are the largest flows travelling interstate along the Corridor. The highest tonnage commodities are coal, food products, chemicals, farm products, and lumber.. Farm product shipments are expected to increase by 80 percent by 2020, and the remainder of the products are expected to increase between 28 to 43 percent. With the exception of the farm products, these forecasts are consistent with a 1-2 percent annual increase, which is what is reflected in the truck forecasts on the Corridor.

The CANAMEX Corridor is a complex freight network, serving many different movements. To accommodate the future increase in freight activity, there is the need for communication and connections – communication about conditions up and down the corridor as well as on east-west routes, and improved connections through urban areas.

RAIL ASSESSMENT

The *Task I: Existing Infrastructure* Working Paper presented details on rail facilities and movements. This section draws on that information to identify opportunities for future rail planning efforts.

A CANAMEX Rail Route

While there is no rail route through the full length of the CANAMEX Corridor from Sonora, Mexico to Alberta, Canada, a route does exist between Las Vegas and Sweet Grass on the US – Canadian border. This route is made up of the following segments belonging to four railroads.

The **Union Pacific Railroad (UP)**, the largest rail system in the US, operates between Las Vegas and Silver Bow, Montana – a distance of 883 miles. This line consists of the following segments:

- Las Vegas and Salt Lake City
- Salt Lake City and Pocatello; and
- Pocatello and Silver Bow.

Railroads measure traffic density on their lines in terms of millions of gross ton-miles per mile (MGTM/M). At between 30 and 35 MGTM/M, traffic volumes between Las Vegas and Salt Lake City/Ogden are comparatively moderate. North to Salt Lake City/Ogden, ton-mileage declines significantly, except for the northern-most section of the line from McCammon to Pocatello, a segment which is actually part of UP's Portland to Chicago route. North of Pocatello, volumes decline again.

The **Montana Western Railroad (MWRR)**, a “short line” or a local railroad, operates on 51 route miles between Silver Bow (west of Butte) and Garrison, Montana. Annual volume on this line is less than 5 MGT/M.

Montana Rail Link (MRL), a regional railroad, operates a 47-mile section between Garrison and Helena. This line generates an annual volume of less than 30 MGT/M. MRL handles some transcontinental traffic for the Burlington Northern and Santa Fe Railway, with which it connects at Sandpoint, Idaho and Huntley, Montana.

The **Burlington Northern Santa Fe Railway (BNSF)**, the second largest US railroad, completes the route with a 236-mile segment between Helena and Sweet Grass. Annual volume on this northern-most section of the CANAMEX rail route varies. It is less than 10 MGT/M Great Falls to Shelby, and less than 5 MGT/M elsewhere. The line connects with the Canadian Pacific Railway (CP) at Sweet Grass. CP operates 15,500 miles of railroad in Canada and the United States. In Canada, its lines run from Vancouver in the west to Montreal in the east.

While Phoenix is comparatively near the Corridor by highway, it is a long way from the Corridor by rail. This is because there is no line between the two cities that follows a course similar to US 93. Nevertheless, there are three potential rail routes that link Phoenix and Las Vegas. These involve:

- UP: Phoenix to Tucson, Tucson to Colton (in the Los Angeles Basin), and Colton to Las Vegas. With an annual volume of almost 50 MGT/M, Tucson to Colton is one of UP’s busier routes.
- BNSF and the UP: Phoenix to Williams and Williams to Daggett on BNSF, and Daggett to Las Vegas on UP. With an annual volume of about 100 MGT/M, Williams to Daggett is on one of BNSF’s busiest lines.
- BNSF, the Arizona and California Railroad (AZCR), and UP: Phoenix to Matthie on BNSF, Matthie to Cadiz on AZCR, Cadiz to Daggett on BNSF again, and Daggett to Las Vegas on UP.

From a CANAMEX Corridor perspective, all these routes are circuitous, as they go through Southern California. For example, the UP route from Las Vegas to Phoenix is about 900 miles long. Similar to Phoenix, Nogales on the US – Mexican border can only be reached circuitously. A 66-mile UP route to Nogales from Tucson provides the physical connection. The Nogales line connects to Grupo Ferroviaria Mexicana (GFM) and the Mexican rail system in Nogales.

Rail Route Issues

CANAMEX Rail Corridor issues are best understood by breaking out the Corridor into segments. For this analysis, the segments are:

- Southern segment from Phoenix, Tucson and Nogales to Southern California and Las Vegas
- Middle segment from Las Vegas to Pocatello
- Northern segment from Pocatello to Sweet Grass

Southern Segment

As mentioned, the southern-most segment of the Corridor is circuitous. This is because rail routes from Sonora and Arizona enter Southern California before they reach the CANAMEX Corridor in Las Vegas. This routing would result in elongated travel times, adding at least one to two days, if not more, for through traffic moving from Nogales or Arizona origins to Las Vegas and points north. Track configurations on all lines consist of single track with sidings. BNSF and UP main line segments have moderate to heavy volumes.

Of all the potential routes to Las Vegas, the UP route via Colton arguably is the most efficient. Even though it is longer, it is a single-line route. The others would involve multiple carriers, with interchanges that could delay shipments. A potential mitigation for potential interchange delay would be the crafting of marketing and operating agreements among the railroads in the route to expedite shipments.

Middle Segment

The middle segment, consisting of traditional UP routes, is efficient and heavily utilized. This segment handles traffic moving between the Southern California and the Midwest, between the Pacific Northwest and the Midwest, and between Montana/Idaho/Utah and Southern California. Track configurations consist of single track with sidings. There appear to be no particular issues with regard to this segment.

Northern Segment

There are four railroads in the route between Sweet Grass and Pocatello. These are the BNSF, MRL, MWRR and UP. This number of carriers by itself would appear to provide a significant operational barrier, as through traffic would have to change hands four times in the US alone. These rail lines are also low-speed and inefficient compared to other routes, and I-15 trucking option. Because routing alternatives exist for each major railroad, (see next paragraph), there is no industry demand for a north-south connection in this part of the Corridor.

It is noted that the BNSF has recently taken its line from Great Falls to Helena out of service due to sinkholes along the line. It is unknown at this time when the line might be reopened. Traffic that formerly was handled on the line is being routed through Laurel to the east.

Routing Alternatives to CANAMEX

While marketing and operating agreements among railroads can expedite trains, it should be noted that both BNSF and UP have alternative routings that could compete effectively with the CANAMEX Rail Corridor. The alternatives would offer shippers single-line routings that would avoid the potential for delays at interchanges between railroads. Using Phoenix as the southern-terminus, the alternatives are:

- BNSF: Sweet Grass – Great Falls – Laurel – Denver – Albuquerque – Flagstaff – Williams – Phoenix.
- BNSF: Vancouver, British Columbia – Seattle – Portland – Daggett – Phoenix.
- UP: Eastport, Idaho – Spokane – Portland – Colton – Tucson – Phoenix.

Additionally, it should be expected that UP and BNSF would market their single-line routes rather than CANAMEX. This is because moving traffic over their single-line route will earn them more revenue than participating in a multiple-carrier route. Also, Canadian Pacific Railway (CP), which connects with UP at Eastport, is planning to invest more than \$20 million

in its line between Eastport (Kingsgate, British Columbia) and Edmonton. Given these plans and an existing “commercial partnership” with UP to promote the Eastport Gateway, CP can be expected to promote that route over an interchange with BNSF at Sweet Grass.

Border Crossing at Nogales

As noted, UP operates a line running between Tucson and Nogales. The line parallels I-19, and is known as the Nogales Branch. The line connects with Grupo Ferroviaria Mexicana (GFM). GFM operates a north-south line linking Nogales with Hermosillo and ultimately Mexico City. As of 1998, UP handled almost 5 MGTM/M on the line. Shipments included double-stack container service through Nogales carrying auto parts for the Ford/Mazda assembly plant in Hermosillo. Outbound rail shipments from Hermosillo to the US included assembled automobiles.

The rail border crossing is located in the Nogales central business district. Given the crossing’s location and the potential for a traffic increase through Nogales due to NAFTA, the former Southern Pacific Transportation Company (which operated the line until its 1996 merger into the UP system) and the Town of Nogales identified a need to relocate the existing rail line out of the downtown area. According to a 1996 Arizona Department of Transportation study⁴, this relocation would potentially reduce the safety hazards and vehicle congestion associated with an increase in rail freight through the City Center. The new alignments were not discussed as a means to improving the border crossing for goods movement; the report noted that 2,500 carloads per month were being interchanged at the “gateway” or border crossing. Four alignments were identified.

Intermodal Issues

Intermodal shipments consist of trailers on flatcars (TOFC), also known as “Piggyback” traffic, and containers on flatcars (COFC) and “double-stack” traffic. Double-stack refers to a load configuration, whereby two containers are be stacked one on top of another. Articulated five-unit double-stack cars can handle up to 10 40-foot-plus containers.

This business segment is a growing one for both UP and BNSF. System-wide, BNSF intermodal shipments increased 2.16 percent between 1996 and 1998. UP’s volumes during that period stagnated as a result of severe service problems following its takeover of SP. However, UP’s intermodal volume is on the rise again.

Intermodal Flows

UP’s intermodal shipments run on the CANAMEX Corridor in three flows. All are east-west in nature. One flow is between Southern California and the Midwest, which runs on the Corridor between Las Vegas and Ogden. The second is between Portland and the Midwest, which runs on the Corridor between Pocatello and McCammon. The third is between Southern California and the Gulf Coast, which runs on the Corridor between Colton and Tucson.

There is also UP intermodal traffic that originates and terminates on the Corridor. UP’s intermodal facilities in the Corridor are in:

- Las Vegas

⁴ *Interstate 19 Tucson to Nogales Multimodal Corridor Profile Review, Final Report*, Arizona Department of Transportation, October 1996.

- Phoenix
- Salt Lake City
- Tucson (closed in 1998)

BNSF's major intermodal flows cross the CANAMEX Corridor. One flow is from the Pacific Northwest to the Midwest. Another is between Northern California (using trackage rights on UP) and the Midwest. As noted above, a third between Southern California and the Midwest could be considered on the Corridor between Daggett and Phoenix. BNSF also has traffic that originates and terminates on the Corridor. BNSF's intermodal Corridor facilities are in:

- Phoenix
- Salt Lake City
- Shelby

Facilities Provide Reasonable Access to Intermodal Systems

From the lists above, it seems clear that for the most part, these facilities offer intermodal shippers reasonable access to the UP and BNSF systems, with the exception of Tucson. The single largest "gap" in intermodal facilities, however, is between Salt Lake City and Shelby – a distance of almost 600 miles. However, the two railroads have numerous intermodal facilities *near* the Corridor, which further enhance access for intermodal shippers in the Corridor:

UP near-CANAMEX intermodal facilities

- Denver
- Reno and Sparks, Nevada
- Seattle
- Green River, Wyoming
- Nampa, Idaho
- Portland and Hinkle, Oregon
- Various sites in Northern and Southern California

BNSF near-CANAMEX intermodal facilities

- Denver
- Portland
- Seattle
- Spokane
- Various sites in Northern and Southern California

Rail Opportunities

It is important to note that the CANAMEX rail route has meaningful competition. The route, which consists of segments belonging to four US railroads, is flanked on either side by single-line routes belonging to BNSF and UP between Canada and Mexico. Inherently, single-line routes are faster, for there is no potential for delays due to interchanges or hand-offs from one railroad to another, even though they may be longer distance routes, depending on the destination.

It is also important to note that BNSF and UP expectedly would promote their routes over a CANAMEX route, as the revenue potential of a single-line haul versus one that is shared between several railroads is greater.

Nevertheless, not all shipments naturally will go to one or another a single-line route. In the final analysis, it is the shipper, not UP or BNSF, who makes the decision on which route to use. For some traffic, a CANAMEX routing may in fact be the most efficient routing possible. These would, of course, include the traffic that is using portions of the route now, e.g., intermodal movements between Southern California and Salt Lake City. However, in the future, it may include products sourced in Alberta and bound for NAFTA manufacturing operations in Sonora. Other potential moves may exist northbound, e.g., finished products from Sonora to Calgary, Edmonton, and Regina.

To facilitate these moves, CANAMEX states should urge the four US railroads in the CANAMEX rail route to craft marketing and operational agreements that would minimize the potential for delay due to interchanges. Given UP's and BNSF's investments in single-line routes, this likely will not be an easy task. At the same time, the railroads would have an incentive to handle additional traffic to their lines that, with the exception of the UP's Arizona – Southern California line, have available capacity. That is, the new traffic would help cover the maintenance costs of these lines.

Summary

Although improvement to rail service exists in the CANAMEX Corridor, it does not appear that new rail facilities are justified. The next steps that should be considered is to work with the four railroads to develop strategies to improve coordination of service and minimize delays on existing routes.

POLICY AND INSTITUTIONAL ISSUES

Previous sections in this chapter addressed highway infrastructure, rail and air issues, freight mobility needs and ITS operational opportunities. These physical infrastructure improvements require a supportive regulatory framework to develop a quality transportation Corridor. This section highlights issues related to ports of entry, NAFTA and other related topics.

CANAMEX is truly an international corridor. The Corridor actually begins in Canada and Mexico. The Mexican end starts in Mexico City, the capitol of the United States of Mexico. The Canadian end is not so easily determined, but clearly extends beyond Edmonton, the capitol of Alberta.

The roadway between Mexico City and Nogales, Mexico has been designated by Mexican Transportation Department, (*Secretaría de Comunicaciones y Transportes "SCT"*) as one of the ten main highway Corridors in Mexico. The Corridor is a mixture of toll roads and free roads. As of 1998 there remained 291 kilometers of the Corridor that required upgrading of the total 2,168 kilometers. The SCT 1999-2000 Highway Investment Program indicates that there was to be approximately six million US dollars invested on the Corridor.

In Canada, the entire length of the Corridor is within the Province of Alberta. Alberta is the economic center of Western Canada and 83 percent of Alberta's exports go to the US. Alberta is investing CA\$ 1 billion to complete 750 miles of interstate quality 4-lane divided highway between the US-Canada border and the Alaska Highway.

Both border states, Montana and Arizona, have developed strong relationships with their neighbors. Montana and Alberta participate in the Montana – Alberta Advisory Committee (MABAC) which serves as a forum for cross-border issues and to broaden international trade and relationships. MABAC was instrumental in the agreement to combine the vehicle inspection stations.

On the Southern border, the Arizona Mexico Commission (AMC) has been a forum for the interchange of economic, political and cultural ideas and issues.

International Border Ports Of Entry

Existing Conditions

The International Ports of Entry on the CANAMEX Corridor exist at Nogales, AZ (Mexican) and Sweet Grass, MT (Canadian). Both of these sites have undergone improvements in recent years and are continuing to be enhanced. The goal of these enhancements is to make the process of moving goods through the border simpler, quicker and more efficient.

Both international border crossings are served by interstate highways (I-19, I-15) and rail access. The crossings connect with major highways in the adjacent countries. At Nogales, I-19 connects with Mexican Highway 15. At Sweet Grass, I-15 connects with Canadian Highway 4.

Nogales is the largest port of entry for winter vegetables in the United States. Commercial daily truck traffic at the Nogales Port of Entry varied from 400 to 1,200 vehicles per day in 1999 with the heaviest traffic occurring during the winter months. A total of 14.4

million passengers and pedestrians; 255,412 commercial trucks; and 34,485 rail cars crossed the border from Mexico in 1999.

The Nogales Port of Entry actually consists of three crossings. Nogales I (Dennis DeConcini) and Nogales II (Morley Gate) are located in the downtown area of Nogales, near the terminus of I-19. Nogales III (Mariposa) is located on SR 189 approximately 1.5 miles west of Nogales I & II. Nogales I has pedestrian, passenger vehicle, and rail access between Mexico and the United States. Nogales II is only a pedestrian crossing and is located immediately east of Nogales I. Nogales III serves commercial and passenger vehicles.

The US facilities at Nogales I were constructed in 1964 with a new facility constructed in 1994. The pedestrian crossing at Nogales II was constructed in 1924. Nogales III facilities were constructed in 1984.

Access to Nogales I and II is provided by Grand Avenue, which interchanges with I-19 at Crawford Street. Nogales III is accessed via SR 189 (Mariposa Road) which interchanges with I-19 approximately 3.1 miles north of the border crossing. Mariposa Road is a two-lane facility from Nogales III to I-19.

The Nogales I and II are open daily. Nogales I is open 24 hours. Nogales III is open from Monday through Saturday, 10 a.m. to 6 p.m. Nogales III is open between the hours of 6 a.m. and 10 a.m. The Mexican ports of entry are open similar hours. The downtown port is open 24 hours a day. The Mexican Customs at the port of entry opposite of Nogales III is open the same hours as the United States Customs Service (USCS) for the release of shipments to the United States; and between the hours of 8 a.m. and 6 p.m for import purposes.

The Sweet Grass, MT Port of Entry is located at the terminus of I-15 in the United States and Canadian Highway 4. The port is open 24 hours in both directions. A total of 208,812 passenger vehicles, 125,607 commercial trucks and 946 buses crossed the border from Canada in 1999.

A Sweet Grass/Coutts Project in Commercial Vehicle Operations is designed to coordinate two different automated vehicle identification (AVI) systems used in the US and Canada. Projects planned as part of this study include a weigh-in-motion and coordinated weight station bypass criteria. Future phases will include coordinated ITS/CVO technologies, custom and immigration policies.

Recent/Planned Improvements

The International Ports of Entry continue to undergo improvements. In 1998, two “SuperBooths” and two bypass lanes for pre-cleared commercial vehicles were constructed at the Nogales III port. A Cargo Search Vehicle Inspection System, or Truck X-Ray, was completed in 1999. In addition, a mobile gamma x-ray unit was also installed that has been beneficial for the examination of tanker vehicles.

The port has been undertaking the “Mariposa Cargo Redesign Project” to enhance processing of commercial vehicles. These improvements include a Drug Screening Area, Rapid Enforcement Lanes and a designated enforcement section on existing docks.

The pre-primary Drug Screening Area consists of a shelter outside of the Customs compound where commercial vehicles are inspected while they are queuing for entry into the compound. The shelter includes platforms and catwalks that permit the inspectors to inspect the

entire truck. In addition, teams of drug sniffing dogs work the queuing line as well. The Drug Screen Area has substantially improved Customs ability to inspect commercial vehicles and has greatly reduced delays associated with congestion because the vehicles are inspected prior to their entry into the compound.

The State of Arizona has also installed two slow speed weigh-in-motion scales at the immediate approach to the Customs Drug Screening facility in order to pre-weigh all incoming commercial vehicles.

In November 1999, Arizona applied for two projects under the US Department of Transportation Allocation Act, Border Safety Programs for the Port of Nogales. These projects are:

- Commercial Vehicle Port Intelligent Transportation System (EPIC 2) \$800,000
- Commercial Vehicle Inspection Station Land Acquisition. \$1,175,000

These applications are part of a facility improvement effort at Nogales III which has to date received \$3.68 million in federal grants. In August 2000, two additional Federal Coordinated Border Infrastructure Grants were applied for which seek an additional \$1.55 million for further port enhancements.

A recent port efficiency study recommended redesign of the entrance and deployment of a Traffic Management System that utilizes Intelligent Transportation Technology. EPIC 2 is such a system.

In September 2000, the Arizona Department of Transportation commenced the bid process to construct the first phase of a new State / Federal Port Annex that will include a new truck safety inspection building and adjacent parking and circulation lanes. The cost for this project will be about \$5 million.

The lack of space available around Nogales III and congestion caused by customs brokers processing paperwork on the Mexican side is hindering the speed at which trucks can be processed.

The City of Nogales and Santa Cruz County are undertaking a study to determine the feasibility of new north-south, east-west connector road and I-19 frontage roads. This is a regional transportation plan intended to develop proposed roadway Corridors. The project has proposed four Corridors for consideration. The proposed north-south connector would provide new four-lane divided access from Nogales III to I-19.

The State of Arizona, in collaboration with federal inspection services is cautiously optimistic that the many new port improvements taking place at Nogales III will add to the overall efficiency of this, the sixth busiest cargo port along the US – Mexico border. The current expansion of the Mariposa facility appears to address many future needs and problems of the border agencies. However, the facility was built in 1984 with a utility life of about 25 to 30 years. The expansion of the facility really only addresses the expanded roles of the port of entry such as vehicle inspection and may not change the life expectancy of the facility.

A future alternative to the eventual redevelopment of Nogales III is the creation of an inland port authority. A good example is the Northern Express Transportation Authority (NETA), also known as the Port of Northern Montana in Shelby, Montana. NETA is an inland port authority chartered under the laws of the State of Montana. NETA was responsible for the

construction of a bulk transload facility, warehousing and transit facilities and the approval of the Free Trade Zones in northern Montana. NETA also initiated the agreement between Montana and Alberta authorizing Canadian truck weight limits on U.S. Interstate 15 between Sweet Grass and Shelby.

An inland port authority in the Nogales region could develop a new port of entry with warehousing facilities, customs broker offices, federal and state inspection facilities. In addition, the port authority could be involved in the planning of roadways and airport expansions and discussions with Mexico regarding trade related issues and cooperation.

In Mexico, a new by-pass (*periférico*) was recently completed. The by-pass is a secure, very limited access roadway that permitted Mexican customs to relocate the customs facility. The Mexican customs facility was moved from its former border location to a site inside Mexico. Due to the relocation of the facility, and the secure nature of the by-pass, Mexican customs allows US trucks to enter Mexico up to the new customs facility.

The new by-pass is a substantial improvement over the old roadway. The old roadway was narrow and made it difficult for passenger vehicles to pass the commercial vehicles queuing for the Mariposa commercial facility. Trucks no longer prohibit the movement of passenger vehicles to the passenger facility at Mariposa.

At the Sweet Grass/Coutts Port of Entry, significant plans are currently being prepared for construction of a new joint border crossing facility. The two-year construction period was projected to begin in March 2001, however this has been delayed. This project will construct a new joint facility for US and Canadian operations. In addition to the \$26 million Main Port Building, other facilities include a US Commercial Inspection Building and Secondary Inspection Building, Canadian Inspection and Tertiary Inspection Buildings. A joint Alberta/Montana vehicle inspection station is also planned.

The projects are designed to reduce processing time and costs. The project is also programmed to provide additional commercial truck storage and parking. A weigh-in-motion system is also currently planned for the facility. Funding for the project is being provided by US General Services Administration (GSA), State of Montana, Province of Alberta and Canadian National Government.

The State of Montana and the Province of Alberta have concerns over which portions of the proposed projects will actually be constructed. Truck storage and automation of the port are high priority issues to be addressed. Current plans omit any parking improvements and automation of the port, however, the facility is being planned to incorporate these improvements at a later date. The State of Montana is currently considering improvements near the port, independent from the joint project, in order to address the truck parking issue, which will continue to impact capacity when the new facility opens.

Recent grants to Sweet Grass include \$700,000 for automated permit ports (APP), including equipment and facilities modifications at nine sites around the country, including the port-of-entry at Sweet Grass. The APP is an alternative inspection system to extend the hours when a person involved in the program may enter the United States. The program involves a photo-ID, personal identification number and voice recognition. An amount of \$500,000 was granted to Sweet Grass for the CVO projects.

Truck Weight Issues

The Port of Entries (POEs) in each of the CANAMEX states have the mission to ensure compliance with motor carrier regulations; to provide assistance and information to the motor carriers; and to assist in the preservation of the highway system and the safety of the traveling public. This mission is accomplished through safety inspections and educational programs provided to commercial vehicle drivers and motor carrier companies. The states have ports of entry along the CANAMEX Corridor to enforce the laws and regulations of the state.

Any vehicle exceeding 80,000 pounds requires special permit in each of the CANAMEX states. Each state along the CANAMEX Corridor has different maximum allowable weights for the permitted trucks. Table II-26 shows the different requirements for trucks traveling along the Corridor. Longer Combination Vehicles (LCV or “triples”) are also listed in the table.

**Table II-26
Truck Gross Vehicle Weight (GVW)
Maximum Allowable by State**

State	Max. Allowable Gross Vehicle Weight * (GVW) (lb)	Longer Combination Vehicles (LCV - “Triples”)	
		Length (ft)	Weight (lb)
Arizona ¹	80,000	Not Allowed	
Nevada	129,000	105	129,000
Utah	125,000	105	129,000
Idaho	105,500	105	105,500
Montana	122,620	105	131,060
Canada	137,500	82	137,500
Mexico	136,600	102	132,000

* See following paragraphs for additional discussion

¹ Arizona does allow trucks weighing up to 129,000 pounds on I-15 in the northwest corner of the state.

Source: State DOTs, Ports of Entry

Truck maximum weight is calculated on the Federal Bridge Formula for non-reducible loads. The number of axles and axle spacing of the vehicle determine the maximum allowable weight for a truck hauling a reducible load. The standard allowable axle weights are 20,000 pounds for a single axle, 34,000 pounds for dual (tandem) axle and 42,500 pounds for triple (tridem) axle.

Arizona’s ports of entry along the CANAMEX Corridor are located at Nogales on I-19 and in Kingman on Highway 93. Arizona does not have a published maximum allowable truck weight, however does allow overweight permits, provided standard axle weights are not exceeded. Arizona does allow trucks weighing up to 129,000 pounds on I-15 in the northwest corner of the state.

Nevada has no Ports of Entry. The maximum operating weight for trucks in Nevada is 129,000 pounds. Nevada uses standard maximum axle weight and the Federal Bridge Formula to permit overweight loads. Overweight/Oversized loads are typically not routed on US 93 over the Hoover Dam.

Utah presently has ten permanent and one mobile ports of entry. Along the CANAMEX Corridor, the ports of entry are located in St. George and Perry. Utah authorizes gross vehicle

weights up to 125,000 pounds. Non-divisible (non-reducible) loads are subject to the Utah Bridge Formula. Longer combination vehicles are not allowed in the construction area of I-15. They must use I-215 as a detour.

Idaho has a total of eight primary ports of entry. Along the CANAMEX Corridor, Idaho has primary ports of entry in Inkom and Sage Junction. Rover ports of entry in Pocatello and Idaho Falls supplement the primary ports. In Idaho, a maximum weight of 105,500 is allowed for interstates and major highways. A pilot test project allowing weights up to 129,000 is being conducted with US 93/SH 33, US 91/SH 34 and US 30.

Montana's ports of entry along the Corridor are located in Lima, Butte, and Sweet Grass. Truck maximum weight in Montana is allowed at 122,620 pounds provided that axle weights are distributed at maximums.

As reflected in the freight assessment, the type of commodities traveling by truck to/from the various CANAMEX states differ in bulk and weight characteristics. Lumber shipments on Montana roads have weight issues while the food products on Arizona's highways tend to "cube out" in volume before weight restrictions apply. With these different characteristics, a single standard may not necessarily encourage freight activity.

As CANAMEX becomes a corridor between three nations, coordination with the regulations in Canada and Mexico become more vital. Currently, the Canadian regulations, established as a result of the Road and Transportation Association of Canada study, provide for maximum axle weight limits of 12,125 pounds for steering (single) axle, 37,479 pounds for tandem-axle and 46,297 to 52,911 pounds for tridem axle. The maximum gross vehicle weight is up to 137,500 pounds. Each of these weight limits is higher than the presently allowable US standards.

The federal government establishes vehicle weight standards in Mexico. Maximum axle weights are 14,330 pounds for steering axle, 42,990 pounds for tandem axle and 49,604 pounds for tridem axle. Maximum gross vehicle weight is also higher than US Standards at 136,600 pounds.

Institutional And Regulatory Issues

The initial step toward the effective movement of goods in North America was made under the U.S. – Canada Free Trade Agreement (US-CA FTA) entered into in 1987. The US-CA FTA permitted U.S. and Canadian truckers to operate in the each other's country with far greater flexibility. This greatly improved the efficiency of trucking companies and reduced the cost of producing goods in both countries. This has continued to be a major influence on the increase of trade between the two countries.

The concern over international trucks from Mexico inundating US highways has been an issue since the signing of the North American Free Trade Agreement (NAFTA). NAFTA sought to reduce and then eliminate commercial vehicle restrictions between the three nations. The steps to eliminate the restrictions were to take place in December 1995 and December of 2000. After 1995, the NAFTA was to allow trucks to complete freight pick-ups and deliveries in border states of the US and Mexico. After 2000, NAFTA would allow trucks to have full access to both countries for international cargo.

NAFTA also allows investment in motor carrier operations in other NAFTA countries. Mexican carriers were to be permitted to create or invest in motor carrier operations in the

United States and Canada. US and Canadian carriers were to be permitted to invest in motor carrier operations in Mexico. Their percentage of ownership in Mexican motor carriers was to increase incrementally over the past 5 years. The investment provisions were intended to allow a single company to have access to the entire North American region in December of 1995.

Currently, Canadian law does not prohibit Mexican motor carriers from operating in Canada. Mexico has provided operating permits to Canadian carriers, but those carriers have not taken advantage of the opportunity to operate in the Mexican Border States.

The US Department of Transportation's Secretary Federico Peña announced in December 1995 that the US would not formally process the Mexican applications for the authority to operate in the US as was scheduled under NAFTA. This announcement was based on the perceived increased risks in terms of public safety, the environment, illegal drug movements, and the impact that Mexican truck traffic would have on US roadways.

United States and Mexican officials recently agreed to the eventual opening of the border to international truck traffic. According to a May 1, 2001 Department of Transportation Press Release, Mexican truckers will be permitted to operate throughout the United States before the end of the year. The Department of Transportation has issued three proposed rulemakings for the safe operation of Mexican truckers within the United States and the full implementation of the terms of NAFTA. The amended regulations should be given final approval in the Fall of 2001.

It is anticipated that truckers from both sides of the border will not begin large scale cross border operations until they understand all of the ramifications. There remain concerns about immigration and language requirements, as well as local law enforcement's understanding of the changes.

New freight operation methods will undoubtedly come into existence when the border is open. Opportunities will arise for freight forwarders and consolidators to move further away from the border. Multi-modal/intermodal centers may be constructed further away from the borders along I-19, I-10 or I-15. These developments will allow freight to be processed more rapidly through Nogales and Sweet Grass and create different trade patterns. Since this process is still progressing, it is difficult to predict how trade will exactly be affected.

AIRPORT IMPROVEMENTS

In the *Task I: Existing Infrastructure Working Paper*, the location and activity of airports in the CANAMEX Corridor were identified. The Primary Commercial airports, other commercial airports and significant General Aviation Airports were depicted for each state in Figures II -9 through -12 of that paper.

Each of the major airports along the CANAMEX Corridor has significant improvements planned over the next 30 years. The improvements are geared towards improving capacity, access and operations as well as land acquisition to mitigate noise and protect expansion potentials. Passenger Facility Charges (PFCs) are assessed at Phoenix, Tucson, Las Vegas and Salt Lake City. These charges provide a source of revenue for commercial airports to assist in development of the facility.

The freight activity in the Corridor is focused on the three major airports – Phoenix, Las Vegas and Salt Lake City. Tucson also has significant freight activity. The addition of a FedEx hub at Great Falls, MT will significantly increase freight activity at that airport.

In addition to the importance of cargo activity in the Corridor, the vitality of smaller commercial and rural airports is vital to the growth of the Corridor. Rural airports provide emergency response, improved safety and cargo/“just-in-time” delivery capability for the rural portions of the Corridor. Many rural areas throughout the Corridor have limited access to convenient air service. This transportation mode is very important in developing rural areas. Convenient air service supports many aspects of electronic commerce and enables a larger population to enjoy a rural lifestyle while being connected to business centers. Investment in these airports is important in order to maintain their viability.

New Airports

Four locations along the CANAMEX Corridor are pursuing new airports. These are Phoenix, AZ; Las Vegas, NV; Mesquite, NV; and St. George UT. Mesquite and St. George are separately undergoing the site selection process for new airports. Both of these existing sites are constrained from expanding to meet increasing demand. This section of the CANAMEX Corridor is projected to exceed normal growth rates. Highway improvements are recommended for this rural section of the Corridor. Evaluation of a single, joint location for both communities in the tri-state (NV, AZ, UT) area may be beneficial. Additional commercial and cargo capacity will be required within the planning horizon.

Las Vegas - McCarran, also constrained from additional expansion, is protecting future growth by purchasing property around Ivanpah Valley Airport south of Las Vegas. Development of this facility is not expected in the near future, but ultimate development will occur towards the end of the planning horizon of this report.

The Maricopa Association of Governments (MAG) has initiated preliminary investigation for a new general aviation airport site in Northwest Phoenix, for construction more than twenty years hence.

Major Improvements

The following paragraphs highlight some of the major improvements committed or projected at the airports.

Tucson International

Tucson International Airport has initiated construction of a \$66 million terminal expansion and rental car upgrade scheduled for completion in 2003. Other projects include:

Land Acquisition for Noise Abatement	\$11.0 Million
Land Acquisition for Parallel Runway	\$ 4.2 Million
Apron and Taxiway Reconstruction	\$ 2.8 Million
Taxiway Construction	\$ 3.2 Million
Access Road and Taxilane Construction	\$ 0.6 Million
Apron Construction	\$ 1.4 Million

Phoenix - Sky Harbor

Phoenix Sky Harbor International Airport is undergoing an aggressive expansion program that has 78 construction projects, at a cost of \$619 million, currently underway. A third runway south of the existing South Runway has been completed. The runway is scheduled for completion in fall 2000. The north runway is being reconstructed and extended to 12,000 feet (\$8 M). A new 12-gate concourse in Terminal 4 was opened in 1999 to accommodate increasing passenger traffic. 24th Street relocation is currently under construction. This project was required as a result of the North Runway extension. Parking expansion at Terminal 4 and Economy Parking is under construction. Additional land acquisition (\$ 3.6 M) is also programmed.

The volume of air cargo increased nearly 70 percent at Sky Harbor between 1993 and 1997. This growth is expected to continue at a rate exceeding ten percent annually for the near future. To accommodate existing activity and anticipate continued growth, a new 172, 600 SF Cargo facility opened in 2000. Renovation and reuse of existing cargo facilities is expected in an effort to attract additional air cargo activity.

Las Vegas – McCarran

McCarran Airport continues to undertake significant projects to upgrade existing facilities. Some of these programmed projects include:

Aircraft wash Pad	\$ 2 Million
Land Acquisition for Part 150 Noise Abatement	\$ 5 Million
Land Acquisition for access	\$80 Million
Common Rental Car Facility	\$60 Million
Drainage / Stormwater Improvements	\$ 5 Million
Taxilanes and Utilities (West side hangar)	\$ 1 Million

There are presently four air carrier runways at McCarran. Further expansion of McCarran would not be cost effective. McCarran is surrounded and constrained by the Las Vegas Strip, a college campus, extensive residential, industrial and commercial development, interstates and railroads. Existing plans will sustain the airport for short and mid term planning horizons.

To maintain the viability of long-term airline service for Las Vegas, Ivanpah Valley (approximately 32 miles south of Las Vegas) has been selected, from several years of study, to be developed for full commercial operation. The site is proximate to I-15 and Union Pacific railroad. The state has programmed \$60 million, initially for purchase of the property.

Salt Lake City

Salt Lake International Airport is presently undergoing re-evaluation of the airport development program set forth in 1998. The original program included major reconstruction of the entire terminal complex. Current evaluation is determining the extent of the original design that will be undertaken. The airfield drainage is currently being upgraded along with interior upgrades in anticipation of the 2002 Olympics. The airport has good access from I-80 and is close to I-215 and I-15. No major upgrades of existing runways, aprons or cargo facilities are planned.

Other Airports

Other airports along the Corridor serve as relievers and other commercial airports to provide additional commercial passenger and freight capacity to the Corridor. Other major

activity and sample airport projects in the CANAMEX states are listed in the following paragraphs.

Arizona

The Maricopa Association of Governments (Phoenix) has responsibility for airport planning for 15 general aviation airports. Recommended improvements include new runways at Glendale and Goodyear Airports. Williams Gateway Airport has been converted from a military installation, to a facility serving general aviation and commercial cargo activity. In addition to these major improvements, MAG has initiated preliminary investigation for a new general aviation airport site for construction more than twenty years hence. Other recommended improvements at selected airports are described in the following paragraphs.

Avra Valley Airport has security fencing (\$350 K) and fire protection upgrades (\$770K) scheduled. Other projects include a taxiway reconstruction (\$1 M), land acquisition (\$1 M) and Apron Construction (\$3.5 M).

Casa Grande Municipal Airport is building a new terminal (\$200 K) and protecting the airport with perimeter fencing (\$430 K)

Chandler Municipal Airport is programmed to purchase land (\$2.3 M) for expansion. New apron construction (\$1.1 M) is scheduled along with a Helipad (\$1.6 M), taxiway (\$450 K) and realign the access road (\$710 K).

Deer Valley airport terminal is undergoing remodeling. Additional parking and T-Hangars are being constructed. Land Acquisition (\$2.2 Million) to protect expansion is programmed

Kingman Municipal will upgrade the runway pavement and lighting (\$825 K) and a runway extension 1,050' (\$2.4 M). The airport is scheduled for construction of a new terminal (\$1.6M).

Mesa – Falcon Field is programmed to reconstruct the taxiway (\$444 K) and widen its runway (\$333 K). The airport will also add a new apron expansion (\$1.1 M), upgrade lighting and signage (\$900 K) and install security fencing (\$260K). Land acquisition for expansion (\$483K) is programmed. Additional auto parking (\$240K) is scheduled. The runway is also recommended to be extended.

Phoenix Goodyear recently opened a new terminal. Additional T-hangars are being constructed.

Prescott - Ernest Love Field will reconstruct the Apron (\$910 K), construct a new terminal (\$2.2 M) and reconstruct the runway (\$3.2M) and taxiway (\$850 K).

Wickenburg Municipal Airport is scheduled to expand its apron (\$150 K) and resurface the runway (\$436K). A runway extension is also recommended in the MAG plan.

Nevada

Henderson Airport is expanding with Land Acquisition (\$5 M), adding a new entrance road to the airport (\$1 M) and expanding the aircraft ramp (\$1 M).

Mesquite Airport is installing an Automated Weather Observing System (AWOS) (\$85 K), and paving some access roads on the airport (\$42 K). The FAA has provided funding for the initial phase of a Site Selection Study, Airport Master Plan, and an Environmental Assessment for a new airport site to accommodate commercial aircraft operations. Once a preferred site is identified, the Master Plan and Environmental Assessment Study phase will begin. (See St. George, Utah)

North Las Vegas Airport is developing its hangar area (\$500 K), constructing facilities for based aircraft (\$5 M) and acquiring land (\$7.6 M).

Utah

St George Municipal Airport is located on a mesa top without the possibility of extending the 6,600' runway. As the St George area continues to grow, potential commercial service for the area is anticipated. A new site selection process has identified six potential locations for a new airport. One potential location is near Littlefield, Arizona approximately 25 miles from St. George and 9 miles from Mesquite, Nevada.

Idaho

Proposed projects at Pocatello Regional Airport include rehabilitating the General Aviation Apron (\$556K), and access road. Taxiway "A" is to be relocated with upgrades to navigational aids (\$2.4 M).

Fanning Field (Idaho Falls) is planning a Terminal renovation/ improvement project (\$2.6 M) and renovation of the General Aviation apron (\$722 K).

Montana

The only Montana airport with significant air cargo activity is Billings, which is significantly removed from the CANAMEX Corridor. The air cargo activity for the three primary airports along the CANAMEX Corridor Butte, Helena and Great Falls combined for less than 2000 tons in 1998. This cargo activity will change with the new FedEx hub at Great Falls.

ITS OPPORTUNITIES

The *Task IV: Emerging Technologies* Working Paper identified several common themes associated with intelligent transportation system (ITS) technologies in the CANAMEX Corridor:

- the need for some level of coordination for traveler information throughout the full corridor, as well as data collection and analysis;
- the need to unify interface and communications standards for commercial vehicle functions along with sharing of information for intermodal activities; and
- the need to provide expanded traffic and incident management and information functions for rural corridors and national park areas.

Two corridor-wide programs have been developed for the CANAMEX Corridor – a CANAMEX Smart Tourist Corridor and a CANAMEX Smart Freight Corridor. Both of these require a shared CANAMEX Corridor Transportation Management and Information Network (CT-MAIN).

Corridor Transportation Management and Information Network (CT-MAIN)

This program would include the following elements:

- Data sharing and coordination between all five CANAMEX states for transportation planning purposes.
- Traveler information database for real-time dissemination by private sector information providers as well as over Corridor web Site. This includes connectivity to ATIS and ATMS activities in metropolitan regions as well as initiatives at National Parks and other attractions.
- Coordination of incident management and commercial vehicle operations activities across the five states as well as with Canada and Mexico.
- Coordination of operational strategies related to construction or rerouting activities that may involve multiple states (e.g. construction work on US 89 in northwest Arizona may have implications for travelers headed from Nevada to Arizona).

Components would include a communications network (either Internet-based or a private network) tying together traffic management, emergency operations and commercial vehicle systems centers, and may include a “central” CANAMEX Management Center if deemed to be of value through the Corridor ITS Architecture development process. Such an architecture-development process, in addition to providing a link between current ITS activities throughout the five states, will establish the most cost-effective, institutionally acceptable and efficient means of providing transportation management and information services not currently being addressed on a Corridor-wide basis.

Smart Tourist

This program would support the “branded identity” for a route system throughout the CANAMEX Corridor that supports the needs of recreational travelers (tourists). Associated with this network would be traveler information services supported by the coordination activities in the CT-MAIN program. The Smart Tourist program would support public-private partnering activities in order to provide tourist-oriented real-time information services at strategically-located kiosks at rest areas and tourist centers. One means of defraying the cost of deployment will be through the integration of Traveler Services Information activities. Traveler information in general for Smart Tourist would be provided over a CANAMEX traveler information web site, with additional support available for wireless web services such as those being supported over wireless telephone and handheld computers, as well as in-vehicle systems.

Traveler information may include static and real-time information, including:

Examples of static information

- location of rest areas
- location of national parks and other landmarks
- international border crossings
- traveler services information (hotels, gas stations, restaurants, hospitals, etc.)
- hunting, fishing license information

Examples of real-time information

- weather conditions (current and forecast)
- highway blockages and anticipated delays due to construction
- highway incidents and lane closures
- congestion locations

Also included would be specific en-route information elements such as variable message signs (VMS) and highway advisory radio (HAR) that would support real-time information and demand management activities. Provision of parking facilities and transit shuttle services to and from national parks and other attractions would be supported through the Smart Tourist program. The national parks along the Corridor are shown in Figure II-10.

The system would also support open standards for communication to in-vehicle and wireless Internet devices through partnerships with private sector services.

Smart Freight

The Smart Freight program would provide the mechanism to: 1) integrate and standardize state and provincial commercial vehicle administrative processes; 2) support interoperability and integration with federal trade movement data systems; and 3) provide the availability of better traveler information and facilities for conducting electronic commerce and coordination between commercial carriers and intermodal facilities. It would also provide a “branded identity” that would also be expanded to physical travel routes for commercial vehicles throughout the Corridor, and would expedite the completion of CVISN services throughout all five states in the Corridor.

The system is to provide service information oriented to commercial vehicle operators and motor carriers, whether over the Web at strategically located trucks top kiosks, or through in-vehicle systems that may be implemented as a result of public-private partnerships.

Traveler information may include static and real-time information, including:

Examples of static information

- location of rest stops
- location of truck stops
- international crossing requirements and operating hours
- locations and facilities for conducting electronic commerce and processing of international shipments
- agriculture inspections facilities at border crossings
- information on obtaining permits

Examples of real-time information

- weather conditions (current and forecast)
- highway blockages and anticipated delays due to construction
- congestion information
- highway incidents and lane closures

Included would be en-route information elements such as variable message signs (VMS) and highway advisory radio (HAR) that would support real-time information associated with commercial operations and advisories along Smart Freight routes.

Hazardous Materials (HazMat) activities would be served through use of automated roadside inspection and vehicle tracking schemes that would permit states to track HazMat shipments. Those shipping companies would be required to set up a network connection between their vehicle tracking systems (or to procure them if not currently in place) and a standard geographic information standard throughout the corridor.

International Trade Processing (ITP) Centers and Intermodal Centers would be incorporated into this network. In particular, the development of ITP Centers is to be encouraged by the CANAMEX Corridor as a method to reduce delays with respect to credentials and administrative processes, and will permit direct transportation of containers across international borders with reduced delay. Centers in strategic locations near railway terminals and intermodal interfaces should be identified for implementation.

To implement this effort, a comprehensive project plan should be developed that will help guide the stakeholders in the CANAMEX Corridor in deploying the Smart Freight program. This should be done in coordination with development of the Corridor ITS Architecture.

SUMMARY

The analysis of highway, freight, rail, port of entry and ITS conditions has identified several common themes.

- The CANAMEX Corridor is an emerging corridor. As growth continues in the CANAMEX states, there is the potential to support economic development by ensuring that the corridor provides users three key elements – capacity, connectivity and communication.
- The CANAMEX Corridor is a complex network of multi-state movements. With committed improvements in place, there will be sufficient interstate capacity to accommodate future flows. Pinchpoints, however, will occur in major urban areas. There is the need to address urban mobility needs, especially for trucks.
- The CANAMEX Corridor is a connection in many east-west routes. Enhancing connectivity during the planning of improved urban capacity could improve connectivity and encourage use of the CANAMEX Corridor.
- The CANAMEX Corridor serves more out-of-corridor travel (through trips or CANAMEX Region to/from other regions) than just in-corridor travel (strictly between CANAMEX states). Information about conditions ahead and on major cross-routes would enhance the corridor and encourage tourists and trucks to use this Smart corridor.

Section IV

TRANSPORTATION INVESTMENT STRATEGIES

This section of the report describes the elements of proposed transportation-related investment strategies. The costs and transportation benefits of these strategies are discussed and the inputs provided for the economic evaluation are noted.

PROPOSED TRANSPORTATION INVESTMENT STRATEGIES

The evaluation of current and future transportation conditions in the CANAMEX Corridor points top three potential transportation investment strategies:

1. Highway improvements, especially in urban areas
2. Tourist-oriented ITS program
3. Commercial vehicle ITS program

These strategies address the need for capacity, connectivity and communication.

Highway Improvements

Proposed Projects

Based on the highway deficiencies outlined in Section III, projected segment improvements are recommended along the Corridor. Table IV-1 provides estimated costs for improvement recommendations by 10-year increments correlated to the traffic volume future year traffic volumes. Some recommendations include the possibility of bypass alternatives. These alternatives are not meant to dictate a specific route, but merely that additional lane capacity is required to accommodate the projected growth in traffic volumes. Other recommendations are based on upgrading the CANAMEX Corridor to stated minimum criteria. The implementation of ITS strategies to get information to truckers, tourists and motorists is recommended as a low cost means of improving capacity on existing facilities. Tables IV-2 and IV-3 provide the v/c ratio for the 10-year increments following the improvement for rural and urban sections, respectively.

The recommendations provided in this study are derived from this study's evaluation. The results have not been coordinated with the multitude of other studies on-going in the CANAMEX Corridor. Specific results and costs may vary from these other studies. The costs set forth in this report pertain only to the CANAMEX portions of roadways.

The Tucson urban area needs additional lane capacity on both I-19 and I-10. In Phoenix, the additional lane capacity will be difficult to achieve in the urban area due to encroaching development. Therefore, the implementation of ITS should be a high priority. These alternatives should continue to be developed. Access to Sky Harbor Airport in Phoenix will be improved with the programmed completion of the Sky Harbor Expressway to I-10.

The current and future capacity constraints do not exist, in this analysis along US 60 and US 93 northwest from Phoenix, except for congestion in downtown Wickenburg. The bypass alternatives for Wickenburg should continue to be pursued. The completion of the

Hoover Dam Bypass is required to meet the minimum standards of the CANAMEX Corridor, as well as to address existing safety and efficiency deficiencies. The portions of US 60 / US 93 that are not presently a multilane facility, should be widened to a minimum of 4 lanes in keeping with the minimum requirements for the CANAMEX Corridor.

**Table IV-1
Proposed CANAMEX Corridor Projects**

Year	State	Route ¹	Segment	Action	Reason ²	Miles	Cost ³ (Millions)	Annual O&M
2010	AZ	I-10 EB	Phoenix MP 147-143	Widen to 12, 14 Lns**	C	4	\$ 80	\$0.032
	NV	US 93	Las Vegas US 95 to I-15	Widen to 8 Lanes	C	7	\$ 70	\$0.028
	UT	I-15	Ogden - Brigham City	Widen to 6 Lanes	C	9	\$ 63	\$0.036
2020	AZ	I-19	Tucson MP 69 - 91	Widen to 6 Lanes	C	21	\$ 147	\$0.084
	AZ	I-10 NB	Phoenix MP 160-154	Widen to 10 Lns**	C	6	\$ 60	\$0.024
	NV	US 93	Las Vegas US 95 to I-15	Widen to 10 Lanes	C	7	\$ 70	\$0.028
	UT	I-15	NV Stateline - Cedar City	Widen to 6 Lanes	C	70	\$ 490	\$0.280
	UT	I-15	Provo, UT MP 266-276	Widen to 8 Lanes	C	10	\$ 100	\$0.040
2030	AZ	I-10	Tucson MP 260-246	Widen to 10 Lanes	C	14	\$ 140	\$0.056
	NV	I-15	Las Vegas Downtown	Widen to 8 Lanes	C	8	\$ 80	\$0.032
	UT	I-15	Provo, UT MP 266-276	Widen to 10 Lanes	C	10	\$ 100	\$0.040
	UT	I-15	Bountiful, UT	Widen to 12 Lns**	C	14	\$ 140	\$0.056
	UT	I-15	Ogden - Brigham City	Urban Capacity	C	9	\$ -	\$ -
	ID *	I-15	Chubbuck - Idaho Falls	Widen to 6 Lanes	C	37	\$ 374.0	\$0.148
	ID *	I-15	McCammon - Inkom	Widen to 6 Lanes	C	10	\$ 104.0	\$0.040
								\$2,018
Total by Decade					2010		\$ 213	\$ 0.096
					2020		\$ 867	\$ 0.456
					2030		\$ 938	\$ 0.372
Total by State					AZ		\$ 427	\$ 0.196
					NV		\$ 220	\$ 0.088
					UT		\$ 893	\$ 0.452
					ID		\$ 478	\$ 0.188

1 See Figure III-1 for locations.

2 M=Minimum CANAMEX Standard, C=Capacity, I=Improvement

3 If not provided by state plans, following costs used : Widening \$7M/mi/2lanes; New Interstate \$15M/mi;

Widening Rural Interstate \$7M/mi/2lanes; Widen Urban Interstate \$10M/mi/2lanes

* Projects are a result of increased traffic growth rate of 3.9%, between Pocatello and Idaho Falls, provided by Idaho for this study, as opposed to HPMS data, used for other states, which yielded 2.75% for this segment in Idaho.

** Most likely achieved by bypass alternatives. Cost for bypass can double

Roadway recommendations in Nevada include the Boulder City / US 93 Corridor Study improvements, widening US 93 from Hoover Dam to US 95 and adding additional capacity on I-15 northeast of downtown Las Vegas. All of these improvements are committed projects or recommended within the 2000 – 2010 window.

Roadway improvement recommendations in Utah include additional lanes on I-15 from Mesquite, NV, through northwest Arizona, to Cedar City, UT. Additional capacity around the urban areas of Provo/Orem, Salt Lake City/Bountiful/Ogden is deemed necessary in the 2010 and 2020 horizon. The rural section of I-15 from Ogden to Brigham City (US 89) will also

require additional lanes by 2010. The additional capacity in the Salt Lake City metropolitan area can be obtained by construction of the Legacy Parkway. This new facility has generated some public opposition for mostly environmental reasons. The Legacy Parkway, as preliminarily planned consists of North Legacy, Farmington to Ogden, Legacy Parkway or South Legacy from Farmington to I-215 West of Bountiful and 5600 West in the western portion of the Salt Lake valley.

**Table IV-2
CANAMEX Corridor Projected Traffic Conditions in Rural Sections With Proposed Projects**

Urban Area or Landmark	Highway ¹	Capacity				Volume-Capacity Ratio						
		Base Case ²	With Proposed Projects ³			Base Case			With Proposed Projects			
			2010	2020	2030	2010	2020	2030	2010	2020	2030	
Nogales, AZ to												
Tucson, AZ	I-19	50,000	n.c.	75,000	75,000	0.84	1.42	1.77	0.84	0.95	1.18	
Casa Grande, AZ	I-10	75,000	n.c.	n.c.	n.c.	0.47	0.50	0.54	0.70	0.75	0.80	
Phoenix, AZ	I-10	75,000	n.c.	n.c.	n.c.	0.59	0.64	0.68	0.89	0.64	0.68	
Kingman, AZ	US 93	50,000	n.c.	n.c.	n.c.	0.18	0.20	0.23	0.18	0.20	0.23	
AZ / NV Stateline	US 93	50,000	n.c.	n.c.	n.c.	0.22	0.27	0.34	0.22	0.27	0.34	
Las Vegas, NV	US 93	50,000	n.c.	n.c.	n.c.	0.44	0.59	0.73	0.44	0.59	0.73	
NV / UT Stateline	I-15	50,000	n.c.	n.c.	n.c.	0.43	0.56	0.70	0.43	0.56	0.70	
Cedar City, UT	I-15	50,000	n.c.	75,000	75,000	0.57	0.98	1.23	0.57	0.66	0.82	
Salt Lake City/Ogden	I-15	50,000	n.c.	n.c.	n.c.	0.29	0.36	0.44	0.29	0.36	0.44	
Brigham City, UT	I-15	50,000	75,000	75,000	125,000	1.09	1.46	1.82	0.73	0.97	0.73	
UT / ID Stateline	I-15	50,000	n.c.	n.c.	n.c.	0.24	0.32	0.40	0.24	0.32	0.40	
Pocatello, ID	I-15	50,000	n.c.	n.c.	n.c.	0.22	0.28	0.35	0.22	0.28	0.35	
Idaho Falls, ID	I-15	75,000	n.c.	n.c.	n.c.	0.44	0.51	0.64	0.44	0.51	0.64	
ID / MT Stateline	I-15	50,000	n.c.	n.c.	n.c.	0.07	0.10	0.12	0.07	0.10	0.12	
Butte, MT	I-15	50,000	n.c.	n.c.	n.c.	0.13	0.18	0.23	0.13	0.18	0.23	
Helena, MT	I-15	50,000	n.c.	n.c.	n.c.	0.14	0.19	0.24	0.14	0.19	0.24	
Great Falls, MT	I-15	50,000	n.c.	n.c.	n.c.	0.10	0.13	0.16	0.10	0.13	0.16	
Sweetgrass, MT	I-15	50,000	n.c.	n.c.	n.c.	0.08	0.10	0.13	0.08	0.10	0.13	

any v/c equal to or greater than 0.9 shown in bold

1 See Figure III-1 for locations

2 Refer to Table III-7 for programmed and planned projects

3 Refer to Table IV-1 for proposed projects

n.c. = no significant change in capacity

Other Considerations

The US 93 I-40 interchange area has potential for distribution along the Corridor with available land, rail, interstate, airport and industrial park.

Rest areas providing information on area attractions, travel conditions, weather and news should be provided along the Corridor.

Coordinated regulations governing truck weight, length limits and condition should be implemented along the Corridor. These will allow seamless transportation of cargo along the Corridor. Additional considerations include truck driver licensing, medical certification policies, “hours on service” regulations.

The CANAMEX Corridor should be emphasized as the link for many of the nations most visited National Parks as well as outdoor recreation activities.

Table IV - 3
CANAMEX Corridor Projected Traffic Conditions in Urban Sections With Proposed Projects

Urban Area ¹	Highway	Base Case ²		Capacity With Proposed Projects ³			Volume-Capacity Ratio					
		Lanes	Capacity	2010	2020	2030	Base Case			With Proposed Projects		
							2010	2020	2030	2010	2020	2030
Tucson, AZ												
	I-19	6	125,000	n.c.	n.c.	n.c.	0.61	0.88	1.10	0.61	0.88	1.10
	I-10	8	160,000	n.c.	n.c.	205,000	0.96	1.17	1.41	0.96	1.17	1.10
Phoenix, AZ												
	I-10 NB/SB	8	160,000	n.c.	205,000	205,000	1.05	1.23	1.43	1.05	0.96	1.12
	I-10 EB/WB	10	205,000	290,000	290,000	290,000	1.39	1.62	1.89	0.99	1.14	1.33
	U.S. 60	4	80,000	n.c.	n.c.	n.c.	0.52	0.67	0.84	0.52	0.67	0.84
Las Vegas, NV												
	US 93 / US 95	4	80,000	n.c.	n.c.	n.c.	0.62	0.78	0.97	0.62	0.78	0.97
	US 93/US 95/I-515	6	125,000	160,000	205,000	205,000	1.29	1.62	2.02	1.01	0.99	1.23
	I-15	6	125,000	n.c.	n.c.	160,000	1.03	1.18	1.34	1.03	1.18	1.05
Provo / Orem, UT												
	I-15	6	125,000	n.c.	160,000	205,000	0.97	1.35	1.68	0.97	1.05	1.02
Salt Lake City / Ogden												
	I-15	14	290,000	n.c.	n.c.	n.c.	0.93	1.34	1.68	0.93	1.34	1.68
	I-15 (Bountiful)	10	205,000	n.c.	n.c.	250,000	0.84	1.20	1.49	0.84	1.20	1.22

any v/c equal to or greater than 1.2 shown in bold

1 See Figure III-1 for locations

2 Refer to Table III-7 for programmed and planned projects

3 Refer to Table IV-1 for proposed projects

n.c. = no significant change in capacity

Although these improvements do not alleviate all the projected congestion by 2030, they do address all 2010 problems and most 2020 problems. Change in v/c ratio is one indicator of the measure of effectiveness of proposed improvements. Another is change in vehicle hours of travel (VHT) and vehicle miles of travel (VMT).

Little change in VMT is expected due to the additional projects. There may be some induced traffic, but that would most likely be as a result of the improvement of conditions near the Hoover Dam, which is in the Base Case (Existing Plus Committed). The additional proposed projects are more oriented to reducing delay than in attracting additional traffic. Table IV-4 presents the anticipated changes in VHT between the Base Case and proposed highway investment strategy for each state.

Overall, Utah would have the most improvement with over 104 million vehicle hours saved each year by 2030. Savings in annual VHT of 78 million and 66 million are expected by 2030 in Arizona and Nevada, respectively.

**Table IV - 4
Transportation Benefits of Highway Improvements**

Future Base Case CANAMEX Corridor ¹						
State	2010 Base Case		2020 Base Case		2030 Base Case	
	Annual VMT	Annual VHT	Annual VMT	Annual VHT	Annual VMT	Annual VHT
Arizona	5,745	109	7,199	159	8,497	242
Nevada	2,479	48	3,079	74	3,780	137
Utah	7,995	135	11,308	232	14,113	403
Idaho	771	10	992	13	1,237	17
Montana	815	11	1,095	15	1,370	18
Total	17,805	313	23,673	493	28,998	817
Future CANAMEX Corridor With Proposed Improvements ²						
State	2010 With Improvements		2020 With Improvements		2030 With Improvements	
	Annual VMT	Annual VHT	Annual VMT	Annual VHT	Annual VMT	Annual VHT
Arizona	5,745	101	7,199	128	8,497	164
Nevada	2,479	43	3,079	54	3,780	71
Utah	7,995	135	11,308	209	14,113	299
Idaho	771	10	992	13	1,237	17
Montana	815	11	1,095	15	1,370	18
Total	17,805	299	23,673	419	28,998	569
Anticipated Savings Between Base Case and Proposed Improvements						
State	2010 With Improvements		2020 With Improvements		2030 With Improvements	
	Annual VMT	Annual VHT	Annual VMT	Annual VHT	Annual VMT	Annual VHT
Arizona	0	9	0	31	0	78
Nevada	0	5	0	21	0	66
Utah	0	0	0	22	0	104
Idaho	0	0	0	0	0	0
Montana	0	0	0	0	0	0
Total	0	14	0	74	0	248

1 See Table III-7 for programmed and planned projects

2 See Table IV-1 for proposed projects

VHT = vehicle hours of travel; VMT=vehicle miles of travel

VMT and VHT are in millions

Transportation Costs

The economic evaluation to be performed on the investment strategies requires that costs and benefits be identified by state. The costs identified in Table IV-1 have been separated by state, with annual operating and maintenance costs added, as depicted in Table IV-5.

CANAMEX Corridor Improvements

Proposed project costs for the CANAMEX Corridor, identified in Table IV-1, total \$2.02 billion with \$213 million by 2010, an additional \$867 million by 2020 and a final \$938 million by 2030. Table IV-5 details the total improvement program for the CANAMEX Corridor, to include planned, programmed and proposed projects to 2030, which total \$5.83 billion. The table also lists the lane miles of improvements for each project along the Corridor. These improvements total approximately 1,500 lane miles for the CANAMEX Corridor over the 30-year planning period. This is nearly the equivalent of adding one lane of roadway for the entire CANAMEX Corridor.

**Table IV-5
Investment Required in CANAMEX Corridor**

Year	State	Route	Segment	Action	Type	Cost (Millions)	Lane Miles	
2010	AZ	I-10	Sky Harbor Expressway	Freeway	PRG	\$ 25.4	8	
	AZ	US 60	Deer Valley - Morristown	Widen to 4 Lanes	PRG	\$ 35.8	42	
	AZ	US 93	Santa Maria - Wikieup	Widen to 4 Lanes	PRG	\$ 220.0	74	
	AZ	I-10	Tucson MP 260-256	Widen to 8 Lanes	PL	\$ 43.0	8	
	AZ	I-10NB	MP 160 -163	San Tan, S.Mtn TI	PL	\$ 129.7	8	
	AZ	US 60	Grand Expressway	Freeway	PL	\$ 161.4	24	
	AZ	US 93	Wikieup Bypass	Bypass	PL	\$ 38.7	16	
	AZ	US 93	at I-40	Interchange	PL	\$ 135.0	8	
	AZ	US 93	Wikieup - I-40	Widen to 4 Lanes	PL	\$ 220.0	68	
	AZ	US 93	MP 17-Hoover Dam	Widen to 4 Lanes	PL	\$ 37.5	34	
	AZ	US 93	To Hoover Dam	New Bridge	PL	\$ 51.0	12	
	AZ	I-10 EB	Phoenix MP 147-143	Widen 12 to 14 Lns**	PRP	\$ 80.0	16	
	NV	US 93	Boulder City US 93 Corridor	Corridor Improve	PL	\$ 170.0	26	
	NV	US 93	Hoover Dam Bypass	New Bridge	PL	\$ 198.0	16	
	NV	US 93	Las Vegas US 95 to I-15	Widen to 8 Lanes	PRP	\$ 70.0	14	
	UT	I-15	Salt Lake City	Widen to 12 Lns**	PL	\$ 100.0	20	
	UT	I-15	Ogden 3100 S - 2700 N	Widen to 6 Lanes	PL	\$ 80.0	16	
	UT	I-15	Ogden - Brigham City	Widen to 6 Lanes	PRP	\$ 63.0	18	
	ID	I-15	Sunnyside	Interchange	PRG	\$ 16.8	8	
	ID	I-15	Riviera	Interchange	PRG	\$ 1.8	8	
	MT	I-15	Gore Hill Interchange	Interchange Improven	PRG	\$ 1.0	8	
	MT	I-15	Cedar Street Interchange	Interchange Improven	PRG	\$ 3.8	8	
	MT	I-15	Capitol Interchange	Reconstruction & Exp	PL	\$ 9.0	8	
	MT	I-15	Between Capitol and Cedar In	Widen to 6 lanes	PL	\$ 11.0	8	
	MT	I-15	Helena	New Interchange	PL	\$ 8.0	8	
	MT	I-15	Northwest Bypass Interchang	Reconstruction & Exp	PL	\$ 8.0	8	
	MT	I-15	Coutts-Sweetgrass Port of En	Rebuild & expand Por	PL	\$ 30.0	8	
	2020	AZ	I-19	Tucson MP 91-100	Widen to 6 Lanes	PL	\$ 90.0	18
		AZ	I-10	Tucson MP 256-248	Widen to 8 Lanes	PL	\$ 69.4	16
		AZ	I-10	Cortaro - Red Rock	Widen to 6 Lanes	PL	\$ 21.0	26
AZ		I-10	Phoenix MP 248-163	Widen to 6 Lanes	PL	\$ 223.0	170	
AZ		US 60	Grand Expressway	Freeway	PL	\$ 352.0	24	
AZ		US 93	Wickenburg Bypass	Bypass	PL	\$ 200.0	8	
AZ		US 93	SR 71 - Santa Maria	Widen to 4 Lanes	PL	\$ 140.0	40	
AZ		US 93	I-40 - MP 17	Divided Highway	PL	\$ 75.0	66	
AZ		I-10 NB	Phoenix MP 160-154	Widen to 10 Lns**	PRP	\$ 60.0	12	
AZ		I-19	Tucson MP 69 - 91	Widen to 6 Lanes	PRP	\$ 147.0	42	
NV		US 93	Las Vegas US 95 to I-15	Widen to 10 Lanes	PRP	\$ 70.0	14	
UT		I-15	Salt Lake City	Widen to 14 Lns**	PL	\$ 100.0	20	
UT		I-15	Bountiful	Widen to 10 Lns**	PL	\$ 140.0	28	
UT/AZ		I-15	NV Stateline - Cedar City	Widen to 6 Lanes	PRP	\$ 490.0	140	
UT		I-15	Provo, UT MP 266-276	Widen to 8 Lanes	PRP	\$ 100.0	20	
UT		I-15	Farmington - Ogden	Widen to 8 Lanes	PL	\$ 180.0	36	
ID		I-15	Pocatello	Interchange Improve.	PL	\$ 70.0	8	
ID		I-15	Idaho Falls	Widen to 6 Lanes	PL	\$ 75.0	16	
ID		I-15	Inkom - Chubbuck	Widen to 6 Lanes	PL	\$ 177.0	36	
MT		I-15	Between Butte and Elk Park	New Interchange	PL	\$ 8.0	8	
MT		I-15	Great Falls	New Interchange	PL	\$ 8.0	8	
MT		I-15	Great Falls Bypass	Bypass	PL	\$ 56.0	28	
2030		AZ	I-10	Tucson MP 260-246	Widen to 10 Lanes	PRP	\$ 140.0	28
		NV	I-15	Las Vegas Downtown	Widen to 8 Lanes	PRP	\$ 80.0	16
	UT	I-15	Provo MP 266-276	Widen to 10 Lanes	PRP	\$ 100.0	20	
	UT	I-15	Bountiful	Widen to 12 Lns**	PRP	\$ 140.0	28	
	ID *	I-15	Chubbuck - Idaho Falls	Widen to 6 Lanes	PRP	\$ 374.0	74	
	ID *	I-15	McCammon - Inkom	Widen to 6 Lanes	PRP	\$ 104.0	20	
	MT	I-15	Between Nissler and East But	Expand structures and	PL	\$ 56.0	16	
	MT	I-15	Between Gore Hill and Emers	Expand structures and	PL	\$ 35.0	10	
Total						\$5,828.3	1,496	

PRG=programmed; PL=planned; PRP-proposed

* Projects are a result of increased traffic growth rate of 3.9%, between Pocatello and Idaho Falls, provided by Idaho for this study, as opposed to HPMS data, used for other states, which yielded 2.75% for this segment in Idaho.

** Most likely achieved by bypass alternatives. Cost for bypass can double

ITS Strategies

The CANAMEX Corridor ITS projects revolve around three primary elements:

- CANAMEX Corridor Management and Information Network (CT-MAIN)
- CANAMEX Smart Tourist System
- CANAMEX Smart Freight System

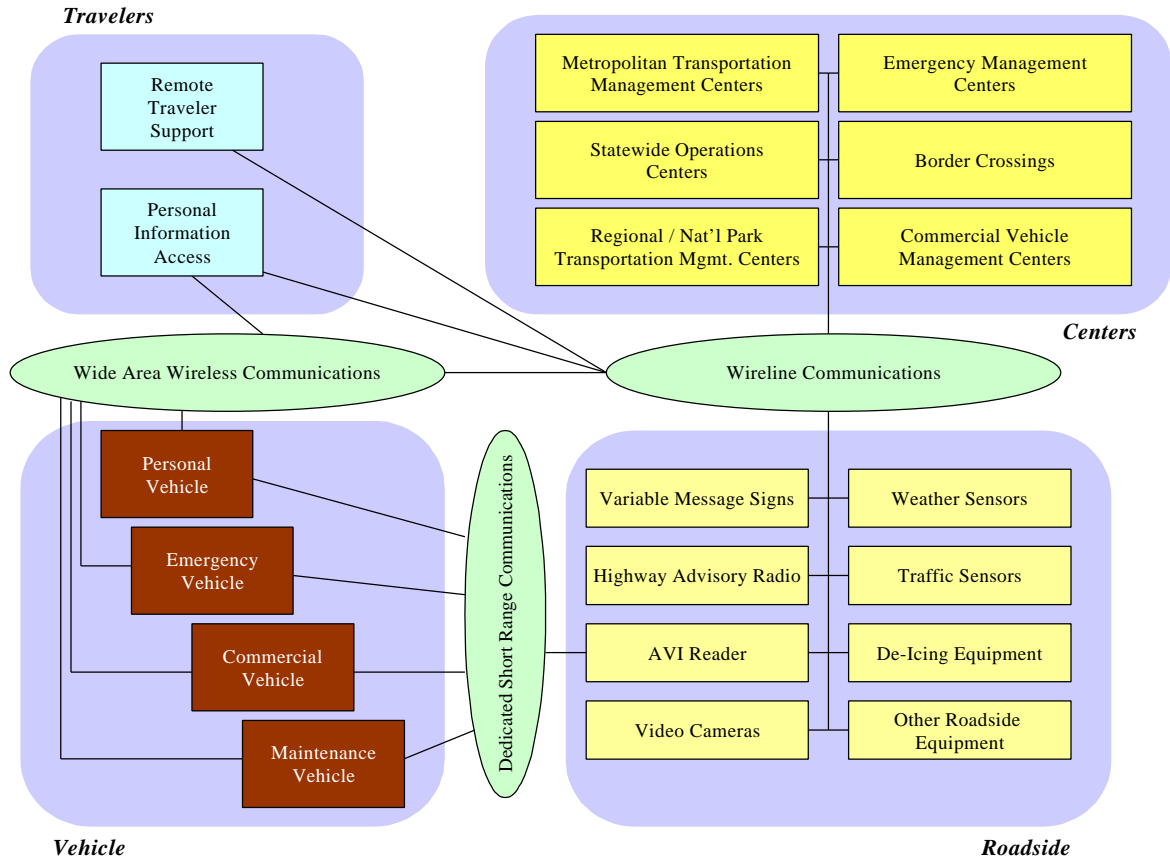
The first ITS project for the Corridor will be the development of a Corridor ITS Architecture. This will set the foundation for the development and design of the other ITS projects for the corridor in a fashion that will provide open system designs, reduce costs, and provide consistency with the National ITS Architecture, which is required for federally-funded projects. A draft conceptual ITS system architecture for the Corridor was developed in order to determine preliminary cost estimates for the system. The CANAMEX Corridor conceptual ITS system architecture is depicted in Figure IV-1.

The CANAMEX Corridor ITS will be organized around the central CT-MAIN component, which will feature the databases and web server for all Corridor ITS elements. Each of the other two ITS components, the Smart Tourist System and the Smart Freight System, will feature integration with a number of existing agencies (and their databases) as well as national databases/information clearinghouses. Specific descriptions of the CANAMEX Corridor ITS elements follow.

CANAMEX Corridor ITS Architecture

The development of an ITS corridor architecture for the CANAMEX Corridor will be the outcome of this first ITS project. The corridor architecture will include the linkages, both in terms of data flows and communication media, between existing ITS infrastructure, the other Corridor ITS projects (MAIN, Smart Tourist System, and Smart Freight System; also potential later projects such as Rural Traveler Aid Network and Rural Region Smart Shuttle), and other elements associated with National ITS Architecture. The resulting architecture will guide the development and design of the other ITS projects and will also provide eligibility requirements for federal funding.

**Figure IV-1
CANAMAEX Corridor Conceptual ITS Architecture**



CANAMEX Corridor Management and Information Network (CT-MAIN)

CT-MAIN will provide the central database and web server functions for all of the CANAMEX ITS program elements. This system will be either a central or “virtual” data warehouse, providing both storage and transmission and reception of data from the Corridor’s partners. These partners will include metropolitan and/or state Advanced Traffic Management System (ATMS) and Advanced Traveler Information System (ATIS) data as well as Commercial Vehicle Operations (CVO) data.

The cost estimate for CT-MAIN assumes a central server, database software (assuming automated transmission and reception of necessary data), web server, and a number of interfaces to state and local information databases. Other system interfaces and integration work is provided under the specific components (Smart Tourist and Smart Freight).

The CT-MAIN includes both a planning and incident management/construction databases. These features are meant to assist in providing member agencies with the data they

need to plan future Corridor needs and to respond to closures, delays, and other incidents in a timely fashion.

Smart Tourist

The Smart Tourist System will provide travelers (both personal and commercial vehicles) with static and real-time traveler information. The information will be available on a web site, via kiosks at major rest stops, and en-route via Variable Message Signs (VMS) and Highway Advisory Radio (HAR). ***The system will also provide an open interface to private sector service providers supporting in-vehicle and wireless Internet services.***

The cost estimate for Smart Tourist System includes the licensing of commercially-available traveler information as well as including corridor-specific data in such a system. The interfaces with other system elements are included in the costs.

Specific hardware estimates are based on the following criteria:

- Variable Message Signs (VMS) – Total: 22. One in each direction at the following major interstate/route crossings* and major attractions:

I-19/I-10; I-10/I-8; I-10/93; 93/I-40; 93/I-15; I-15/I-70; I-15/I-80; I-15/I-84; I-15/I-86; I-15/I-90; I-15 for Yellowstone traffic

* In metropolitan areas, these signs may already exist. These signs would be additional corridor related signs that could be placed in the general locations described above or moved to locations near other National Parks/attractions.

- Highway Advisory Radio (HAR) – Total:11. One HAR transmitter (5-mile radius) at each of the VMS locations above, including Yellowstone. Where there are already existing HAR, new HAR could be positioned for other National Parks/attractions.
- Corridor Traveler Information Kiosks – Total: 10. Based on two rest stops per state, one in each direction of travel. The kiosks will provide real-time traveler information as well as travel services information related to hotels, restaurants,
- Points of interest, hospitals and other facilities of relevance to the tourist.

Smart Freight

The Smart Freight System will provide Corridor agencies with interfaces to CVO-related information to help expedite the clearance and safety checks of commercial vehicles using the corridor. It will also be linked to the Smart Tourist System to provide commercial vehicle operators with static and real-time information pertinent to them, as well as expediting information regarding freight movements and connections through intermodal centers.

The Smart Freight Corridor system will include interfaces with existing Norpass and PrePass electronic clearance systems, interface with Canadian and Mexican CVO information, interface with existing and planned state CVO systems, and interface with CVISN-related

databases, including SAFER (safety and inspection information) and the IRP and IFTA clearinghouses (for fees and taxes). The Smart Freight Corridor, through its coordination with CT-MAIN, would provide a data clearinghouse function for this information so that each state could share data with other states via their existing, planned, or future CVO systems.

Specific cost estimate elements include information at border crossings:

- VMS—4 (2 each Canada/Mexico)
- HAR—2 (Canada/Mexico)

Costs of ITS Strategies

The cost of the ITS strategies was estimated and distributed by state to facilitate the economic evaluation. Table IV-6 reflects the costs for each of the different components. Table IV-7 summarizes the capital and annual operating and maintenance costs by state by time period. Capital costs recur every 10 years due to the life-cycle of the hardware.

Implementing just a Smart Tourist System Strategy is estimated to cost \$4.5 million by 2010, with Arizona's and Utah's costs exceeding \$1 million each. Since the Smart Freight Strategy requires some of the elements of the Smart Tourist, the Smart Freight Strategy costs include implementation of both the Smart Tourist and Smart Freight. The 2010 capital costs total \$5.4 million.

Table IV-6
Estimated Costs of ITS Elements of Canamex Corridor

	Capital Costs			Annual O&M Costs			Capital Cost Per State (\$000)					Annual O&M Cost Per State (\$000)				
	Unit Price	# of Units	Total Price	Life Cycle (years)	Maintenance Cost Factor	Annual O&M	AZ	NV	UT	ID	MT	AZ	NV	UT	ID	MT
MAIN																
Central Database Server	\$100,000	2	\$200,000	10	0.1	\$20,000	\$40	\$40	\$40	\$40	\$40	\$4	\$4	\$4	\$4	\$4
MAIN Database/Query Package	\$200,000	1	\$200,000	10	0.1	\$20,000	\$40	\$40	\$40	\$40	\$40	\$4	\$4	\$4	\$4	\$4
Central/Virtual Planning Database/User Interface	\$40,000	1	\$40,000	10	0.1	\$4,000	\$8	\$8	\$8	\$8	\$8	\$0.8	\$0.8	\$0.8	\$0.8	\$0.8
Central/Virtual Traveler Information Database/User Interface	\$40,000	1	\$40,000	10	0.1	\$4,000	\$8	\$8	\$8	\$8	\$8	\$0.8	\$0.8	\$0.8	\$0.8	\$0.8
Central/Virtual Incident Management/Construction Database/User Interface	\$40,000	1	\$40,000	10	0.1	\$4,000	\$8	\$8	\$8	\$8	\$8	\$0.8	\$0.8	\$0.8	\$0.8	\$0.8
Central/Virtual CVO Database/User Interface	\$40,000	1	\$40,000	10	0.1	\$4,000	\$8	\$8	\$8	\$8	\$8	\$0.8	\$0.8	\$0.8	\$0.8	\$0.8
Map Database	\$20,000	1	\$20,000	10	0.1	\$2,000	\$4	\$4	\$4	\$4	\$4	\$0.4	\$0.4	\$0.4	\$0.4	\$0.4
MAIN Web Site	\$75,000	1	\$75,000	10	0.05	\$3,750	\$15	\$15	\$15	\$15	\$15	\$0.75	\$0.75	\$0.75	\$0.75	\$0.75
Interface to Other ATMS/ATIS:																
Phoenix	\$30,000	1	\$30,000	10	0.1	\$3,000	\$6	\$6	\$6	\$6	\$6	\$0.6	\$0.6	\$0.6	\$0.6	\$0.6
Tucson	\$30,000	1	\$30,000	10	0.1	\$3,000	\$6	\$6	\$6	\$6	\$6	\$0.6	\$0.6	\$0.6	\$0.6	\$0.6
Las Vegas	\$30,000	1	\$30,000	10	0.1	\$3,000	\$6	\$6	\$6	\$6	\$6	\$0.6	\$0.6	\$0.6	\$0.6	\$0.6
Salt Lake City	\$30,000	1	\$30,000	10	0.1	\$3,000	\$6	\$6	\$6	\$6	\$6	\$0.6	\$0.6	\$0.6	\$0.6	\$0.6
National Parks	\$30,000	3	\$90,000	10	0.1	\$9,000	\$18	\$18	\$18	\$18	\$18	\$1.80	\$1.80	\$1.80	\$1.80	\$1.80
Central VMS Control	\$40,000	5	\$200,000	10	0.1	\$20,000	\$40	\$40	\$40	\$40	\$40	\$4	\$4	\$4	\$4	\$4
Central HAR Control	\$10,000	5	\$50,000	10	0.1	\$5,000	\$10	\$10	\$10	\$10	\$10	\$1	\$1	\$1	\$1	\$1
MAIN Integrated Workstations	\$50,000	5	\$250,000	10	0.1	\$25,000	\$50	\$50	\$50	\$50	\$50	\$5	\$5	\$5	\$5	\$5
MAIN Operators (1 per state)						\$375,000						\$75	\$75	\$75	\$75	\$75
TOTAL			\$1,365,000			\$507,750	\$273	\$273	\$273	\$273	\$273	\$101.55	\$101.55	\$101.55	\$101.55	\$101.55
Smart Tourist System																
Interface to MAIN Traveler Information Database	\$30,000	1	\$30,000	\$10	0.1	\$3,000	\$6	\$6	\$6	\$6	\$6	\$0.6	\$0.6	\$0.6	\$0.6	\$0.6
Static Traveler Information Database (Licensed)	\$100,000	1	\$100,000	\$10	0.1	\$10,000	\$20	\$20	\$20	\$20	\$20	\$2	\$2	\$2	\$2	\$2
Traveler Information Web Site Design	\$75,000	1	\$75,000	\$10	0.1	\$7,500	\$15	\$15	\$15	\$15	\$15	\$1.5	\$1.5	\$1.5	\$1.5	\$1.5

Table IV-6 (cont'd)
Estimated Costs of ITS Elements of Canamex Corridor

	Capital Costs			Annual O&M Costs			Capital Cost Per State (\$000)						Annual O&M Cost Per State (\$000)					
	Unit Price	# of Units	Total Price	Life Cycle (years)	Maintenance Cost Factor	Annual O&M	AZ	NV	UT	ID	MT	AZ	NV	UT	ID	MT		
VMS	\$100,000	22	\$2,200,000	10	0.1	\$220,000	\$800	\$200	\$600	\$400	\$200	\$80	\$20	\$60	\$40	\$20		
HAR	\$20,000	11	\$220,000	10	0.1	\$22,000	\$80	\$20	\$60	\$40	\$20	\$8	\$2	\$6	\$4	\$2		
Interface to MAIN Incident Management/Construction Information	\$30,000	1	\$30,000	10	0.1	\$3,000	\$6	\$6	\$6	\$6	\$6	\$0.60	\$0.60	\$0.60	\$0.60	\$0.60		
Kiosk Server	\$10,000	2	\$20,000	10	0.1	\$2,000	\$4	\$4	\$4	\$4	\$4	\$0.40	\$0.40	\$0.40	\$0.40	\$0.40		
Kiosk Host	\$60,000	1	\$60,000	10	0.1	\$6,000	\$12	\$12	\$12	\$12	\$12	\$1.2	\$1.2	\$1.2	\$1.2	\$1.2		
Software/Integration (MAIN)	\$45,000	10	\$450,000	10	0.1	\$45,000	\$90	\$90	\$90	\$90	\$90	\$9	\$9	\$9	\$9	\$9		
TOTAL			\$2,980,000			\$298,000	\$1,033	\$373	\$813	\$593	\$373	\$103.30	\$37.3	\$81.3	\$59.3	\$37.3		
Smart Freight System																		
Interface to MAIN CVO Database	\$21,000	1	\$21,000	10	0.1	\$2,100	\$4.2	\$4.2	\$4.2	\$4.2	\$4.2	\$0.42	\$0.42	\$0.42	\$0.42	\$0.42		
Interface for CVISN Databases	\$50,000	1	\$50,000	10	0.1	\$5,000	\$10	\$10	\$10	\$10	\$10	\$1	\$1	\$1	\$1	\$1		
Interface to Norpass Database	\$21,000	1	\$21,000	10	0.1	\$2,100	\$4.2	\$4.2	\$4.2	\$4.2	\$4.2	\$0.42	\$0.42	\$0.42	\$0.42	\$0.42		
Interface to PrePass Database	\$21,000	1	\$21,000	10	0.1	\$2,100	\$4.2	\$4.2	\$4.2	\$4.2	\$4.2	\$0.42	\$0.42	\$0.42	\$0.42	\$0.42		
Interface for Safety Management	\$40,000	1	\$40,000	10	0.1	\$4,000	\$8	\$8	\$8	\$8	\$8	\$0.8	\$0.8	\$0.8	\$0.8	\$0.8		
Interface to Canada/Mexico CVO Information	\$21,000	2	\$42,000	10	0.1	\$4,200	\$8.4	\$8.4	\$8.4	\$8.4	\$8.4	\$0.84	\$0.84	\$0.84	\$0.84	\$0.84		
Border Crossing Integration Elements	\$40,000	2	\$80,000	10	0.1	\$8,000	\$16	\$16	\$16	\$16	\$16	\$1.6	\$1.6	\$1.6	\$1.6	\$1.6		
VMS	\$100,000	4	\$400,000	10	0.1	\$40,000	\$200	\$200	\$200	\$200	\$200	\$20	\$20	\$20	\$20	\$20		
HAR	\$20,000	2	\$40,000	10	0.1	\$4,000	\$20	\$20	\$20	\$20	\$20	\$2	\$2	\$2	\$2	\$2		
CVO Web Site Design	\$75,000	1	\$75,000	10	0.1	\$7,500	\$15	\$15	\$15	\$15	\$15	\$1.5	\$1.5	\$1.5	\$1.5	\$1.5		
Interface to Smart Tourist/MAIN Traveler Information Database	\$25,000	1	\$25,000	10	0.1	\$2,500	\$5	\$5	\$5	\$5	\$5	\$0.5	\$0.5	\$0.5	\$0.5	\$0.5		
TOTAL			\$815,000			\$81,500	\$29.5	\$7.5	\$7.5	\$7.5	\$29.5	\$29.5	\$7.5	\$7.5	\$7.5	\$7.5		
Corridor ITS Architecture																		
Development of Architecture	\$250,000	1	\$250,000				\$50	\$50	\$50	\$50	\$50	\$5	\$5	\$5	\$5	\$5		
TOTALS			\$5,410,000			\$887,250	\$1,651	\$771	\$1,211	\$991	\$991	\$234.3	\$146.3	\$190.3	\$168.3	\$168.3		

**Table IV-7
CANAMEX Corridor ITS Project Costs**

CANAMEX Corridor ITS Project Costs									
Type	State	Year	Cost		Type	State	Year	Cost	
			Capital	Annual O&M				Capital	Annual O&M
CANAMEX Smart Tourist	Arizona	2010	\$1,033,000	\$103,300	(parts of the Smart Tourist system are required to fully implement the Smart Freight System)	Arizona	2010	\$295,000	\$29,500
		2020	\$1,033,000	\$103,300			2020	\$295,000	\$29,500
		2030	\$1,033,000	\$103,300			2030	\$295,000	\$29,500
		Subtotal	\$3,099,000	\$309,900			Subtotal	\$885,000	\$88,500
	Nevada	2010	\$373,000	\$37,300		Nevada	2010	\$75,000	\$7,500
		2020	\$373,000	\$37,300			2020	\$75,000	\$7,500
		2030	\$373,000	\$37,300			2030	\$75,000	\$7,500
		Subtotal	\$1,119,000	\$111,900			Subtotal	\$225,000	\$22,500
	Utah	2010	\$813,000	\$81,300		Utah	2010	\$75,000	\$7,500
		2020	\$813,000	\$81,300			2020	\$75,000	\$7,500
		2030	\$813,000	\$81,300			2030	\$75,000	\$7,500
		Subtotal	\$2,439,000	\$243,900			Subtotal	\$225,000	\$22,500
	Idaho	2010	\$593,000	\$59,300		Idaho	2010	\$75,000	\$7,500
		2020	\$593,000	\$59,300			2020	\$75,000	\$7,500
		2030	\$593,000	\$59,300			2030	\$75,000	\$7,500
		Subtotal	\$1,779,000	\$177,900			Subtotal	\$225,000	\$22,500
	Montana	2010	\$373,000	\$37,300		Montana	2010	\$295,000	\$29,500
		2020	\$373,000	\$37,300			2020	\$295,000	\$29,500
		2030	\$373,000	\$37,300			2030	\$295,000	\$29,500
		Subtotal	\$1,119,000	\$111,900			Subtotal	\$885,000	\$88,500
	Total	2010	\$3,185,000	\$318,500		Total	2010	\$815,000	\$81,500
		2020	\$3,185,000	\$318,500			2020	\$815,000	\$81,500
		2030	\$3,185,000	\$318,500			2030	\$815,000	\$81,500
		Total	\$9,555,000	\$955,500			Total	\$2,445,000	\$244,500
Canamex MAIN (shared equally by all states)	Total	2010	\$1,365,000	\$507,750	Canamex ITS System Architecture (shared equally by all states)	Total	Before 2010	\$250,000	
		2020	\$1,365,000	\$507,750			(not included in overall strategy costs)		
		2030	\$1,365,000	\$507,750					
Just Smart Tourist Strategy	Arizona	2010	\$1,306,000	\$204,850	Smart Tourist and Smart Freight Strategies	Arizona	2010	\$1,601,000	\$234,350
		2020	\$1,306,000	\$204,850			2020	\$1,601,000	\$234,350
		2030	\$1,306,000	\$204,850			2030	\$1,601,000	\$234,350
		Subtotal	\$3,918,000	\$614,550			Subtotal	\$4,803,000	\$703,050
	Nevada	2010	\$646,000	\$138,850		Nevada	2010	\$721,000	\$146,350
		2020	\$646,000	\$138,850			2020	\$721,000	\$146,350
		2030	\$646,000	\$138,850			2030	\$721,000	\$146,350
		Subtotal	\$1,938,000	\$416,550			Subtotal	\$2,163,000	\$439,050
	Utah	2010	\$1,086,000	\$182,850		Utah	2010	\$1,161,000	\$190,350
		2020	\$1,086,000	\$182,850			2020	\$1,161,000	\$190,350
		2030	\$1,086,000	\$182,850			2030	\$1,161,000	\$190,350
		Subtotal	\$3,258,000	\$548,550			Subtotal	\$3,483,000	\$571,050
	Idaho	2010	\$866,000	\$160,850		Idaho	2010	\$941,000	\$168,350
		2020	\$866,000	\$160,850			2020	\$941,000	\$168,350
		2030	\$866,000	\$160,850			2030	\$941,000	\$168,350
		Subtotal	\$2,598,000	\$482,550			Subtotal	\$2,823,000	\$505,050
	Montana	2010	\$646,000	\$138,850		Montana	2010	\$941,000	\$168,350
		2020	\$646,000	\$138,850			2020	\$941,000	\$168,350
		2030	\$646,000	\$138,850			2030	\$941,000	\$168,350
		Subtotal	\$1,938,000	\$416,550			Subtotal	\$2,823,000	\$505,050
	Total	2010	\$4,550,000	\$826,250		Total	2010	\$5,365,000	\$907,750
		2020	\$4,550,000	\$826,250			2020	\$5,365,000	\$907,750
		2030	\$4,550,000	\$826,250			2030	\$5,365,000	\$907,750
		Total	\$13,650,000	\$2,478,750			Total	\$16,095,000	\$2,723,250

Benefits of ITS Strategies

The proposed projects described above may be assessed based on benefits information obtained through a variety of sources. Much of this information has been incorporated into an ITS Benefits database by the USDOT's ITS Joint Program Office. (Reference: *Intelligent Transportation Systems Benefits: 1999 Update*, 28 May 1999, US Department of Transportation, Washington, DC.)

Particularly for rural ITS deployments, little or no benefits information has been collected to date by the various implementers or operators. More information has been obtained for urban implementations. However, components such as incident management systems and variable message signs can provide similar functionality and benefits regardless of whether the highway is in an urban or a rural environment. Thus, the Team has looked at both urban and rural ITS functions in order to address the range of benefits that may occur.

Benefit Areas and Taxonomy - In assessing benefits, USDOT has identified specific benefits areas, which are related to the proposed CANAMEX programs below. Within each of the areas is a taxonomy that classifies the different types of benefits relevant to the CANAMEX projects:

CANAMEX Transportation Management and Information Network (CT-MAIN)

- Traveler Safety and Security
 - Hazardous Conditions Information
 - Weather
 - Roadway
 - Surveillance
- Infrastructure Operation and Maintenance
 - Traffic Management
 - Work Zone Safety
 - Event Based/Seasonal
 - Urban Extensions
- Incident Management
 - Surveillance
 - Detection
 - Response

CANAMEX Smart Tourist

- Tourism and Travel Information
 - Route Selection/Navigation
 - Pre-trip
 - En-route
 - Services Information
 - Hotels, restaurants
 - Tourist information

- Freeway management
 - Surveillance
 - Incident detection
 - Display – Audio/Visual
 - VMS
 - HAR
 - Specialized Information

CANAMEX Smart Freight

- Safety Assurance
 - Safety Information Exchange
 - Automated inspections
 - Onboard monitoring (*HAZMAT vehicles*)
 - Trip monitoring
 - Cargo monitoring
- Credentials Administration
 - Electronic credentialing
 - Interagency data exchange
 - Interstate data exchange
- Electronic Screening
 - Safety screening
 - Credential checking
 - Border clearance
 - Weight screening
- Carrier Operations
 - Fleet & Freight Management
 - Scheduling
 - Vehicle Tracking
 - Traveler Information
 - Hazmat Incident Response
 - Administrative Processes
 - Oversize/overweight permitting
 - Data clearinghouses

In review of the current FHWA benefits summaries (see reference above), the following serve as “typical” benefits relevant to the CANAMEX Corridor projects.

Advance Congestion and Incident Information - Advance information using variable message signs and highway advisory radio result in a 40% reduction in incidents, based on assessment of several deployments in various metropolitan areas. This reduction is largely due to the reduction of “secondary accidents” that may occur as a result of not having prior warning about stopped traffic or unanticipated congestion. As VMS’s in rural areas may serve a similar purpose (as well as providing weather information functions as discussed below), the Team

feels it is likely that similar or greater benefits would accrue outside urban areas as well, particularly as congestion or incident conditions tend to be more of a “surprise” in non-urban areas.

Advance Weather Information - Estimates with respect to advanced weather information services provided in Finland yield an approximate cost benefit ratio of 5-to-1, based on accident reduction, time cost reductions, and decreased vehicle operating costs.

Interoperability of CVO Processes - Standardization or full interoperability of preclearance technologies will likely increase the “market penetration” of CVO transponders, and thus increase the use and efficiency of commercial vehicle electronic administrative and preclearance activities. Based on 20 seconds time between vehicles arriving at the scale and an estimated 25 seconds at the facility, preclearance time savings will be 100% for transponder-equipped vehicles, and may range from 30 seconds per non-equipped vehicle (at 20% market penetration) to 8 minutes per non-equipped vehicle (at 80% market penetration).

Border Clearance Benefits - Electronic Border Crossing Systems will provide a 5.4:1 benefit-cost ratio, inclusive of potential reductions in delay and administrative expenses.

Calculation of CANAMEX Benefits - Calculation of CANAMEX benefits is based on the following measures of effectiveness:

- Vehicle-hours of travel (reduction)
- Reduction in accidents
- Reduction in “other” (administrative and public sector operations) costs.

Data used in determination of these estimated benefits includes the following:

- Vehicle-Hours and Vehicle-Miles Traveled
- Accident rate – NHTSA data
- Truck percentage of VMT.

The following represent the estimations of benefits due to CANAMEX Corridor ITS projects:

- CT-MAIN + Smart Tourist: 40% incident reduction based on VMS’s and HAR’s installed under Smart Tourist program, with 5:1 benefit-cost ratio for interface to statewide systems (traffic, weather and other data). Also assume an average estimated delay of 10 minutes per vehicle impacted by congestion from a major incident, with major incident durations of 30 minutes.
- CT-MAIN + Smart Freight: 40% incident reduction based on VMS’s and HAR’s installed under CRT program, with 5:1 benefit-cost ratio for interface to statewide systems (traffic, weather and other data).
- Smart Freight: Reductions in delay per truck per weigh station will occur as a result of increased interoperability and market penetration for CVO electronic clearance transponders. As this is expected to be completed under other initiatives, this has not been assumed to be a CANAMEX-specific benefit.

- Smart Freight: 5.4:1 benefit-cost ratio for border crossing related ITS improvements.

It is noted that, for VMS and HAR deployment, the MAIN program is essential in that it provides the coordination between different statewide ITS and information systems needed to support the deployment activities.

Table IV-8 summarizes the calculation of ITS benefits by state by time-period. The benefits for the Smart Tourist Strategy are clear-cut. To determine the benefits of a full Smart Freight plus Smart Tourist Strategy, the benefits should be added together. These benefits serve as inputs to the economic evaluation.

Table IV-8
Annual CANAMEX ITS Project Benefits

	Total	Arizona	Nevada	Utah	Idaho	Montana
Smart Tourist + MAIN						
2010						
VHT Reduction (millions)	14.39	4.50	0.98	8.79	0.06	0.07
Accident Cost Reduction (\$) - incident info	\$ 6,080,691	\$ 1,954,900	\$ 991,979	\$ 2,744,146	\$ 189,769	\$ 199,897
Estimated Benefit(\$)- weather info	\$ 840,000	\$ 270,054	\$ 137,034	\$ 379,082	\$ 26,215	\$ 27,614
2020						
VHT Reduction (millions)	39.55	8.52	1.97	28.85	0.10	0.12
Accident Cost Reduction (\$) - incident info	\$ 11,434,405	\$ 2,954,531	\$ 1,595,008	\$ 6,370,923	\$ 245,272	\$ 268,671
Estimated Benefit(\$)- weather info	\$ 840,000	\$ 217,047	\$ 117,173	\$ 468,024	\$ 18,018	\$ 19,737
2030						
VHT Reduction (millions)	98.56	15.85	4.47	77.91	0.15	0.18
Accident Cost Reduction (\$) - incident info	\$ 22,043,661	\$ 4,657,644	\$ 2,954,917	\$ 13,785,656	\$ 309,256	\$ 336,187
Estimated Benefit(\$)- weather info	\$ 840,000	\$ 177,485	\$ 112,601	\$ 525,319	\$ 11,785	\$ 12,811
Smart Freight+ MAIN						
2010						
VHT Reduction (millions)	3.60	1.12	0.25	2.20	0.01	0.02
Accident Cost Reduction (\$) - incident info	\$ 1,520,173	\$ 488,725	\$ 247,995	\$ 686,037	\$ 47,442	\$ 49,974
Estimated Benefit(\$)- weather info	\$ 210,000	\$ 67,514	\$ 34,259	\$ 94,771	\$ 6,554	\$ 6,904
Estimated Benefit (\$) - border xing info	\$ 864,000	\$ 432,000	\$ -	\$ -	\$ -	\$ 432,000
2020						
VHT Reduction (millions)	9.89	2.13	0.49	7.21	0.02	0.03
Accident Cost Reduction (\$) - incident info	\$ 2,858,601	\$ 738,633	\$ 398,752	\$ 1,592,731	\$ 61,318	\$ 67,168
Estimated Benefit(\$)- weather info	\$ 210,000	\$ 54,262	\$ 29,293	\$ 117,006	\$ 4,505	\$ 4,934
Estimated Benefit (\$) - border xing info	\$ 864,000	\$ 432,000	\$ -	\$ -	\$ -	\$ 432,000
2030						
VHT Reduction (millions)	24.64	3.96	1.12	19.48	0.04	0.05
Accident Cost Reduction (\$) - incident info	\$ 5,510,915	\$ 1,164,411	\$ 738,729	\$ 3,446,414	\$ 77,314	\$ 84,047
Estimated Benefit(\$)- weather info	\$ 210,000	\$ 44,371	\$ 28,150	\$ 131,330	\$ 2,946	\$ 3,203
Estimated Benefit (\$) - border xing info	\$ 864,000	\$ 432,000	\$ -	\$ -	\$ -	\$ 432,000

Section V

ECONOMIC IMPACT OF INITIATIVES

This section presents an economic impact analysis of five of the major Initiatives. The section begins with a discussion of the economic impact model used by ERA, identifies key assumptions, and then discusses each Initiative, including policy variables utilized, methodology, and results.

THE REMI POLICY INSIGHT ECONOMIC IMPACT MODEL

To evaluate the economic impact of the five major Initiatives on the CANAMEX Corridor states, ERA leased an economic model developed by Regional Economic Models, Inc. (REMI). The REMI model uses hundreds of equations developed over the past two decades and is based on data from the Bureau of Economic Analysis, The Bureau of Labor Statistics, the Department of Energy, the Census Bureau, and other public sources. The REMI model was customized for the five CANAMEX states – Arizona, Idaho, Montana, Nevada, and Utah, and provides the mechanism for identifying impacts at the individual state and five-state regional levels.

The REMI model is a structural model and includes cause-and-effect relationships. It is based on two key underlying assumptions of mainstream economic theory: households maximize utility and producers maximize profits. In the REMI model, businesses produce goods to sell to other firms, consumers, investors, governments, and purchasers outside the region. The output is produced using labor, capital, fuel, and intermediate inputs. The demand for labor, capital and fuel per unit of output depends on their relative costs, since an increase in the price of any one of these inputs leads to substitution away from that input to other inputs. The supply of labor in the model depends on the size of the population and the proportion of those people who participate in the labor force. Economic migration affects the population size. People will move into an area if the real after-tax wage rates or the likelihood of being employed increases in a region.

Supply and demand for labor in the model determine the wage rates. These wage rates, along with other prices and productivity, determine the cost of doing business for every industry in the model. An increase in the cost of doing business causes either an increase in price or a cut in profits, depending on the market for the product. In either case, an increase in cost would decrease the share of the local and the U.S. market supplied by local firms. This market share combined with the demand described above determines the amount of local output. Of course, the model has many other feedback loops. For example, changes in wages and employment impact income and consumption, while economic expansion changes investment and population growth impacts government spending.

The REMI model brings together the population and labor supply, output, market shares, labor and capital demand, and wages, prices, and profits to determine the value of each of the variables in the model for each year in the baseline forecasts. The model includes all of the inter-industry relationships that are in an input-output model in the output block, but goes well beyond the input-output model by including the relationships in all of the other blocks, as shown in Figure V-1. In order to broaden the model in this way, REMI estimated key

relationships, based upon using extensive data sets covering all areas in the country. These large data sets and two decades of research effort have enabled REMI to simultaneously maintain a theoretically sound model structure and build a model based on all the relevant data available.

The REMI model is operated by defining a policy question based upon a policy change, selecting a baseline forecast, then generating an alternative forecast using an external variable set that includes changes in the external values, which are affected by the policy issue. For each Corridor Initiative, ERA identified major categories of impacts and corresponding REMI policy variables, quantified these changes, then applied these changes to the REMI model.

Overall Assumptions

When developing the alternative regional forecast for the CANAMEX Initiatives, ERA made many specific, detailed assumptions that are described in this section. However, there are several overall principles that the entire economic analysis is based upon. Most of these are based upon general economic impact theory and are described as follows:

- Every economic impact analysis is based upon a specific geographic region. The analysis of the CANAMEX Initiatives examined the economic impact of these initiatives on each of the five CANAMEX states as well as the entire five-state region as a whole. While some of the Initiatives are likely to create impacts within states that are significant at a policy level (e.g. rural vs. urban, individual county impacts, etc.), this economic impact analysis examines the impacts at the statewide level.
- The time period analyzed was between the year 2000 and the year 2030.
- To establish a baseline economic forecast, ERA primarily relied upon REMI's economic forecast for the five CANAMEX states and the five-state region, but adjusted the population growth assumptions to correspond with the individual state's population projections. In order to account for the differences between REMI's population forecast and the individual state's forecast, ERA increased the non-pecuniary amenity variable (part of the population and labor supply block) until the population in the baseline forecast was within one percent of the states' forecasts for years 2000, 2005, 2010, 2020, and 2030. The baseline population assumptions for the CANAMEX states are presented in Table V-1.
- Each REMI forecast predicts the difference between the growth that would normally have occurred in the Base Case and growth with the Initiative being analyzed.

INITIATIVE No. 1: SMART FREIGHT CORRIDOR (BOLD)

The analysis for Bold Initiative No. 1, the Smart Freight Corridor, includes a series of intelligent transportation system improvements strategies described in detail in Section IV. This initiative does not include the highway improvements analyzed separately in Initiative No. 4.

Methodology and Assumptions

The methodology and assumptions specific to this Initiative are as follows:

- The key components driving economic impact include the savings in vehicle hours traveled, the new capital investment in ITS infrastructure and the expenditures required for maintenance of that infrastructure.
- The recommended ITS capital expenditures are detailed in Section IV. The capital improvements required for these improvements was assumed to be new funding to the five states from the Federal Government, and we also assumed that this new funding would not replace existing funding for highway construction, maintenance, and operations.
- These expenditures were entered into the REMI model as a change in demand for miscellaneous business services for each state. This category includes the engineering firms that would be likely to receive most of the revenues from the ITS capital expenditures. Using the demand policy variable accounts for the fact that not all services might be provided by business located within each state.
- The additional operations and maintenance cost for the improvements was assumed to represent an increase in state and local government spending on commerce and transportation.
- The decrease in production cost for the 48 REMI industries, having a significant transportation component in their production cost, were calculated using the value of border crossing information in addition to the reduction of hours traveled, value of weather information, and accident reduction.
- The total reduction in vehicle hours traveled was first divided between industry and consumer vehicles (25 percent of time savings were allocated to industry vehicles and 75 percent to consumer vehicles). These time savings were then converted into dollar amounts using Department of Transportation estimates for dollar values of hours traveled for commercial and private vehicles (\$26 per hours for commercial vehicles and \$6 to \$8 per hour for private vehicles).
- For consumer reduced travel time, the monetary equivalent for the reduction in hours traveled was entered into the REMI model under the non-pecuniary amenity variable.

Factors Influencing Impact

The strongest driver of economic impact in this Initiative is the saving in vehicle hours traveled. The magnitude of impact is correlated to the travel efficiency gain, for both commercial and passenger vehicles, resulting from the ITS investment. The economic impact of a multi state effort would be greater than the sum of the efforts of the individual states, if the cooperative effort is able to generate greater travel efficiencies or more savings in vehicle hours traveled.

The construction expenditures also have an impact because they represent an injection of new federal dollars into each of the five states. However, because the magnitude of capital expenditures in this Initiative are minor, when compared to the expenditures spent for highway construction, the construction spending does not have a major influence on net employment gain. This is particularly true when we consider that the construction dollars are spread over a 30-year period and may be spent on engineering firms based outside of the CANAMEX region.

The expenditure for operating and maintenance of the ITS infrastructure, because they are funded by taxes collected within each state, does not have significant influence in accelerating employment gain. It represents a recirculation of dollars collected locally.

We have not attempted to include the impact of coordinated alternative fuel infrastructure efforts among the five Corridor states, because of the need for air quality models that are specific to the various air basins and such analysis went well beyond the scope of this assignment.

Results

Key indicators of the economic impact of Initiative No.1 on each of the states and the five-state region are presented in Tables V-2 through V-7. Specific highlights for each state are as follows:

Initiative No. 1: Smart Freight Corridor	Net Job Gain by 2030
Arizona	28,000
Nevada	38,000
Utah	35,000
Idaho	15,000
Montana	5,000
Total CANAMEX Corridor States	120,000

INITIATIVE No. 2: SMART TOURIST CORRIDOR (BOLD)

Bold Initiative No. 2, the Smart Tourist Corridor, is defined in detail in Section II. The analysis approach is basically the same as for the Smart Freight Corridor. The analysis of Bold Initiative No. 2 impacts have been carefully conducted to avoid any double counting of impacts already considered in Bold Initiative No 1.

Methodology and Assumptions

Due to the overlap and similarity of the two initiatives, the methodology and assumptions used for analyzing the economic impact of this Initiative included those used to analyze the first Bold Initiative. The additional considerations are as follows:

- The Smart Tourist Corridor Strategy was expected to result in a decrease in accident cost due to improved access to weather information. To calculate the decrease in production costs for industry, ERA used transportation satellite account information to calculate transportation cost savings for 48 different industries based upon gross regional output, percentage of overall cost represented by transportation, and in-house transportation ratios. This reduction in production cost for industries was then entered into the REMI model.
- The REMI model does include a policy variable for number of tourists; however, in order to ensure that the total increase in tourist expenditures in each state would correspond with recent economic impact studies and data collected by individual state

tourism offices, ERA chose to represent the increase in tourism through output in the following categories: hotels, eating and drinking, amusement and recreation, rest of retail, and local and interurban transportation. Based upon information from each state’s tourism office regarding the economic impact of non-resident visitors and percentage of per capita expenditures by category, ERA calculated existing annual tourist expenditures by these five REMI industry categories. ERA assumed that the CANAMEX states could achieve an increase in tourist spending of one percent by the year 2010, three percent by the year 2020, and five percent by the year 2030 due to the implementation of this Initiative.

Factors Influencing Impact

The key factors influencing economic impact generated by this Initiative include those already described under Initiative No. 1. The additional factor is increased tourist visitation and spending due to the development of new tourism attractions and to a concerted marketing campaign. Each state working individually and the five states working cooperatively as a region will be able to influence the magnitude of the future tourism sector growth and overall employment gain by undertaking the following actions:

- Aggressively promoting the development of new tourism assets that have strong visitor appeal, particularly to high-income visitors.
- Undertake well-targeted and cost effective marketing campaigns.
- Take advantage of the CANAMEX branding opportunity provided by multi-state cooperation to mount a concerted marketing campaign. A well-orchestrated five-state marketing effort is likely to have greater overall impact than five individually directed campaigns using a comparable level of resources.

Results

Key indicators of the economic impact of Initiative No. 2 on each of the states and the five-state region are presented in Tables V-8 through V-13. The additional employment growth over the Base Case forecast by 2030 for each state is shown below:

Initiative No. 2: Smart Tourist Corridor	Net Job Gain by 2030
Arizona	27,000
Nevada	37,000
Utah	30,000
Idaho	14,000
Montana	5,000
Total CANAMEX Corridor States	113,000

INITIATIVE No. 3: RURAL TELECOMMUNICATIONS ACCESS (BOLD)

Providing telecommunications access to rural areas, particularly “last mile” telecommunication access, could have a variety of impacts, some of which are conducive to

economic impact analysis, and some of which are difficult to quantify in economic terms. Major categories of economic impact include: an increase in sales for small businesses in rural areas, particularly in industries that are tourism or information service-based, a decrease in production cost for businesses, particularly in the professional services industries, that have higher than average percentage of communications costs, an increase in labor productivity as a result of increased levels of education and training due to improved access to education programs, decreased consumer medical costs and increased survival rates due to access to telemedicine, decreased consumer price for household operations, decreased consumer price for transportation due to better access to state and local government services, and expenditure by state and local government for providing incentives to private firms to develop telecommunications infrastructure in these rural areas.

It should be noted that the REMI model does not analyze differences between rural and urban areas – it only analyzes the impact at the statewide level. The realization of economic impacts in these categories are largely dependent upon how particular incentives are implemented and public policy (i.e. development of specific programs for rural online education or tele-medicine). Therefore, ERA has developed reasonable estimates and assumptions for each category of impact.

Methodology and Assumptions

Specifically, ERA used the following approach and assumptions in developing the REMI inputs for Bold Initiative No. 3:

- The increase in output was applied to the following REMI industries: communication, banking, insurance, credit and finance, real estate, eating and drinking, rest of retail, hotels, amusement and recreation, medical, miscellaneous business services, and miscellaneous professional services. Using estimates of rural population in each state from the U.S. Census Bureau, ERA estimated the percentage of total output accounted for by rural areas. Then, assuming a maximum 10 percent increase in output for rural businesses by the year 2030, and a gradual increase from 2005 through 2030, ERA developed an overall average increase in output for the affected industries in each of the five states.
- The decrease in production cost was applied primarily to the following communication intensive REMI industries: communication, banking, insurance, credit and finance, real estate, medical, miscellaneous professional services, and miscellaneous business services. Again, ERA used U.S. Census Bureau information to estimate percent of total output accounted for by rural businesses. Then, assuming that communications represents approximately five percent of total business cost, and assuming a 10 percent maximum decrease in communications cost by the year 2030, ERA developed an overall average decrease in production cost for these selected industries for each state.
- To estimate the increase in labor productivity for all industries, ERA first assumed that 20 percent of the rural population would take advantage of online education and take an average of one class per year (or achieve 0.25 years of education annually, on average). Based upon the percentage of rural population, ERA developed an average increase in years of education for the overall population. Based upon a study by the Department of Labor that found an 8 to 13 percent increase in labor productivity for every additional year of education, ERA calculated an average increase in labor productivity for each state.

- The increase in survival rate for the population was estimated by assuming a 0.5 percent increase in the survival rate for the rural populations in each state. Based upon this assumption and the percent rural population for each state, ERA calculated an average increase in survival rate for the overall population in each state.
- To estimate the decrease in consumer price of medical expenses, ERA assumed a \$4 savings per capita for the rural population. The \$4 per capita assumptions was developed using a weighted average based on the percentage of the rural population that would be able to take advantage of telemedicine and an average per capita savings estimate.
- To estimate the decrease in consumer price for household operations, ERA assumed a \$2 savings per capita for the rural population. This is based upon the percentage of overall household operation cost that is accounted for by communications, the weighted average based on the percentage of the rural population that would be able to take advantage of these improved telecommunications, and an average per capita savings.
- The decrease in consumer price for transportation due to increased online access to state and local government was estimated using an approach similar to that used for the previous decreases in consumer price for medical expenses and household operations. In this case, the savings for the rural population were assumed to be \$0.50 per capita.

Factors Influencing Impact

Expanding the telecommunications infrastructure into smaller rural communities provides improved opportunity for but does not guarantee accelerated economic development. Allowing on-line access to basic government services, providing improved on-line education programs, and protecting the quality of life in these smaller communities as they grow are all still important. Improving telecommunications access is one of several important considerations for economic development.

Since the REMI model uses economic migration, or labor force attraction, to determine the job growth of one state as compared to another, speed of implementation will affect the economic performance of this five-state region. The objective of this Initiative is for the five-state region to provide telecommunications access to rural communities faster than competing states are able to do likewise. The gain in competitive advantage is relative and temporary.

Results

The impact of this Initiative has been analyzed in tandem with Initiative No. 5: Smart Process Partnerships, because the productivity gains of that Initiative are not available to rural areas unless high-speed telecommunications access is provided to the smaller, rural communities. Given that rural area job increases due to Smart Process Partnerships absolutely depend upon new telecommunications infrastructure, the rural portion of the job increases in each state resulting from Smart Process Partnerships has been credited to this Rural Telecommunications Access Initiative. The net job gains by state, and for the region as a whole, have not been affected due to this reallocation of credit for job gain.

Key indicators of the economic impact of Initiative No. 3 on each of the states and the five-state region are presented in Tables V-14 through V-19. The additional employment growth over the Base Case forecast by 2030 for each state is shown below:

Initiative No. 3: Rural Telecom Access	Net Job Gain by 2030
Arizona	59,000
Nevada	29,000
Utah	29,000
Idaho	46,000
Montana	38,000
Total CANAMEX Corridor States	201,000

INITIATIVE No. 4: HIGHWAY IMPROVEMENTS

Initiative No. 4 is a series of highway improvements in Arizona, Nevada, Utah, Idaho, and Montana that are above and beyond the highway improvements already planned and programmed within the Corridor. Because these are traditional highway improvements that would not need any new multi-state level cooperation for implementation, this Initiative is not considered a “Bold Initiative.” Major categories of impacts include the investment required for the construction of the road improvements, the marginal operation and maintenance cost of the improved or expanded highways, the efficiencies gained or decrease in production cost as a result of the highway improvements for commercial vehicles, and the reduction in travel time for consumers.

It is important to note that some of the northern portions of I-15 within the Corridor are over forty years old and have a history high maintenance costs due to severe winters. Although Montana is not expected to experience urban-based congestion within the Corridor, Montana’s I-15 segment of the Corridor represents the strategic trade link between Alberta and all of the southern members of the Coalition. This reality will make improvements to Montana’s portion of the Corridor increasingly important when, as studies predict, trade and traffic increase along the entire length of the Corridor.

Methodology and Assumptions

Specifically, ERA utilized the following methodology and assumptions to assess the economic impacts of Initiative No. 4:

- The investment levels required for highway construction are detailed in Section IV. The funding required for these improvements was assumed to represent new funding to the five states from the Federal Government. ERA also assumed that this new transportation funding would not replace existing funding for highway construction, maintenance, and operations.
- The expenditures associated with the construction of the highway improvement were assumed to represent a change in total output for the construction industry. ERA assumed that the demand for construction services for each state could be met by businesses within each state, and therefore the expenditures were considered a change in output, or sales, rather than a change in demand.

- The additional operations and maintenance cost for the roadway improvements was assumed to represent an increase in the state and local government spending on highways.

Calculation of Industry Reduced Travel Time – Transportation Satellite Accounts

Industry reduced travel time can be treated in one of two ways using the REMI model – as an increase in factor productivity or as a decrease in production cost. We chose to represent the reduced travel time as a decrease in production cost. The total reduction in vehicle hours traveled (VHT) resulting from the transportation improvements are estimated in Section IV. Based upon current highway usage patterns, ERA assumed that approximately 25 percent of this reduction represented savings to commercial trucks. These hours were then translated into dollar savings based upon factors provided by Department of Transportation. The average value of an hour of reduced commercial vehicle travel time is approximately \$26.

These dollar savings were then distributed among 48 different industries. While the majority of the benefit accrued to the trucking industry, other industries also use in-house transportation savings and are likely to experience a decrease in transportation cost as a result of highway improvements. To determine the distribution among industries, ERA utilized Transportation Satellite Accounts (TSA) data provided by the Bureau of Economic Analysis (BEA). The TSA model, adjusted for regional output in each state, provides ratios of in-house transportation costs that allow for the calculation of decrease in production cost among these 48 different industries. Based upon this distribution, ERA allocated the resulting decrease in production cost for all 48 industries into the appropriate REMI variables.

Consumer Reduced Travel Time

Finally, ERA determined consumer reduced travel time by converting the remaining 75 percent in reduction of vehicle hours traveled to a dollar value, based upon an average value of \$6-\$8 per hour for consumer vehicles (provided by Department of Transportation). This increased value for consumers was applied to the non-pecuniary amenity aspects REMI variable.

Factors Influencing Impact

The most important determinant of economic impact in this Initiative is the saving in vehicle hours traveled. The magnitude of impact is correlated to the travel efficiency gain, for both commercial and passenger vehicles, resulting from the highway investment. Once the highway improvement is made, the travel efficiency gains are perpetual until growth in traffic volume requires an additional iteration of investment.

The construction expenditures also have an impact because they represent an injection of new federal dollars into each of the five states. However, the construction expenditures have relatively minor impact because they are spread over a 30-year period and each year's impact is temporary.

The expenditure for operating and maintenance of the highway infrastructure, because they are funded by taxes collected within each state, does not have significant economic impact. These expenditures represent a recirculation of dollars collected locally.

Results

The impact of this Initiative correlates with where the improvements are made. Net job gain in Idaho is understated because not all proposed highway improvements were taken into account at the time that this analysis was performed. Key indicators of the economic impact of Initiative No. 4 on each of the states and the five-state region are presented in Tables V-20 through V-25. The additional employment growth over the Base Case forecast by 2030 for each state is shown below:

Initiative No. 4: Highway Improvements	Net Job Gain by 2030
Arizona	30,000
Nevada	27,000
Utah	43,000
Idaho	6,000
Montana	3,000
Total CANAMEX Corridor States	110,000

INITIATIVE No. 5: SMART PROCESS PARTNERSHIPS (BOLD)

Implementing Smart Process Partnership programs in all five CANAMEX states could have a tremendous economic impact on all industries. However, there has been very little research conducted regarding the economic impact of e-commerce, e-government or digital signature program implementation, primarily due to the emerging nature of legislation and technology in this field. As a result, ERA developed reasonably conservative assumptions based upon interviews with industry professionals in order to analyze the economic impact of this Initiative.

Methodology and Assumptions

The three major categories of economic impact of Smart Process Partnership development and implementation in the five CANAMEX states are a reduction in costs for all industries, a reduction in consumer expenses on household operations, and state and local government expenditures to implement and monitor a partnership program. Specifically, ERA used the following assumptions and inputs to estimate the economic impact of this initiative using the REMI model:

- ERA assumed that the cooperative implementation of Smart Process Partnerships in all five states resulted in a 0.5 percent decrease in production costs for all industries by the year 2010, a one percent decrease in production costs for all industries by the year 2020, and a two percent decrease in production costs for all industries by the year 2030. While it is difficult to ascertain exactly what the decrease in production costs would be for each industry, these broad-based assumptions at least allow for an understanding of what the economic impact would be if digital signature legislation resulted in decrease costs of these magnitudes.

- ERA assumed that the consumer price of household operation would decrease by .05 percent starting in the year 2010 and continuing until the year 2030.
- Based upon interviews with industry professionals, ERA estimated that each state government would spend approximately \$1.5 million in 2001 (or early on in the implementation phase) to set up the systems and procedures, then an additional \$500,000 for the next three years to assist with applications development for specific industries. Operations and maintenance costs were assumed to not have an impact on net state government spending – these costs would likely be covered by existing budgets and replace operations and maintenance costs for other systems that would be replaced by the partnership program.

Factors influencing Impact

Using modest assumptions about the reduction in across the board business transaction cost in these five states, this Initiative has a major impact in accelerating job growth. However, because the REMI model compares the relative employment attractiveness of the CANAMEX states to the other states in the nation, the CANAMEX Corridor job attraction impact of this Initiative would not be as powerful if all states in the entire nation simultaneously adopted similar initiatives. Therefore, speed of implementation of key partnerships, common standards and interoperable systems for the CANAMEX Corridor region is important to accelerating job growth. The risk for the region is that the standards and systems adopted in haste for the digital signature part of the program are not ultimately fully compatible with that adopted by other major states in the nation.

Results

Key indicators of the economic impact of Initiative No. 5 on each of the states and the five-state region are presented in Tables V-26 through V-31. Specific highlights for each state are as follows:

Initiative No. 5: Smart Process Partnerships	Net Job Gain by 2030
Arizona	199,000
Nevada	108,000
Utah	101,000
Idaho	36,000
Montana	22,000
Total CANAMEX Corridor States	466,000

COMBINED IMPACT OF THE FIVE MAJOR INITIATIVES

The five major Initiatives, if implemented effectively, will accelerate economic development and employment growth within the five-state region. Over a 30-year period, the estimated impact is in the vicinity of one million additional jobs over the Base Case forecast. When dealing with long term forecasts, the precise numbers are less important than the

magnitude of the change from the Base Case. *The million additional jobs represent an eleven percent increase in job growth by the end of the 30-year period.* This magnitude of addition job growth indicates that the recommended Initiatives will enhance the already strong economic performance of the region. The combined job creation impacts of the first four Bold Initiatives plus that of the additional highway improvements are displayed below and detailed in Tables V-32 to V-36.

Five Major Corridor Initiatives	Net Job Gain by 2030
Arizona	343,000
Nevada	240,000
Utah	237,000
Idaho	117,000
Montana	72,000
Total CANAMEX Corridor States	1,009,000

Table V-32
IMPACT OF CANAMEX INITIATIVES ON STATE OF ARIZONA
(As Measured by Employment in Thousands)

CANAMEX Initiatives	Base Case		With Initiative		
	2000	2030	Total	Gain Over Base Case	
			2030	Number	Percentage
Smart Freight Corridor	2,675	3,704	3,732	28	0.8%
Smart Tourist Corridor	2,675	3,704	3,731	27	0.7%
Telecom Access	2,675	3,704	3,763	59	1.6%
Transportation Improvements	2,675	3,704	3,734	30	0.8%
New Smart Process	2,675	3,704	3,903	199	5.4%
TOTAL IMPACT	2,675	3,704	4,047	343	9.3%

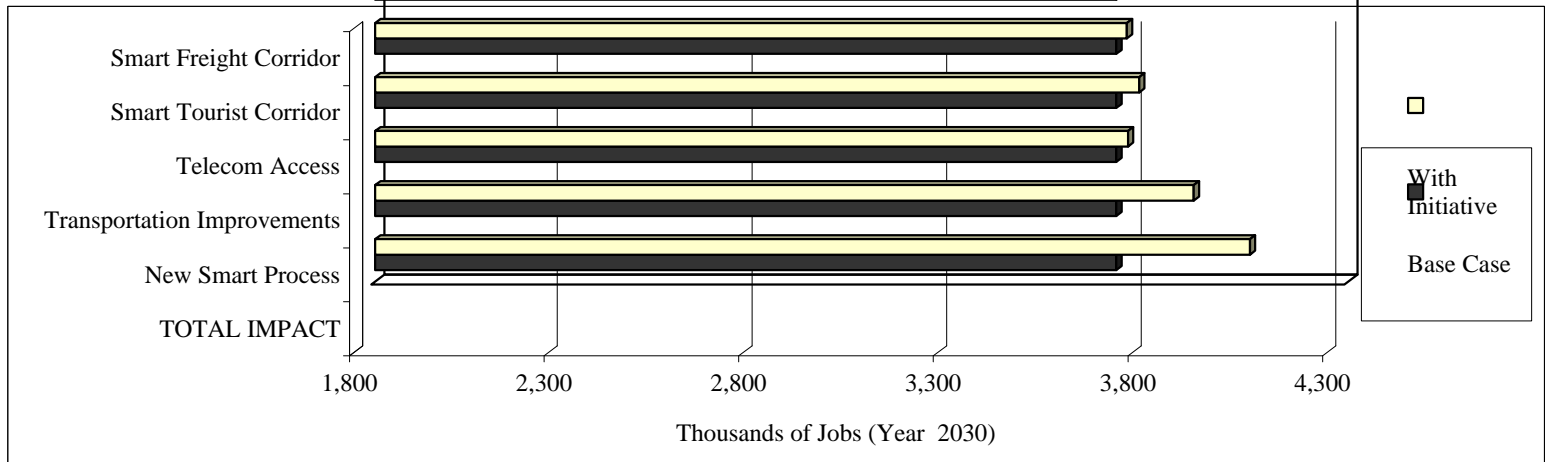


Table V-33
IMPACT OF CANAMEX INITIATIVES ON STATE OF NEVADA
(As Measured by Employment in Thousands)

CANAMEX Initiatives	Base Case		With Initiative		
	2000	2030	Total	Gain Over Base Case	
			2030	Number	Percentage
Smart Freight Corridor	1,187	1,977	2,015	38	1.9%
Smart Tourist Corridor	1,187	1,977	2,014	37	1.9%
Telecom Access	1,187	1,977	2,006	29	1.5%
Transportation Improvements	1,187	1,977	2,004	27	1.4%
New Smart Process	1,187	1,977	2,085	108	5.5%
TOTAL IMPACT	1,187	1,977	2,217	240	12.1%

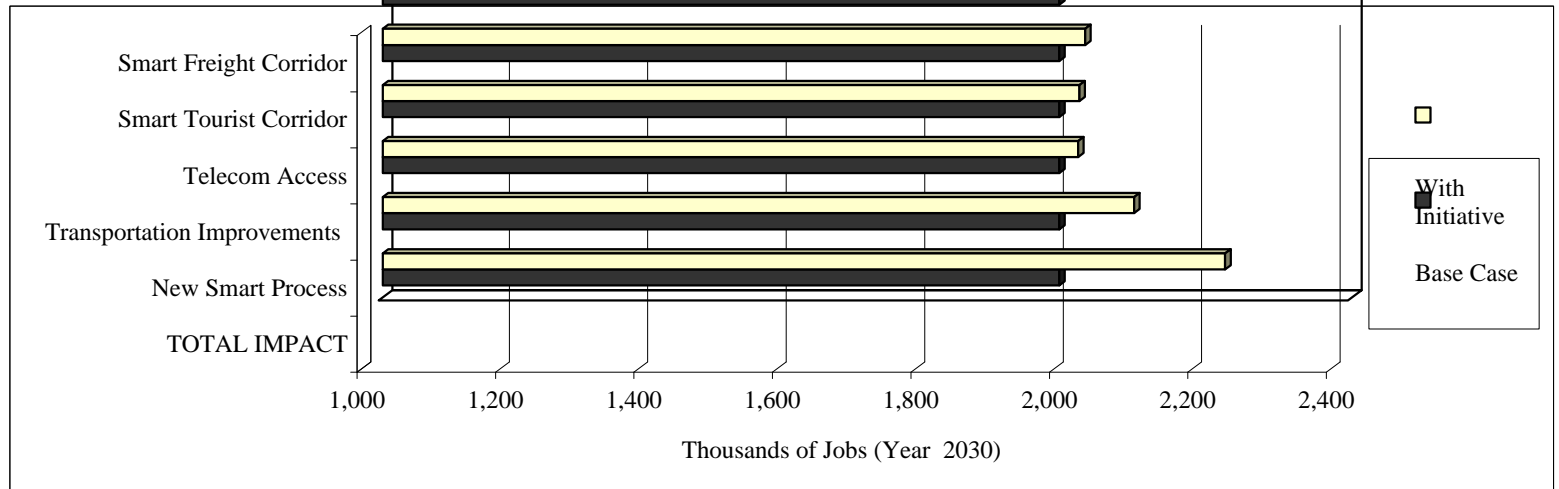


Table V-34

IMPACT OF CANAMEX INITIATIVES ON STATE OF UTAH

(As Measured by Employment in Thousands)

CANAMEX Initiatives	Base Case		With Initiative		
			Total	Gain Over Base Case	
	2000	2030	2030	Number	Percentage
Smart Freight Corridor	1,332	1,862	1,896	35	1.9%
Smart Tourist Corridor	1,332	1,862	1,891	30	1.6%
Telecom Access	1,332	1,862	1,891	29	1.6%
Transportation Improvements	1,332	1,862	1,905	43	2.3%
New Smart Process	1,332	1,862	1,963	101	5.4%
TOTAL IMPACT	1,332	1,862	2,099	237	12.8%

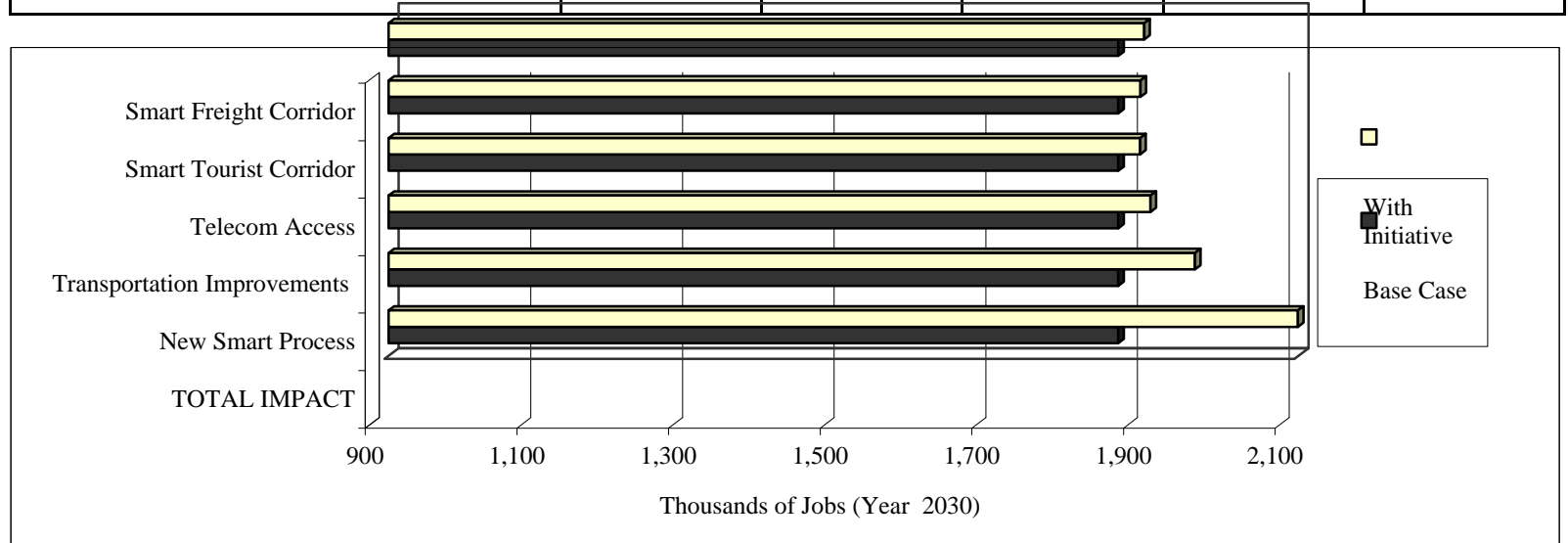


Table V-35
IMPACT OF CANAMEX INITIATIVES ON STATE OF IDAHO
(As Measured by Employment in Thousands)

CANAMEX Initiatives	Base Case		With Initiative		
			Total	Gain Over Base Case	
	2000	2030	2030	Number	Percentage
Smart Freight Corridor	744	977	992	15	1.5%
Smart Tourist Corridor	744	977	991	14	1.5%
Telecom Access	744	977	1,023	46	4.7%
Transportation Improvements	744	977	982	6	0.6%
New Smart Process	744	977	1,013	36	3.7%
TOTAL IMPACT	744	977	1,094	117	12.0%

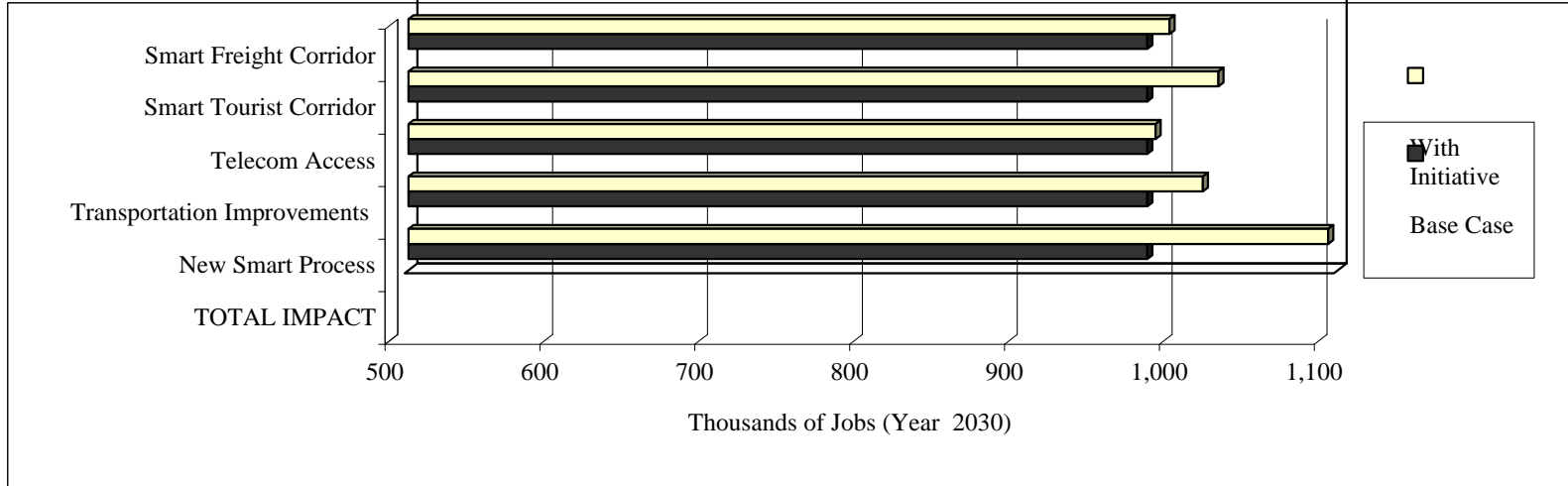


Table V-36

TABLE V-5: IMPACT OF CANAMEX INITIATIVES ON STATE OF MONTANA

(As Measured by Employment in Thousands)

CANAMEX Initiatives	Base Case		With Initiative		
			Total	Gain Over Base Case	
	2000	2030	2030	Number	Percentage
Smart Freight Corridor	560	718	722	5	0.6%
Smart Tourist Corridor	560	718	722	5	0.6%
Telecom Access	560	718	756	38	5.3%
Transportation Improvements	560	718	721	3	0.5%
New Smart Process	560	718	740	22	3.1%
TOTAL IMPACT	560	718	790	72	10.1%

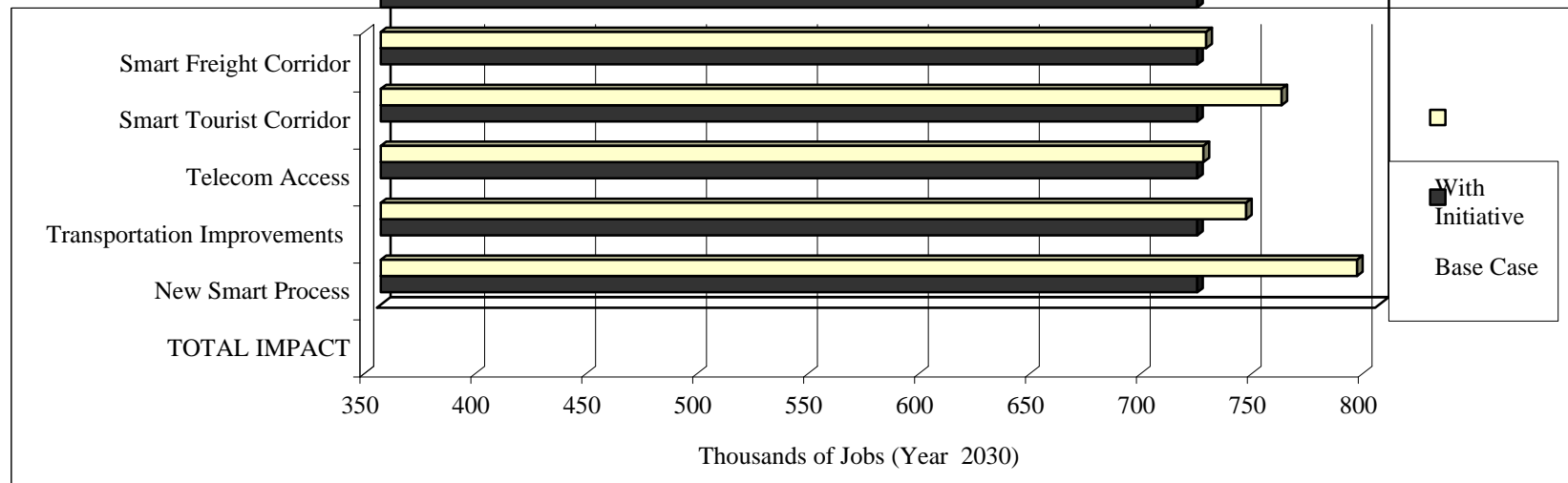
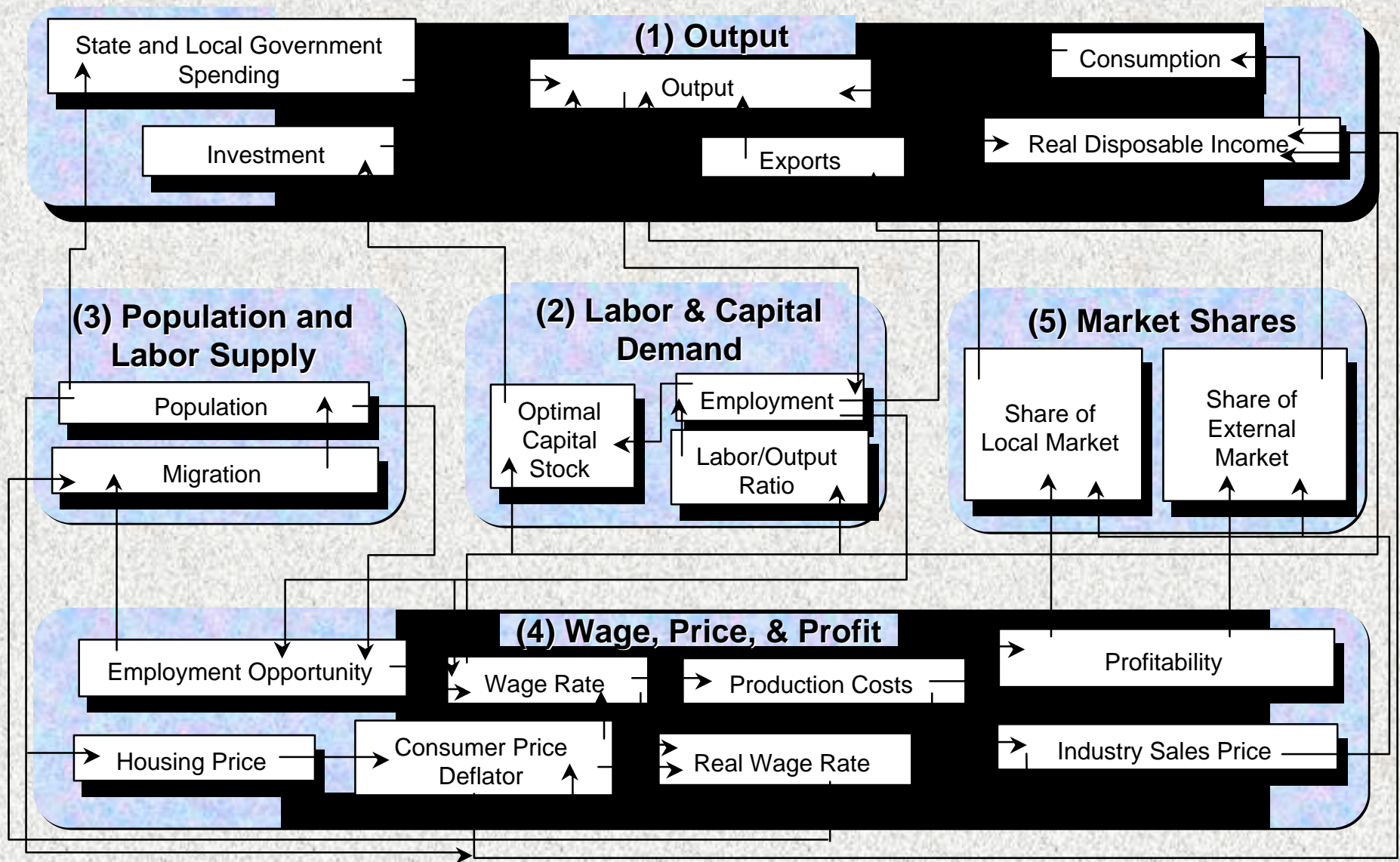


Figure V-1: Current REMI Model Structure



**Appendix Table A-6
Major Domestic Trade Links Across CANAMEX Region**

Top 10 1998 Trade Links Across CANAMEX (Millions of Tons)							
Through CANAMEX Region West to East				Through CANAMEX Region East to West			
Commodity	O-D	Mode	Volume	Commodity	O-D	Mode	Volume
1 Miscellaneous mixed shipments	Southern California - Other East	rail	17.472	1 Miscellaneous mixed shipments	Other East - Southern California	rail	13.090
2 Lumber or wood products	Oregon and Washington - Other East	rail	5.666	2 Food or kindred products	Other East - Southern California	truck	6.456
3 Miscellaneous mixed shipments	Oregon and Washington - Other East	rail	5.634	3 Farm products	Wyoming - Oregon and Washington	rail	6.119
4 Food or kindred products	Northern California - Other East	rail	4.257	4 Farm products	Other East - Oregon and Washington	rail	4.930
5 Farm products	Northern California - Other East	truck	4.211	5 Chemicals or allied products	Other East - Southern California	truck	4.784
6 Food or kindred products	Northern California - Other East	truck	3.972	6 Miscellaneous mixed shipments	Other East - Oregon and Washington	rail	4.598
7 Lumber or wood products	Oregon and Washington - Other East	truck	3.952	7 Miscellaneous mixed shipments	Other East - Northern California	rail	4.106
8 Miscellaneous mixed shipments	Northern California - Other East	rail	3.284	8 Chemicals or allied products	Other East - Southern California	rail	3.699
9 Food or kindred products	Oregon and Washington - Other East	truck	2.899	9 Food or kindred products	Other East - Oregon and Washington	truck	3.543
10 Farm products	Southern California - Other East	truck	2.758	10 Food or kindred products	Other East - Northern California	truck	3.473
Above represents 51% of flows through CANAMEX Region travelling west to east				Above represents 36% of flows through CANAMEX Region travelling east to west			

West	Washington, Oregon, California
Immediately East	Wyoming, North Dakota, South Dakota, Nebraska, Colorado, New Mexico
Other East	Remaining continental states
Other	Alaska, Hawaii