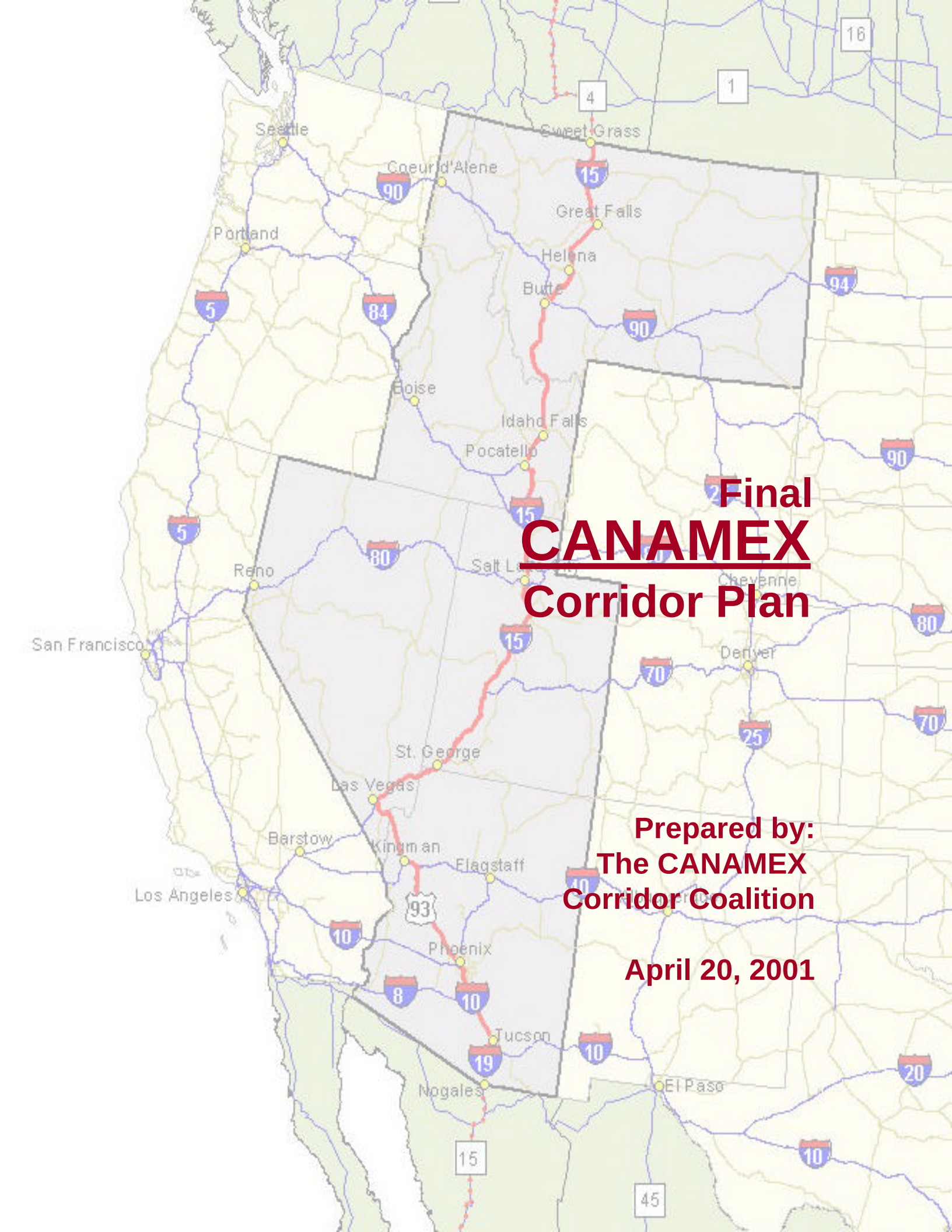

Final
CANAMEX
Corridor Plan

Prepared by:
The CANAMEX Corridor Coalition

April 20, 2001

ERA

Economics Research Associates

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Submitted by

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CANAMEX CORRIDOR COALITION MEMBERS

The governors of the five CANAMEX states appointed a ten-member coalition to provide guidance and assume overall responsibility for the preparation of the CANAMEX Corridor Plan. Each governor appointed the director or other executive staff from the department of transportation and one prominent member form the private sector. The CANAMEX Corridor Coalition (CCC) members, who contributed time, met quarterly to guide the creation of this Plan.

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CANAMEX STAFF

In 1999, Governor Hull appointed **Carol Sanger** Executive Director of the CANAMEX Corridor Project. Formerly Assistant Deputy Director of the Arizona Department of Commerce, Ms. Sanger has been involved with CANAMEX development in Arizona since 1994. She has coordinated the efforts of the Coalition, the Technical Advisory Committee and served as lead contact for the members of the Consultant team. She has

guided development of the international outreach to Canada and Mexico, and has provided support to the Coalition working groups on Interoperability and Telecommunications.

Administrative support for this plan has been provided by **Jennifer Broaddus** (August 1999-August 2000) and **Shannon Wulf** (August 2000 to present), both Honors Students at Arizona State University. Their professionalism and dedicated commitment to this project has been exemplary.

TECHNICAL ADVISORY COMMITTEE MEMBERS

A Technical Advisory Committee (TAC) was created to act as liaison between the CCC staff, the consultant team and the five states. The TAC members met monthly to review, critique and refine the work prepared by the consultant team.

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CONSULTANT TEAM

Using a public procurement process, the CCC selected a multi-disciplinary consultant team to assist with Plan preparation.

Economics Research Associates — **Prime Contractor**
William Lee – Project Manager — Economics analysis
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EXECUTIVE SUMMARY

INTRODUCTION

The five CANAMEX states, Montana, Idaho, Utah, Nevada and Arizona, share common attributes and aspirations, including low population densities, high quality of life and high expectations of the future. The North American Free Trade Agreement (NAFTA), which created a set of preferential economic relationships between Canada, United States and Mexico, underscored the importance of strengthening north-south economic and transportation linkages. Recognizing the shared challenges and opportunities presented by the region's principal north-south transportation corridor, the governors of these five Western states signed a Memorandum of Understanding to establish a joint working committee called the CANAMEX Corridor Coalition (CCC) and to prepare a CANAMEX Corridor Plan.

The CANAMEX Corridor is a very dynamic corridor that is affected by above average growth. Consequently, 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 this plan to establish local alignments or project priorities within the participating states. The states recognize that projects identified as part of this Corridor Plan have continued to evolve during the development of this document. The current list of projects presented in this plan should be considered "place holders" used to estimate local needs and funding.

Using the highway corridor as the unifying element, the Corridor Plan is to be a forward looking document designed to guide strategic transportation and other infrastructure investment. The CANAMEX Corridor Plan has the following objectives that are common to all five states:

- To stimulate economic development and enhance economic opportunity in the communities traversed by the CANAMEX Corridor. The communities are defined to include states, metropolitan areas, counties, cities, towns, and Native American reservations.

- To heighten awareness of the Corridor nationally and internationally and to incorporate the views, concerns and aspirations of key stakeholders from the Corridor communities into the development of the Plan.

- To identify the most critically needed transportation and telecommunications infrastructure (basic installations and facilities) projects within the Corridor, for the purposes of facilitating the safe and efficient movement of people, goods and services for the next 30 years, and to plan for their development.

- To establish the Corridor as a leader in the innovative use of emerging technologies to accelerate economic development and sustain quality growth.

- To enhance the global competitiveness of the CANAMEX Corridor states.

- To prepare a Plan that represents the interest of each state and allows the five CANAMEX Corridor states to present a united front to the Federal Government for the funding of critically needed improvements and action on other initiatives.

The initiatives proposed in the CANAMEX Corridor Plan are in a conceptual stage. Therefore, it is premature at this point to conduct a quantitative analysis of the potential environmental effects. In the future, as projects in the Plan move forward for implementation, they will be subject to environmental review procedures as required by each state.

This Corridor Plan is built largely from the synthesis and refinement of five interim tasks each covered by its own written product.

THE FIVE STATE REGION

The CANAMEX Corridor region now has 11.3 million residents as compared to 6.8 million only 20 years ago. Nevada's population increased by two and one-half times over this period, and Arizona's increased by 80 percent during the past two decades. In terms of absolute growth, the southern states in the Corridor are growing much faster than the northern states. During the past decade, Nevada, Arizona, Utah and Idaho ranked first, second, fourth and fifth in terms of the rate of population growth among all states in the nation. In 30 years, the Corridor region is projected to have a population of over 20 million, indicating a tripling of population in the 50 years from 1980 to 2030.

Population (1,000)	**1980**	**2000**	**2030**
Arizona	2,738	4,927	8,600
Nevada	810	2,065	4,605
Utah	1,473	2,158	3,897
Idaho	948	1,272	1,880
Montana	789	905	1,245
Total	**6,758**	**11,327**	**20,228**

Source: Department of Commerce and ERA forecast

With a total employment of 6.5 million, the economies of these five CANAMEX states have entered into the technology driven information age at varying levels of depth. Arizona, the largest of the five states in population, has perhaps the most diversified economy. Its recent manufacturing growth has been led by the technology sector. The

Nevada economy continues to be dominated by gaming and tourism. Utah has a well-established medical technology and software industry and is looking to the long-term tourism impact of the 2002 Olympic Winter Games. With the Idaho National Engineering and Environmental Laboratory (INEEL), a world-renowned research facility administered by the Department of Energy, and the likes of Micron Computers, Idaho is well poised for the information age. Montana's economy, with a tradition in mining, agriculture and tourism, recently has begun to participate in the new economy.

These five states also share a common challenge, that a high proportion of the land area is owned by the Federal government and therefore not typically available for near term development. In total the Federal government and Native American nations control 63 percent of the land area in this five-state region. The highways within these CANAMEX state must traverse vast area that are typically not available for economic development and tax generating uses, because they are outside of state government, local government or private ownership control. While the funding of highway operations and maintenance along the CANAMEX is already a significant challenge for all states, the land ownership pattern compounds this challenge.

	Total Land Area in Acres	**Federal Owned Acres**	**Native American Owned Acres**	**Percent Federal & Native American**
Arizona	72,688,000	33,130,067	20,718,125	74%
Nevada	70,264,320	58,375,263	1,231,603	85%
Utah	54,132,902	34,599,495	2,388,725	68%
Idaho	52,933,120	33,073,325	588,974	64%
Montana	93,271,040	26,136,138	5,502,535	34%
Total	**343,289,382**	**185,314,288**	**30,429,962**	**63%**

Source: US General Services Administration (Fiscal Year 1998), Bureau of Indian Affairs (December, 1997), Utah Governor's Office of Planning and Budget (1999)

THE CORRIDOR

Proceeding from south to north, the CANAMEX Corridor runs from Nogales to Tucson along Interstate 19, from there to Phoenix along Interstate 10, and through Kingman to Las Vegas on US Route 93. It traverses the Arizona's fast-growing high technology areas as well as major warehousing and distribution centers located in Phoenix and Tucson.

The Corridor enters Nevada at the Hoover Dam crossing along US Route 93 from Arizona. After passing through Boulder City and Henderson, it transitions to Interstate

Figure ES-1

CANAMEX Corridor

15 in Las Vegas and heads northeast through Mesquite and then the northwestern corner of Arizona into Utah. It passes through Nevada's fast-growing Las Vegas Metropolitan Area, which contains 69 percent of the state's population and employment.

This Corridor runs the entire length of Utah along its main north / south highway, Interstate 15. The vast majority of Utah's population is concentrated along the Corridor in the cities and towns along the Wasatch Front. The Wasatch Front stretches from Provo on the south through Salt Lake City to Ogden on the north. This six-county area accounts for over 78 percent of Utah's population and 82 percent of its employment.

On leaving Utah, the CANAMEX Corridor traverses Eastern Idaho along Interstate 15. The Corridor passes through the largest cities in this part of the state, Idaho Falls and Pocatello. Eastern Idaho is home to INEEL, which encompasses an 890-square-mile area to the west of Idaho Falls. A number of high technology manufacturing facilities located in the Idaho portion of the Corridor are associated with INEEL operations or personnel.

Continuing northward, the Corridor crosses through the western portion of Montana along Interstate 15. It crosses Interstate 90 at Butte and then proceeds up through Helena, Great Falls to the Sweet Grass Border Station at the Canadian border (see Figure ES-1).

INTERNATIONAL PORTIONS

The CANAMEX Corridor was originally conceived of as a three-nation corridor stretching from **Can**ada to **Ame**rica and **Mex**ico. At the Arizona border, the Corridor heads south into the Mexican provinces of Sonora, Sinaloa, Nayarit, Jalisco and Michoacan before heading into Mexico City. It is the primary highway corridor linking the western states of Mexico. The cities of Guadalajara, in Jalisco, and Mexico City serve as the important southern anchors of this Corridor. At the Canadian border, the Corridor heads north into the Province of Alberta. Calgary and Edmonton, Alberta's largest and most important cities, are the northern anchors in the Canadian portion of the CANAMEX Corridor.

TRANSPORTATION

The CANAMEX Corridor has a developed transportation infrastructure that currently provides reasonable service in the five CANAMEX states. Nonetheless, as growth continues, future transportation deficiencies and needs will occur. Both people and goods move along and across the CANAMEX Corridor -- by highway, rail or air. The transportation assessment of the CANAMEX Corridor revealed several key characteristics:

- Most of the Corridor is constructed to interstate standards. However, of the 1,504-mile (2,406 km) length, 233 miles in Arizona and 14 miles in Nevada are not of interstate standards. This deficiency is particularly acute at the Arizona and Nevada approaches to the Hoover Dam.

- Approximately $4 billion of highway improvements are currently either *programmed* or *planned* 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. Many of the *planned projects* require significant funding outside of resources presently available to state agencies. This category includes the new Hoover Dam bypass crossing which has secured funding for $118 million of the $198 million needed. Even with this level of investment, the CANAMEX Corridor is likely to experience, in the near-term as well as long-term future, congestion in and around major urban centers including Tucson and Phoenix in Arizona, Las Vegas in Nevada and Provo/Orem, Salt Lake City and Ogden in Utah.

- To alleviate anticipated congestion improvements are *proposed* by each of the three horizon years – 2010, 2020 and 2030. *Proposed* projects include projects that have been identified but have not had any preliminary work completed or funding allocated. Improvements by time period include:

  - By 2010: widening of I-10 in Tucson as well as additional capacity on I-10 in Phoenix; Wickenburg Bypass in Arizona; widening of US 93 in Arizona and Nevada; additional capacity on I-15 in Salt Lake City; widening of I-15 in Bountiful; and widening of I-15 between Ogden and Brigham City.

  - By 2020: widening of I-19 through Tucson and I-10 through Phoenix; widening of US 93 in Arizona and Nevada near Las Vegas; widening of I-15 south of Cedar City as well as in Provo and Salt Lake City.

  - By 2030: widening of I-10 in Tucson; widening of I-15 in Las Vegas, Provo, Bountiful, between Chubbuck and Idaho Falls, and between McCammon and Inkom.

- Other local areas along the CANAMEX Corridor will also experience increased congestion, which will require additional funding for projects at specific locations. Due to the length of the corridor, the 1,504 mile route was divided into eighteen (18) rural segments and eleven (11) urban segments in five large urban areas. The broad scope of this study, however did not allow for evaluation of traffic conditions at specific individual locations.

- In Year 2000 dollars, additional *proposed* improvements, above and beyond projects identified by each of the states, are anticipated to cost in the vicinity of $2 billion. Before some of these capacity improvements are implemented,

Intelligent Transportation System (ITS) improvements should be adopted to improve operational efficiency without costly infrastructure construction. ITS improvements address urban area congestion problems associated with private automobile as well as commercial truck traffic.

- The total improvement program for the CANAMEX Corridor, including *planned, programmed* and *proposed* projects to 2030, totals $5.83 billion. These improvements consist of a total of 1,496 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.

- While the metropolitan areas of Phoenix and Salt Lake City have and continue to improve Advanced Traffic Management Systems (ATMS), Las Vegas is the only other city in the corridor that is planning and designing a system on a similar scale. Tucson is developing a smaller scale ATMS. ITS infrastructure is very limited in many rural portions of the corridor.

- The CANAMEX Corridor is a true crossroads serving more freight movements traveling to/from or through the five-state region (67 percent) as opposed to within the region (33 percent). The highway/truck component of the CANAMEX Corridor is the primary transportation mode for freight movement. While other modes will gain in value and use over the next 30 years, most goods will continue to be transported by truck.

- Urban centers are critical junctions for CANAMEX freight movements. Urban area ITS, as well as highway capacity improvements, will enhance the CANAMEX Corridor as a significant trade route.

- The interoperability (ability for states to operate on a shared system with the same information, etc) of ITS on rural and suburban sections is important to fill in the gaps between the major metropolitan centers. Both commercial vehicle (i.e. freight) and recreational passenger travel will benefit with up-to-date weather and traffic condition information.

- The CANAMEX Corridor provides convenient access to numerous national parks, monuments and areas of visitor interest. Las Vegas is an unparalleled visitor destination. The recreational value of the corridor is a significant feature, and enhanced information services through ITS improvements can provide considerable opportunity for a robust tourism industry (see Figure II-10).

- An ITS system with a shared Corridor Transportation Management and Information Network (CT-MAIN) program that links ITS elements together and with Smart Tourist and Smart Freight components is proposed for the CANAMEX Corridor. The total cost for development over a 30-year period is estimated at $16 million. Initial capital costs are estimated at $5.6 million.

Such a system would benefit traveler safety and security, traffic management, route selection, credentialing of commercial vehicles and commercial vehicle administrative processes.

- Rail is the second most used freight transportation mode in the Corridor. However, the rail infrastructure in the CANAMEX states is primarily oriented in an east-west direction. While an enhanced north-south rail corridor could be developed, demand for such service has yet been demonstrated. Due to the need to cross the Grand Canyon, the Arizona-Nevada-Utah rail linkage will be a political and technical challenge. Therefore, rail service improvements, rather than infrastructure construction, should be considered to provide a reasonable alternative to trucking.

- The CANAMEX Corridor includes four airports listed in the Airport Council International's top 100 US Airports for total passengers and cargo activity. They are in Tucson, Phoenix, Las Vegas and Salt Lake City. Each of these major airports has significant improvements planned over the next 30 years. The improvements are geared towards improving capacity, access and operations as well as additional land acquisition to mitigate noise and protect expansion potentials. Four communities along the CANAMEX Corridor are pursuing new airports. These are Phoenix, AZ; Las Vegas, NV; Mesquite, NV; and St. George UT.

- The International Ports of Entry on the CANAMEX Corridor exist at Nogales, AZ (Mexican) and Sweet Grass, MT (Canadian). Both of these ports 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 though the border simpler, quicker and more efficient. Recommended improvements include; continued coordination between US, Mexican and Canadian officials over inspections, automated pre-clearance, documentation and hours of operation; improved truck storage near the ports; and continued enhancement of automation at the ports.

In summary, there are substantial opportunities to enhance the safe movement of people and goods along and across the CANAMEX Corridor through a variety of transportation improvements. This analysis is a macro-assessment of these opportunities in terms of need, cost and general feasibility. This information, in addition to the results of the economic impact analysis, provides the background needed for the CANAMEX states to establish an identity and direction for further development of the Corridor.

This Plan identifies and describes areas where the CANAMEX states can collaborate for mutual benefit to enhance safety and efficiency within the Corridor. An excellent example of regional collaboration is the Hoover Dam bypass project, a joint effort by the states of Arizona, Nevada and the Federal Highway Administration. This project

has important safety, economic development and highway efficiency benefits for the region. Similarly, other transportation improvements can benefit from partnerships and multiple funding sources. Additional follow-up studies will provide the details necessary for final implementation.

INITIATIVES

Based on the analysis summarized in the main portions of this document, the Plan proposes five 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.

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.

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)

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 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 as leverage to encourage, promote and/or mandate 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 within 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.

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. 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.

As indicated in Section II of this report, the Hoover Dam Bypass Project is included as a planned project, 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.

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.

- 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. Montana, however, will also incur the substantial on-going investment to maintain and reconstruction 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.

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 the 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.

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 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.

ECONOMIC IMPACT ASSESSMENT

To evaluate the economic impact of the five major Plan 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 Plan 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 Plan Initiative being analyzed.
- In this analysis, we used employment gain as the key determinant of economic performance.

The five major Initiatives recommended in the CANAMEX Corridor Plan 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 Initiatives recommended by the CANAMEX Corridor Plan 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 ES-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 ES-1
DISTRIBUTION OF JOBS ADDED BY INITIATIVES

	Base Case Jobs in Region in 2030		Jobs Added by Initiaitves 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

I: PLAN DEVELOPMENT

INTRODUCTION

The five CANAMEX states, Montana, Idaho, Utah, Nevada and Arizona, share common attributes and aspirations, including low population densities, high quality of life and high expectations of the future. The North American Free Trade Agreement (NAFTA), which created a set of preferential economic relationship between Canada, United States and Mexico, underscored the importance of strengthening north-south economic and transportation linkages. Recognizing the shared challenges and opportunities presented by the region's principal north-south transportation corridor, the governors of these five Western states signed a Memorandum of Understanding (MOU) to establish a joint working committee called the CANAMEX Corridor Coalition (CCC) and to prepare a CANAMEX Corridor Plan. The governors who signed the MOU are identified below:

Jane Dee Hull	**Governor of Arizona**
Kenny C. Guinn	**Governor of Nevada**
Michael O. Leavitt	**Governor of Utah**
Dirk Kempthorne	**Governor of Idaho**
Marc Racicot	**Governor of Montana**

The members of the CCC consist of two gubernatorial appointees from each of the five member states. Each governor appointed the director or other executive staff from the department of transportation and one member form the private sector. The CCC was charged with the responsibility of preparing a comprehensive Corridor Plan, utilizing TEA-21 grant funds. The CCC met quarterly in the larger cities within the CANAMEX Corridor to review progress, hear public testimony and to guide Plan development. These meetings were held in Phoenix (AZ), Las Vegas (NV), Idaho Falls (ID), Salt Lake City (UT), Great Falls (MT) and Nogales (AZ). The Plan was to establish common goals and objectives for the five member states and to guide long term development of the CANAMEX Corridor.

PURPOSE OF PLANNING EFFORT

Using the highway corridor as the unifying element, the Corridor Plan is to be a forward looking document designed to guide strategic transportation and other infrastructure investment. The Plan's short-term goal is to enable the five-state region to more fully harness the benefits of a changing national economy. Its long-term goal is to enable this region to catapult into the forefront of the post information economy.

The CANAMEX Corridor Plan objectives common to the five states are summarized as follows:

- To stimulate economic development and enhance economic opportunity in the communities traversed by the CANAMEX Corridor. The communities are defined to include states, metropolitan areas, counties, cities, towns, and Native American reservations.

- To heighten awareness of the Corridor nationally and internationally and to incorporate the views, concerns and aspirations of key stakeholders from the Corridor communities into the development of the Plan.

- To identify the most critically needed infrastructure projects within the Corridor, for the purposes of facilitating the safe and efficient movement of people, goods and services for the next 30 years, and to plan for their development.

- To establish the Corridor as a leader in the innovative use of emerging technologies to accelerate economic development and sustain quality growth.

- To enhance the global competitiveness of the CANAMEX Corridor states.

- To prepare a Plan that represents the interest of each state and allows the five CANAMEX Corridor states to present a united front to the Federal Government for the funding of critically needed improvements and action on other initiatives.

THE GOVERNING STRUCTURE FOR PLAN DEVELOPMENT

Arizona, serving as the lead state, applied for and received a one million dollar national corridor planning grant from the Federal Highway Administration (FHWA) in 1999 pursuant to Section 1119 of Tea-21. The Governor of Arizona appointed the Executive Director in August of 1999 to manage and coordinate the day to day responsibilities of preparing this strategic Corridor Plan. The CCC members established the scope of work and provided the policy guidance for the development of this Corridor Plan. Using a public procurement process, the CCC selected a multi-disciplinary consultant team to assist with Plan preparation.

Each state appointed a senior level department of transportation official to serve on a Technical Advisory Committee (TAC) with the Executive Director and a FHWA representative from the Arizona office. The TAC met monthly to review interim products and to provide valuable guidance to the consultant team in Plan development.

TECHNICAL WORKING PAPERS

This final Corridor Plan is built largely from the synthesis and refinement of five interim tasks each covered by its own written product. Each task and its written product are described below. Once finalized, each paper will be posted on the CANAMEX website: **www.canamex.org.**

Task I: Existing Infrastructure

This working paper examined the economic conditions, growth trends, high technology industries, tourism, and economic development assets within each of the five CANAMEX states and their major metropolitan areas. It also presented an inventory of transportation facilities in the Corridor, including highways, airports, railroads, ports, and customs operations. The transportation information included projected utilization and levels of service. In addition, this paper covered the existing wireline and wireless communications and data transmission facilities and services within the Corridor.

Task II: Public Involvement Programs

For this task, the team prepared five detailed Public Involvement Programs, one for each state. The individual programs identified goals, interested parties and public involvement activities. They also covered a summary of the key issues within each state and the suggested projects or initiatives for that state.

Task III: Transportation Infrastructure and Economic Impact Analysis

This working paper provided an early description of the Plan Initiatives, detailed the additional transportation improvements needed within the Corridor, presented transportation and ITS strategies, estimated the investment level required for each strategy, and assessed the efficiencies gained as a result of each transportation strategy. This paper concluded with a detailed economic impact analysis of the recommended transportation improvements and Bold Initiatives.

Task IV: Emerging Technologies

This working paper explored how emerging technologies, with a focus on telecommunications and transportation technologies, are likely to affect future Corridor development. It reviewed the transformation of the national and world economies from the industrial era to the information age and discussed the emergence of E-commerce and its implications for freight movement and land development in the Corridor. In addition, the paper explored the strategic implications of this economic change for the Corridor's tourism industry and presented ideas on the long-term drivers of economic development as the region moves beyond the information age.

Because of the importance of infrastructure development to the Corridor Plan, this paper presented a more detailed analysis of emerging telecommunications technologies, especially as they relate to mobile and fixed wireless systems. This paper also evaluated the way emerging transportation technologies may enhance future transportation safety and efficiency in the Corridor. It reviewed a number of different technologies and examined the suitability of each for usage within the corridor.

Task V: Financing Strategies

In this paper the team provided a brief review of the likely sources of financing for the highway improvements suggested in the Plan.

Task VI: Environmental Fatal Flaw Screening and International Regulatory Issues

In this paper the team provided a brief discussion of the Initiatives from an environmental "fatal flaw" perspective. In addition, this working paper covered the international border and regulatory issues.

ENVIROMENTAL CONSIDERATIONS

A broad qualitative discussion of potential environmental issues associated with the five initiatives proposed for the CANAMEX Corridor is provided below. Because the initiatives are in a conceptual stage, it is premature at this point to conduct a quantitative analysis of the potential environmental effects. As the initiatives are developed in more detail, including specific alignments for proposed improvements to the Highway Improvements described under Initiative #4, environmental review will be determined on a state by state and project by project basis.

Initiative # 1 – Smart Freight Corridor

The proposed improvements would enhance use of the Corridor by commercial vehicles, leading to economic benefits related to support industries in the commercial, industrial, and service sectors. In general the environmental effects of the proposed improvements and programs under this Bold Initiative are not expected to be negative. The primary adverse environmental effect would be increase traffic through the Corridor and associated noise and air quality effects. However these impacts would be evaluated as part of the environmental review of proposed highway widening and new road construction projects.

Initiative # 2 - Smart Tourist Corridor

This initiative involves improving access to information for travelers along the Corridor, through expanded facilities, marketing, and telecommunications. These improvements are likely to increase the use of the Corridor by tourists, which would

have a positive economic impact to the region. In general these types of programs would have few physical impacts on the environment. However additional telecommunication systems could present site-specific environmental issues. For example, the siting and construction of new cellular transmitter towers is controversial in some areas of the country because of potential adverse visual effects. Also, the installation of new telecommunication cable requires trenching which could affect biological and cultural resources. Environmental review of these activities could require analysis for the following agencies: a) U.S. Fish and Wildlife Service to address Section 7 of the Endangered Species Act; b) The U.S. Army Corps of Engineers to address Section 404 of the Clean Water Act State; and c) Historic Preservation Office to address Section 106 of the National Historic Preservation Act. State land agencies will also require consistency with local and state resource management plans.

In cases where telecommunications improvements are proposed on lands held by the Bureau of Land Management, Forest Service, or Native American Tribes, consistency with state and federal resource management plans and Native American laws will be evaluated as part of the environmental review process.

Initiative # 3 – Rural Telecommunications Access

This initiative will provide the greatest incentive for economic development in rural areas. The proposed technology would be provided within existing state-owned right-of-ways and would be subject to the same environmental analysis described under Initiative #2 above.

The proposed expanded coverage for cellular phone service would also have a positive impact on business activities as well as emergency response times in rural areas. As discussed under Initiative #2, the siting and construction of new cellular transmitter towers can be controversial in some areas of the country because of potential adverse visual effects.

Initiative # 4 – Corridor Highway Improvements

A number of the capital improvement projects are currently underway throughout the Corridor, or are planned and/or programmed for implementation within the next 20 years. In addition to the highway projects already planned or programmed by the various departments of transportation, the Corridor Plan suggests some $2 billion in addition highway projects that will be needed in the long term. All of these projects will be subject to their own environmental review as required by each state once funding is obtained. Some of these projects are already conducting environmental review (i.e. Hoover Dam Bypass Project). Some of these projects will incorporate the principles of Context Sensitive Design currently being developed by FHWA. (Utah is one of five pilot states developing this concept.)

Typical environmental issues that will be considered include the following: right-of-way acquisition impacts, noise impacts, historic and cultural resources impacts, scenic

resources impacts, air quality impacts, effects on biological resources including wetlands and endangered species, and impacts on migratory patterns of wildlife.

In addition, the US Department of Transportation Act of 1966 specifies that publicly owned land from historic sites, public parks, recreation areas, wildlife or waterfowl refuges of national, state or local significance may be used for federally funded projects only if there is no feasible and prudent alternative to the use of such lands, and such highway program or project includes all possible planning to minimize harm to 4(f) lands resulting from such use. In cases where 4(f) lands are involved, an environmental review will be required.

Initiative # 5 – Smart Process Partnerships

The Smart Process Partnerships will make it easier to conduct business in all areas of these five states. Combined with Initiative #3, it will facilitate the expansion of economic activity in the Corridor states.

In summary, this discussion of environmental issues is intended as a preliminary identification of environmental considerations. A detailed Environmental Impact Statement has not been prepared on the Draft CANAMEX Plan. In the future, as projects in the Plan move forward for implementation, they will be subject to environmental review procedures as required by each state.

INVOLVING THE PUBLIC

For the CANAMEX Corridor Plan to represent the interest of the different states and communities along the corridor, it was essential that the public be involved in plan development. The consultant team prepared a detailed public involvement program after consulting with the CCC and TAC members. The goals of the public participation process were:

- To define a broad range of key stakeholders with interest in the CANAMEX Corridor Plan and seek their input early on and throughout the planning process.

- To inform and educate the public and stakeholders about the CANAMEX trade corridor.

- To obtain feedback on recommendations in the Draft CANAMEX Corridor Plan.

Stakeholder Interviews

To obtain early public input into the Plan, the CANAMEX team conducted a series of interviews with stakeholders from various interests, including local and state officials,

and transportation, economic development, environmental, business, recreation, educational, and technology interests. The consultant team interviewed approximately 100 stakeholders, some 20 in each state, either in person or by telephone.

The first round of interviews occurred in February through May of 2000, and the second round of interviews occurred in June through September of 2000. The interviews identified issues that are unique to each state as well as those common to the five-state region. The results of the stakeholder interviews were summarized and consideration by the team in the development of this Plan.

Communication Materials

A one-page Overview of the CANAMEX Corridor Project was created and distributed during the stakeholder interviews and at the Coalition meetings. The Overview was also sent with a thank you letter to all stakeholders who participated in the initial interviews.

Native American Consultation

In August and September of 2000, the Transportation Department for each state issued a letter and a copy of the CANAMEX Overview to the Bureau of Indian Affairs and tribal leaders for each tribe identified along the Corridor. This correspondence served to inform the tribes of the Corridor Plan and to provide the tribes with an opportunity for early input. In addition, where appropriate the team conducted follow-up telephone consultations with all tribal leaders who received letters to discuss the CANAMEX Corridor. The development of this Draft Plan included a documentation of the consultation process and the issues raised.

As part of the Native American Outreach, copies of the Draft Plan were mailed to appropriate tribal leaders and the Bureau of Indian Affairs. In addition, a Summary of the Draft Plan and the public meeting announcement were mailed to Native American Tribes.

Environmental Justice Populations and Title VI Coordination and Consultation

In September of 2000, the CANAMEX team sent a letter and the one-page Overview to the primary elected officials in all the counties and communities identified in the Public Involvement Program as having significant Environmental Justice population. The purpose of this early consultation was to inform the communities with significant Environmental Justice population of the CANAMEX planning process and to provide them an easy opportunity to identify issues and generate ideas to be considered by the Plan. In addition, a letter or phone consultation was made with community organizations in communities with significant Environmental Justice population where such contact was requested. The one-page Overview was also distributed to all county libraries in the Corridor. In Arizona the Overview was also distributed in Spanish.

Additional outreach occurred in communities with significant Environmental Justice population to ensure they had full opportunity to review and comment on the Draft CANAMEX Corridor Plan. This outreach included the distribution of the Plan Summary to the primary elected officials and of press releases to community-based newspapers.

Canada and Mexico Coordination

The Executive Director and selected CCC members met with representatives from both Mexico and Canada concerning this Corridor Plan. Communications with both Canada and Mexico will continue. The consultant team has also reviewed papers prepared by both the Canadians and Mexicans on this Corridor.

Webpage

The Executive Director and project staff created a project webpage. **The website is www.canamex.org.** The website provides project background, current information and an opportunity for the public to make comments about the Draft Plan. It will also contain the Final Plan and Working Papers.

Mailing List/Database

The consultant team compiled a 2000 name mailing list database, consisting of approximately 400 names from each state. The mailing list was developed with input from the participating agencies and includes all interested parties who requested to be on the list.

Public Meeting to Review Draft CANAMEX Corridor Plan

A public information meeting was held in each state in February 2001 following the distribution of the Draft Plan for public review. The meetings were publicized through press releases and a notice mailed to the project mailing list. At the meetings, the public was given an opportunity to discuss the project with the project team and to submit written comments. Elected officials from cities and counties along the corridor received a summary of the Draft Plan and were invited to participate at the public meetings.

Following the meetings, a brief report was prepared that documented the input received at all meetings. The documentation highlighted areas of community support for the plan and defined issues that required further discussion and review. All comments gathered on the Draft Plan were considered in preparation of the Final CANAMEX Corridor Plan.

Communication Materials

In addition to issuance of a public meeting notice to the project mailing list, a summary of the Draft Plan was prepared and distributed to the mailing list. The Plan Summary

highlighted the Draft Plan's findings and recommendations and served the purpose of getting information about the Plan to the public.

State Review of Final CANAMEX Corridor Plan

After the Draft CANAMEX Corridor Plan received its full public review in all states, a Final CANAMEX Corridor Plan was presented to the CANAMEX Corridor Coalition. Going forward, each state will determine what level of environmental review is appropriate and what level of local coordination is needed to move forward to implement elements of this Plan.

Overview of Public Meeting Process

The Transportation Departments for the states of Arizona, Nevada, Utah, Idaho, and Montana and the CANAMEX Corridor Coalition held one public information meeting in each of the five CANAMEX states to present the Draft CANAMEX Corridor Plan and receive input on the Draft Plan. The public meetings were held on February 5, 2001 in Blackfoot, Idaho, on February 6, 2001 in Great Falls, Montana, on February 7, 2001 in Salt Lake City, Utah, on February 14, 2001 in Tucson, Arizona, and on February 15, 2001 in Las Vegas, Nevada. The meetings were noticed by mailing meeting announcements to the project's mailing list of 2000 names and by media releases in all states.

The meetings consisted of an informal open house format where attendees had an opportunity to view Plan information, discuss the project with staff members, and submit written comments. In Arizona, a formal presentation on the Draft CANAMEX Plan was also provided. Display boards included information on the Plan's objectives, a map of the corridor, key points of the five initiatives, a summary of the economic impacts of the Plan's initiatives, and next steps.

The attendance for each meeting was good. Approximately 60 people attended the meeting in Idaho, 40 in Montana, 15 in Utah, 40 in Arizona, and 60 in Nevada.

Written comments were received at the meetings and by fax, email and regular mail through the closing of the comment period on March 15, 2001. Approximately 40 written comments were received.

Overview of Comments Received

The public comments received were quite varied. Comments received in support of the Plan typically favored the potential economic benefits of the Plan. Informally, at the public meetings, those in favor of the Plan expressed the most interest in Initiative Number 2, Smart Tourist Corridor and Initiative Number 3, Telecommunications Access for Rural Areas. Some people expressed an interest in knowing more about how the CANAMEX Plan would be implemented and who would be involved.

Some of the commentors expressed concern about specific elements of the CANAMEX Plan. The issue of truck safety related to the number, size, and weight of trucks was expressed in all five states. Some citizens expressed concerns about the cost of implementing the Plan, specifically the costs to local taxpayers.

Some citizens expressed concern that the CANAMEX Plan would not benefit the economy and that local jobs would be lost to Canadian and Mexican workers, especially in the trucking industry.

Regarding quality of life, some parties expressed concern about the potential environmental impacts of increased roads, traffic and visitors on smaller communities, forestlands, and air quality.

Many people who responded did not submit specific comments on the Draft CANAMEX Plan or on the proposed Initiatives. Rather some commentors submitted their personal opinion and views on broader issues that are either beyond the scope of the CANAMEX Plan or indirectly related. These comments typically expressed an opposition to the North American Free Trade Agreement (NAFTA) in general, opposition to Congress's designation of the CANAMEX Corridor, concerns about enforcement of local trucking regulations, and concerns about policing the borders and potential for illegal activities.

Consideration of the Comments

The Technical Advisory Committee and the consultant team for the project have reviewed and considered all of the comments received. Public comments in each state have also been made available to the appropriate CANAMEX Coalition members.

Comments that represent personal opinions on other topics or other projects have been noted for the record but not specifically addressed. Comments that requested revisions to the Plan have been made where appropriate. Specific Plan modifications have included corrections of technical inaccuracies where noted, and the addition of transportation projects to the Plan specifically in Idaho and Montana.

Several comments were received on the environmental issues pertaining to the Draft CANAMEX Plan, and some parties commented as if the Plan was an Environmental Impact Statement. The Plan, and the Initiatives discussed in the Plan are at a conceptual stage. As the Initiatives are developed in more detail, the level of environmental review that is required will be determined on a state by state and project by project bases.

Comments regarding next steps will be considered in the implementation program for CANAMEX.

II: TRANSPORTATION

BACKGROUND

A traditional, conservative perspective might include solely highways in a transportation assessment. But the CANAMEX Corridor has the potential to be much more than a system of roadways. Although highway infrastructure might be the backbone of a transportation system, there are also operational components and institutional policy issues as well as other modes such as rail and air that define a transportation corridor.

The transportation assessment conducted for the CANAMEX Corridor Study reviewed the Corridor from all perspectives - from traditional people-moving capacity to freight movement issues; from highways to rail to air; from highway infrastructure needs to operational Intelligent Transportation Systems (ITS) potentials; from port of entry institutional issues to corridor regulations. This thorough examination provides the first comprehensive review of the Corridor to determine appropriate directions for future improvements.

The CANAMEX Corridor is a very vital and dynamic interstate and intrastate transportation corridor. The higher than average growth rates in the region will require that the states continue to closely monitor the proposed projects and timing to ensure the projects are implemented to respond to this growth. The study was conducted to evaluate and promote regional transportation issues and projects, not detailed local travel conditions. Several new alignment and bypass projects are currently under study in the corridor. These projects have continued to develop during this study, and may have an impact on some of the projects planned or proposed in this report. This study was not designed to impact or provide alignments for those studies, or to be an Environmental Impact Study for any specific project.

This section of the Draft Plan includes overviews of highway, freight, ITS, rail, air, policy/institutional and financing issues. More detail on these topics can be found in the individual Working Papers.

HIGHWAY ELEMENT

The CANAMEX Corridor is shown in Figure II-1 as it exists between Nogales, Arizona and Sweet Grass, Montana. It is 1,504-miles long route, with all but US 93 between Phoenix, AZ and Henderson, NV being interstate highways. US 93 consists of 160 miles of two-lane highway and an additional 87 miles of a four-lane divided highway. This is a total of 247 miles, or sixteen (16) percent of the corridor, which are not of four-lane divided, access controlled standards. Nevada has 14 miles of the total 247 miles, with the remaining 233 miles in Arizona. US 93 is, however, on the National Highway System (NHS).

The CANAMEX Corridor is the only Interstate/US Highway route linking Mexico to Canada between I-5 on the Pacific Coast and I-25/I-90/I-15 through New Mexico, Colorado, Wyoming and Montana to the east. The CANAMEX Corridor bisects this distance between the I-5 to I-25 corridors, which is approximately 900 miles. The CANAMEX Corridor is interconnected with many other interstates and major highways along its alignment.

Current traffic volumes for the CANAMEX Corridor were determined from State traffic volume reports. Levels of Service and volume/capacity ratios were used to evaluate the performance of locations along the corridor. For the purpose of calculating volume – capacity (v/c) ratios, 24-hour, two-way capacities were established for the CANAMEX Corridor, as shown in Table II-1. The capacities were based on traffic characteristics in the Corridor and developed in accordance with the 1994 Highway Capacity Manual.

Table II-1
Estimated Interstate 24-Hour Capacities

Area	Number of Lanes[1]	Estimated 2-Way Capacity[2]
Rural	2-lane	15,000
	4-lane	50,000
	6-lane	75,000
Urban	4-lane	80,000
	6-lane	125,000
	8-lane	160,000
	10-lane	205,000

[1] Total through lanes in both directions combined.
[2] Source: 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 to its capacity 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

Figure II-1

CANAMEX Corridor

ratios are presented in Table II-2. 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 II-2
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

For the purposes of this study, the *acceptable* level of service is considered LOS C. 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, which are generally expected and anticipated in urban conditions.

Because of its length, the corridor has been divided into eighteen (18) rural segments and eleven (11) urban segments in five large urban areas. These large urban areas have metropolitan statistical area (MSA) populations of over one million people. This method allows for changes in traffic volumes and conditions to be readily apparent for long lengths of the Corridor. The scope of this study did not allow for detailed analysis of small segments, so segments were divided into stretches of the Corridor with similar characteristics. The rural and large urban area segments are identified in the following tables.

Existing Conditions

Existing v/c ratios and the corresponding LOS for selected rural locations are given in Table II-3. The 1998 Average Annual Daily Traffic (AADT) volumes were selected from each state's annual traffic reports at locations between major urban areas, or between a major urban area and a state line. These locations serve as midpoints, with minimum influences by major traffic generation areas. At these locations the CANAMEX Corridor is assumed to be a four-lane highway (two lanes in each direction), except for US 93 in Arizona and Nevada, which is a two-lane roadway.

The rural sections of the CANAMEX Corridor, according to 1998 traffic counts operate at acceptable levels of service, except for the Ogden to Brigham City, Utah segment. Bottlenecks occur, however, at urban locations indicated in Table II-4. The traffic

volumes for urban locations were chosen where significant traffic existed. The limits of the urban areas correlate to the metropolitan planning organization boundaries. (The milepost locations of each urban area are identified in the Task 1 report.) 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 II-4. The following lane configurations correlate to those volumes:

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

Table II-3
1998 Existing Typical Rural CANAMEX Corridor Performance

To City [1]	Route	AADT	V/C Ratio	LOS
Nogales, AZ (Begin)				
Tucson, AZ	I-19	22,600	0.28	A – B
Casa Grande, AZ	I-10	32,429	0.41	B – C
Phoenix, AZ	I-10	41,122	0.51	C
Kingman, AZ	US 93	7,778	0.27	B
Nevada Stateline	US 93	8,571	0.31	B *
Las Vegas, NV	US 93	14,000	0.28	B *
Utah State Line	I-15	14,985	0.30	C
Cedar City, UT	I-15	14,865	0.30	B
Salt Lake City/Ogden, UT	I-15	10,990	0.22	A
Brigham City, UT	I-15	38,540	0.77	D
Idaho Stateline	I-15	8,840	0.18	A
Pocatello, ID	I-15	7,944	0.16	A
Idaho Falls, ID	I-15	18,000	0.36	B
Montana Stateline	I-15	6,200	0.12	A
Butte, MT	I-15	4,030	0.08	A
Helena, MT	I-15	4,690	0.09	A
Great Fall, MT	I-15	3,520	0.07	A
Sweet Grass, MT	I-15	3,070	0.06	A

[1] The city on line with the AADT traffic volumes, is the end point of the segment. The traffic volume provided is at a midpoint between that city and the previous city., eg. The AADT volume of 41,122 occurs between Casa Grande and Phoenix, AZ.

* The Levels of Service are calculated at mid points between the Hoover Dam and Kingman, AZ and the Hoover Dam and Las Vegas, NV. These LOS are not meant to represent the significant delays and poor LOS at the approaches to the Hoover Dam itself.

Table II-4
1998 Existing Large Urban CANAMEX Corridor Performance

City	Route	AADT	V/C Ratio	LOS
Tucson, AZ	I-19	48,537	0.60	B – C
	I-10	121,895	0.97	C – E
Phoenix, AZ	I-10 NB/SB	140,000	0.86	C – F
	I-10 EB/WB	236,387	1.15	D – F
	US 60	30,496	0.38	B – C
Las Vegas, NV	US 93/US 95	37,900	0.47	C
	US 93/US 95/I-515	122,765	0.98	E
	I-15	110,710	1.38	E
Provo/Orem, UT	I-15	81,185	0.65	D
Salt Lake City/ Ogden, UT	I-15	73,096[1]	0.46	C
	I-15 (Bountiful)	112,705	0.90	E

[1] I-15 is undergoing reconstruction. 1996-97 volumes ranged from 150,000 to 200,000 AADT

All urban areas are performing near or above capacity and at minimum levels of service, especially the Salt Lake City and Phoenix areas. The reconstruction of I-15 in Salt Lake City, due for completion in late 2001, will enhance and extend its capacity. Only short segments of I-10 in Phoenix are scheduled for widening. Additional studies are currently underway to determine the possibilities of widening and adding HOV lanes to I-10. Continued growth in Tucson, Phoenix, Las Vegas, Provo/Orem and Salt Lake City/Ogden areas will add stress to the corridor's existing capacity.

In summary, the rural sections beyond the urban areas have acceptable Levels of Service (LOS), the exceptions being the rural sections between Ogden and Brigham City in Utah, and the approaches to the Hoover Dam in Arizona and Nevada. Conversely, many urban sections are highly congested. These urban locations include Tucson and Phoenix in Arizona; Las Vegas, Nevada; and Provo/Orem and Salt Lake City/Ogden City/Ogden in Utah.

Future Base Case Conditions

The existing traffic volumes 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.

Since 1970, vehicle-miles of travel (VMT) have increased on rural highways at an average annual rate of 2.24 percent per year nationwide and 2.23 percent in the Western Region.[1] 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. Tables II-5 and II-6 present existing and projected traffic volumes for selected rural and urban locations, respectively.

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

Table II-5
CANAMEX Corridor Existing and Projected Traffic Volumes in Rural Sections

To City [1]	Highway	County	1998 ADT	1998 Percent Trucks [2] Single	Comb.	Total	2010 ADT	2020 ADT	2030 ADT
Nogales, AZ to		Santa Cruz							
Tucson, AZ	I-19	Pima	22,600	5	10	15	42,200	71,000	88,600
Casa Grande, AZ	I-10	Pima	32,429	12	16	28	35,200	37,600	40,200
Phoenix, AZ	I-10	Maricopa	41,122	11	24	35	44,600	47,700	51,000
Kingman, AZ	US 93	Mohave	7,778	6	22	28	9,000	10,200	11,500
AZ / NV Stateline	US 93	Mohave	8,571	8	17	25	11,000	13,600	16,800
Las Vegas, NV	US 93	Clark	14,000	3	9	12	21,800	29,300	36,500
AZ/NV Stateline	I-15	Mohave	14,985	3	18	21	21,600	28,200	35,200
Cedar City, UT	I-15	Washington	14,865	2	18	20	28,600	49,200	61,400
Salt Lake City/Ogden, UT	I-15	Weber	10,990	3	18	21	14,300	17,800	22,200
Brigham City, UT	I-15	Box Elder	38,540	3	7	10	54,600	72,900	91,000
UT / ID Stateline	I-15	Box Elder	8,480	4	10	14	12,000	16,000	20,000
Pocatello, ID	I-15	Oneida	7,900	4	22	26	11,000	14,200	17,700
Idaho Falls, ID	I-15	Bingham	18,000	4	22	26	28,500	38,500	48,100
ID / MT Stateline	I-15	Jefferson	2,600	4	22	26	3,700	4,800	6,000
Butte, MT	I-15	Beaverhead	4,030	4	25	29	6,500	9,100	11,400
Helena, MT	I-15	Jefferson	4,690	4	10	14	7,100	9,700	12,100
Great Falls, MT	I-15	Cascade[3]	3,520	4	16	20	5,000	6,600	8,200
Sweet Grass, MT	I-15	Pondera	3,070	3	22	25	4,000	5,000	6,300

1 The city on line with the AADT traffic volumes, is the end point of the segment. The traffic volume provided is at a midpoint between that city and the previous city., eg. The AADT volume of 41,122 occurs between Casa Grande and Phoenix, AZ.

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 rate based on average in all counties in Montana on I-15, as 1998 HPMS data contained no samples on I-15 in Cascade County.

Future Highway Improvement Projects

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 II-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

Table II-6
CANAMEX Corridor Existing and Projected Traffic Volumes in Urban Sections

Urban Area and Highway [1]	County	1998 ADT	1998 Percent Trucks [2]			2010 ADT	2020 ADT	2030 ADT
			Single	Comb.	Total			
Tucson, AZ								
I-19	Pima	48,537	4	5	9	75,800	110,000	137,300
I-10	Pima	121,895	7	15	22	153,700	186,500	226,300
Phoenix, AZ								
I-10 NB/SB	Maricopa	140,000	5	5	10	168,400	196,500	229,200
I-10 EB/WB	Maricopa	236,387	5	5	10	284,400	331,700	387,000
U.S. 60	Maricopa	30,496	7	8	15	41,900	53,500	66,800
Las Vegas, NV								
US 93 / US 95	Clark	37,900	2	1	3	49,800	62,400	77,800
US 93/US 95/I-515	Clark	122,765	1	2	3	161,400	202,000	252,100
I-15	Clark	110,710	1	2	3	129,300	147,100	167,400
Provo / Orem, UT								
I-15	Utah	81,185	2	11	13	120,800	168,300	210,100
Salt Lake City / Ogden, UT								
I-15	Salt Lake	175,000	1	9	10	270,800	389,600	486,200
I-15 (Bountiful)	Davis	112,705	2	5	7	172,200	245,100	305,900

1 See Figure II-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).

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
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	Maricpoa	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 Corrido	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 Interchang	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 Interchar	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 Par	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 II-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

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.

These projects will provide 36.5 more miles of four-lane divided, access control highway for US 93 in Arizona. Additionally, 3.5 miles of US 93 in Nevada will be upgraded to interstate standards. These improvements will reduce the length of US 93 that remains as a two-lane highway to 120 miles. 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.

Highway Constraints

The CANAMEX Corridor has several constraints, or bottlenecks, along the route from Mexico to Canada. In addition to the identified and funded improvement projects, however, several states are conducting significant studies to determine alternatives to existing constraints. These studies are identified in *italicized* text in the following descriptions. It is not an element of this study to comment on the progress, feasibility or preferred alignments of these studies. They are, however, being mentioned as part of the comprehensive overview of transportation activity within the CANAMEX Corridor.

Congestion in and around the Phoenix area is a hindrance to rapid movement of traffic and goods through the metropolitan area. US 60 is a signalized, four-lane arterial through metropolitan Phoenix. The arterial is oriented northwest-southeast through the city's grid system of east-west, north-south streets. The intersections are a difficult 6-legged configuration, because of US 60's diagonal orientation. West of AZ Loop 101, US 60 contracts to a two-lane facility. The study to designate CANAMEX Corridor through Maricopa County is being conducted. It is expected to be completed by late 2001 or early 2002.

US 93/US 60 is currently a two-lane facility for most of its route through Arizona and Nevada. The upgrading of this highway to a four-lane divided, access controlled highway between Phoenix and Las Vegas is a recommendation of this study in order to

reduce delays, improve safety and remove significant bottlenecks along the corridor. As part of the potential upgrade of US 93, the *Wickenburg/US 93 Location/Design Report* is being undertaken to examine, among other options, possible alternatives in order to take US 93 on a bypass route around the city.

A significant hindrance to traffic in the CANAMEX Corridor is the two-lane, winding section of US 93 leading to and from the Hoover Dam. *The Hoover Dam Bypass* project is being conducted to determine the best route for a new road and bridge over the Colorado River. The project cost is estimated at $198 million. Of this amount, $118 million has been allocated, with the remaining $80 million yet to be identified. Eight of the original eleven alternatives studied have been eliminated. The three remaining alternatives are:

Sugarloaf Mountain Alternative south of the dam (preferred alternative); and

Promontory Point Alternative north of the dam; and

Gold Strike Canyon Alternative further south of the dam.

Each of the remaining alternatives for the Hoover Dam Bypass includes a new four-lane highway and new four-lane bridge. The Hoover Dam Bypass would allow trucks to use the new alignment, which would be a significant improvement to the safety and efficiency of CANAMEX Corridor. Negative aspects of the present alignment include poor geometry on the approaches to the Hoover Dam; hours of delays to traffic; and the mixing of trucks and tourist traffic on the route.

The US 93 route north of the Hoover Dam travels through the city of Boulder. The present geometry, signalized intersections and local traffic from new housing development slow through traffic in this suburban area. *The Boulder City/US 93 Corridor Study* is examining the best ways to accommodate traffic in and through Boulder City.

Another constraint on the CANAMEX Corridor is between Salt Lake City and Ogden, where the available land for transportation development is constrained by the proximity of the Wasatch Mountains to the Great Salt Lake. I-15 is currently being widened to eight-lanes with HOV lanes in this area. *The Legacy Parkway Study* is examining the feasibility of a new interstate standard highway north of Salt Lake City through this bottleneck. Existing development along the corridor, extreme slopes of the mountains and wetlands and the Great Salt Lake all hinder the development of additional lanes on I-15 or new roads in this section of the corridor.

Future Traffic Conditions

Figure II-2

2010 Base Case Conditions (Programmed and Planned)

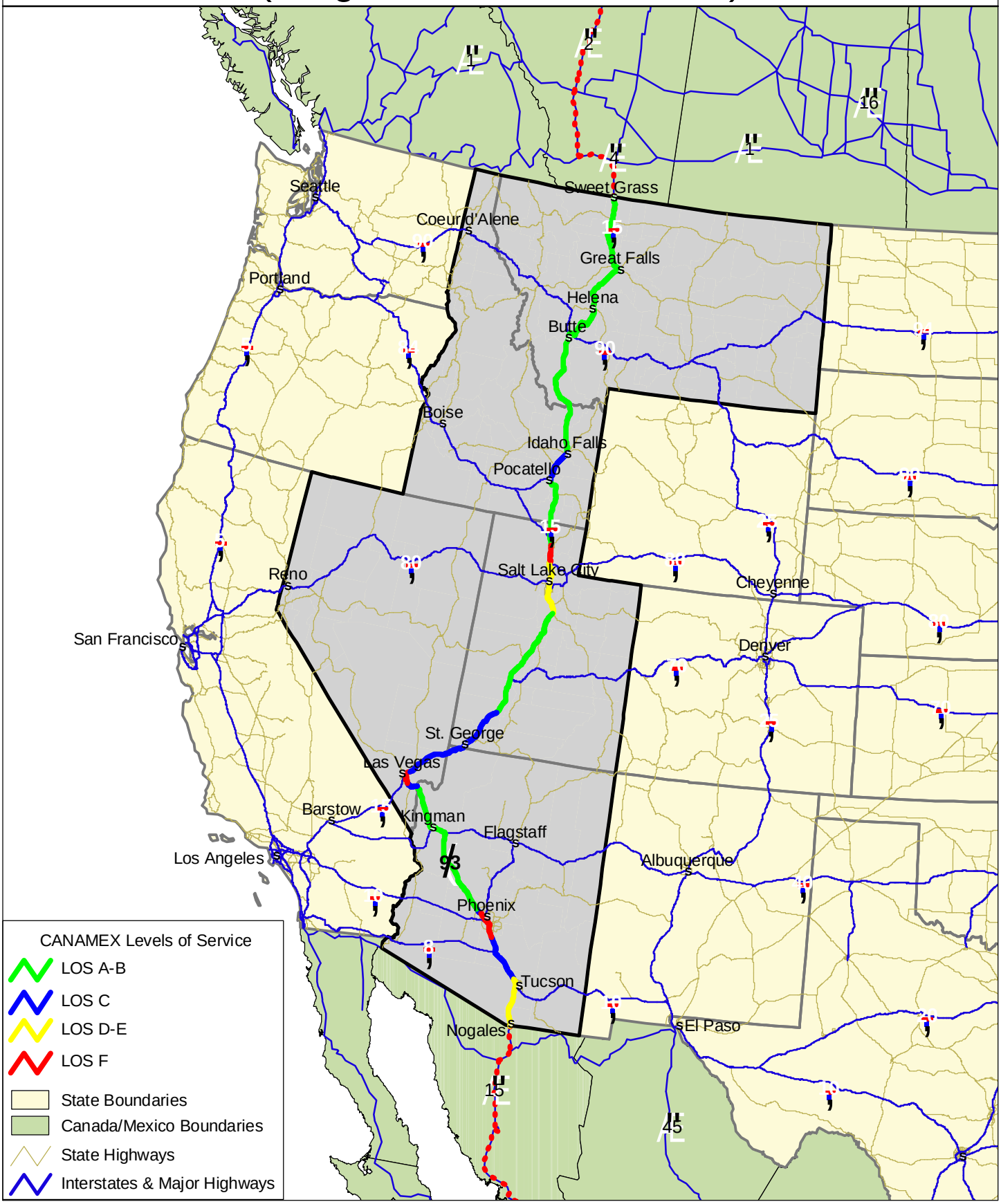


Figure II-3

2020 Base Case Conditions (Programmed and Planned)

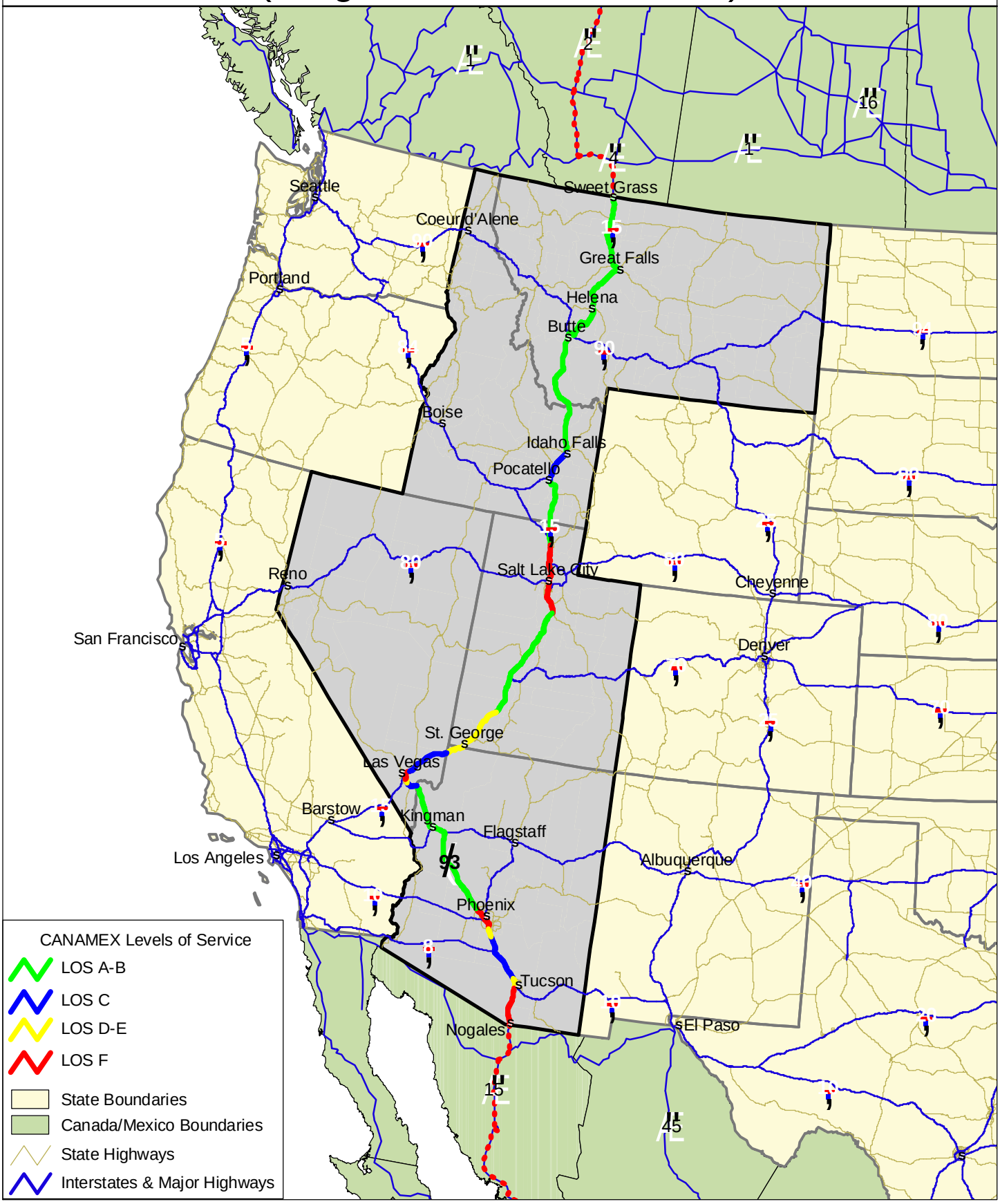
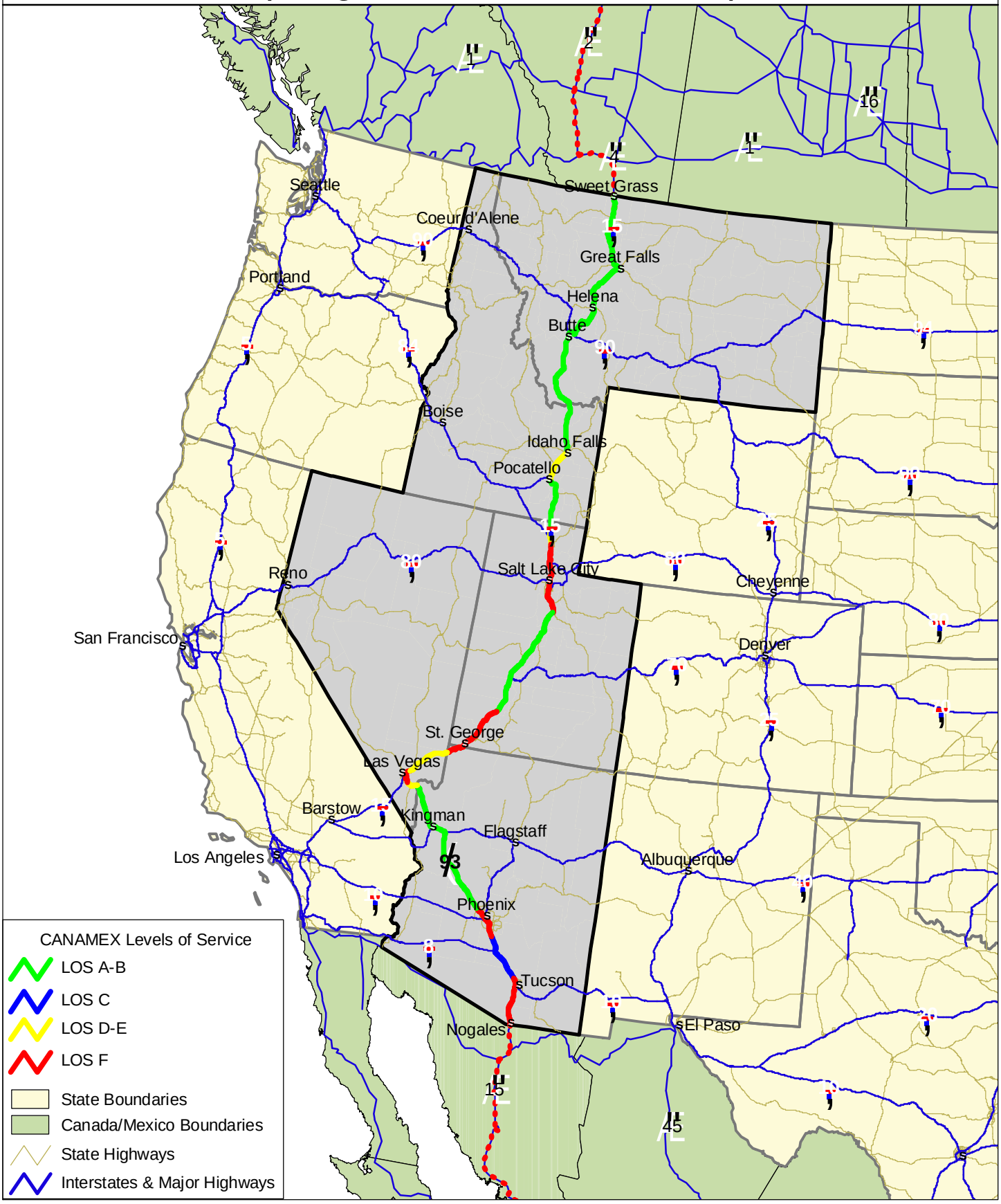


Figure II-4

2030 Base Case Conditions (Programmed and Planned)



Tables II-8 and II-9 show the resulting v/c ratios for selected rural and urban locations, respectively. 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 Future Base Case. Figures II-2 through II-4 depict the Base Case conditions for 2010, 2020, and 2030, respectively.

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

To City [1]	Highway	Capacity		Volume-Capacity Ratio						
				Existing	No Improvements			Programmed and Planned		
		Existing	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 II-7 for programmed and planned projects

n.c. = no significant change in capacity

Rural Conditions - For rural segments, a v/c ratio benchmark of 0.90 (LOS E) was deemed at capacity and in need of expansion. Although 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.

Urban Area Conditions **-** Table II-9 illustrates entirely different conditions in the urban areas. 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 in urban conditions. 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 II-9
CANAMEX Corridor Existing and Projected Traffic Conditions in Urban Sections

	Programmed Plus Planned [2]		Volume-Capacity Ratio						
			Existing	No Improvement			Programmed Plus Planned		
Urban Area[1] Highway	Lanes	Capacity	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, UT									
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**

1 See Figure II-1 for locations. **any v/c equal to or greater than 1.2 shown in bold, indicating potential congestion**

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

Proposed Improvements

Based on the identified highway deficiencies, improvements will be needed along several segments of the corridor. Table II-10 provides estimated costs for these proposed projects. Some recommendations include the possibility of bypass

alternatives. These alternatives are not meant to dictate a specific route, but merely indicate that additional lane capacity is required to accommodate the projected growth in traffic volumes. Other recommendations are needed to upgrade the CANAMEX

Table II-10
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	**$0.924**

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 II-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

Corridor to stated minimum standards. Moreover, the implementation of ITS strategies to get information to truckers and motorists is recommended as a cost-effective means of managing traffic flows on existing or new facilities.

The recommendations provided in this have not been coordinated with the multitude of other more detailed studies on-going in the CANAMEX Corridor. Specific results and

costs may vary from these other studies because 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. The actual route of CANAMEX through Phoenix is currently under evaluation. 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.

Current and future capacity constraints do not exist along US 60 and US 93 heading northwest from Phoenix to Las Vegas, except for the portion 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 deficiencies in safety and efficiency. The portions of US 60/US 93that 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.

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 timeframe.

Roadway improvement recommendations in Utah include additional lanes on I-15 from the Arizona border, coming from Mesquite, NV through the northwest corner of 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 planning 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 four segments; North Legacy from I-15 to Farmington; the Legacy Parkway from Farmington to I-215 at 2100 North; 5600 West Legacy in Salt Lake County from I-215 to Utah County Line; and South Legacy from the Utah County Line to I-15 near Nephi, Utah.

Traffic Impacts

Tables II-11 and II-12 provide resulting v/c ratios for rural and urban sections, respectively. With the exception of I-19 south of Tucson, all rural segments of the CANAMEX Corridor are anticipated to operate at acceptable conditions. Even with

substantial improvements some urban segments may still experience congestion, especially in the Salt Lake City and Ogden areas in Utah.

Table II-11
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 II-7 for locations
2 Refer to Table II-7 for programmed and planned projects
3 Refer to Table II-10 for proposed projects
n.c. = no significant change in capacity

Table II - 12
CANAMEX Corridor Projected Traffic Conditions in Urban Sections With Proposed Projects

	Base Case [2]		Capacity With Proposed Projects [3]			Volume-Capacity Ratio					
						Base Case			With Proposed Pro		
Urban Area [1] Highway	Lanes	Capacity	2010	2020	2030	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, UT											
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**

1 See Figure II-7 for locations **any v/c equal to or greater than 1.2 shown in bold**
2 Refer to Table II-7 for programmed and planned projects
3 Refer to Table II-10 for proposed projects
n.c. = no significant change in capacity

A conservative estimate of transportation benefits was calculated assuming no change in vehicle miles of travel but savings in vehicle hours of travel due to improved speeds from capacity improvements. Table II-13 summarizes the key transportation benefits anticipated from the additional proposed improvements. By 2030 an estimated 248 million annual vehicle hours can be saved throughout the CANAMEX Corridor with the additional proposed projects.

Table II-13
Transportation Benefits of Highway Improvements

Future Base Case CANAMEX Corridor [1]						
	2010 Base Case		2020 Base Case		2030 Base Case	
State	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]						
	2010 With Improvements		2020 With Improvements		2030 With Improvements	
State	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						
	2010 With Improvements		2020 With Improvements		2030 With Improvements	
State	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 II-7 for programmed and planned projects

2 See Table II-10 for proposed projects

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

VMT and VHT are in millions

CANAMEX Corridor Improvements

Proposed project costs for the CANAMEX Corridor, identified in table II-10, total $2.02 billion with $213 million by 2010, an additional $867 million by 2020 and a final $938 million by 2030. Table II-14 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 1,496 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 II-14
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

FREIGHT ISSUES

The previous section on highway conditions indicated truck flows account for up to one third of CANAMEX Corridor flows. Moreover, those areas where trucks represent 20 percent or more of total traffic flow tend to be the areas with highest traffic volumes or highest growth rates, such as I-10 between Tucson and Phoenix and sections of I-15 in Utah. This level of activity suggests that the CANAMEX Corridor has the potential to be a significant trade corridor. Currently, CANAMEX does not meet the criteria for a major North American Free Trade Agreement (NAFTA) trade corridor, but it is viewed as a "corridor of importance to binational trade."[2] This freight assessment supports the importance of the Corridor to national as well as binational trade.

Although trucks are the primary carrier of freight in the CANAMEX Corridor, it is not the only mode. How the CANAMEX Corridor could be enhanced to improve freight movement requires more detailed information on the origins and-destinations and the modes of travel as well as the type of freight that moves along and across the Corridor. This information was provided through an assessment of 1998 commodity flow data extracted from the TRANSEARCH commodity flow database by Reebie Associates.

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

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

- **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
- **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 II-5 depicts this terminology graphically while Tables II-15 through II-18 present an overview of germane characteristics. Additional detail is provided in *Task III: Transportation Strategies and Economic Impact Analyses Working Paper.*

Existing CANAMEX Region Freight Flows

Total Flows By General Origin-Destination

Table II-15 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 to other regions of the US or outside the US. In fact, only a small portion of the freight currently is to or from Canada or Mexico.

Regional freight movements (excluding through movements) can be characterized as:

- mostly domestic (98 percent); and
- a mixture of short-distance intrastate (47 percent) and longer distance interstate and external trips (53 percent).

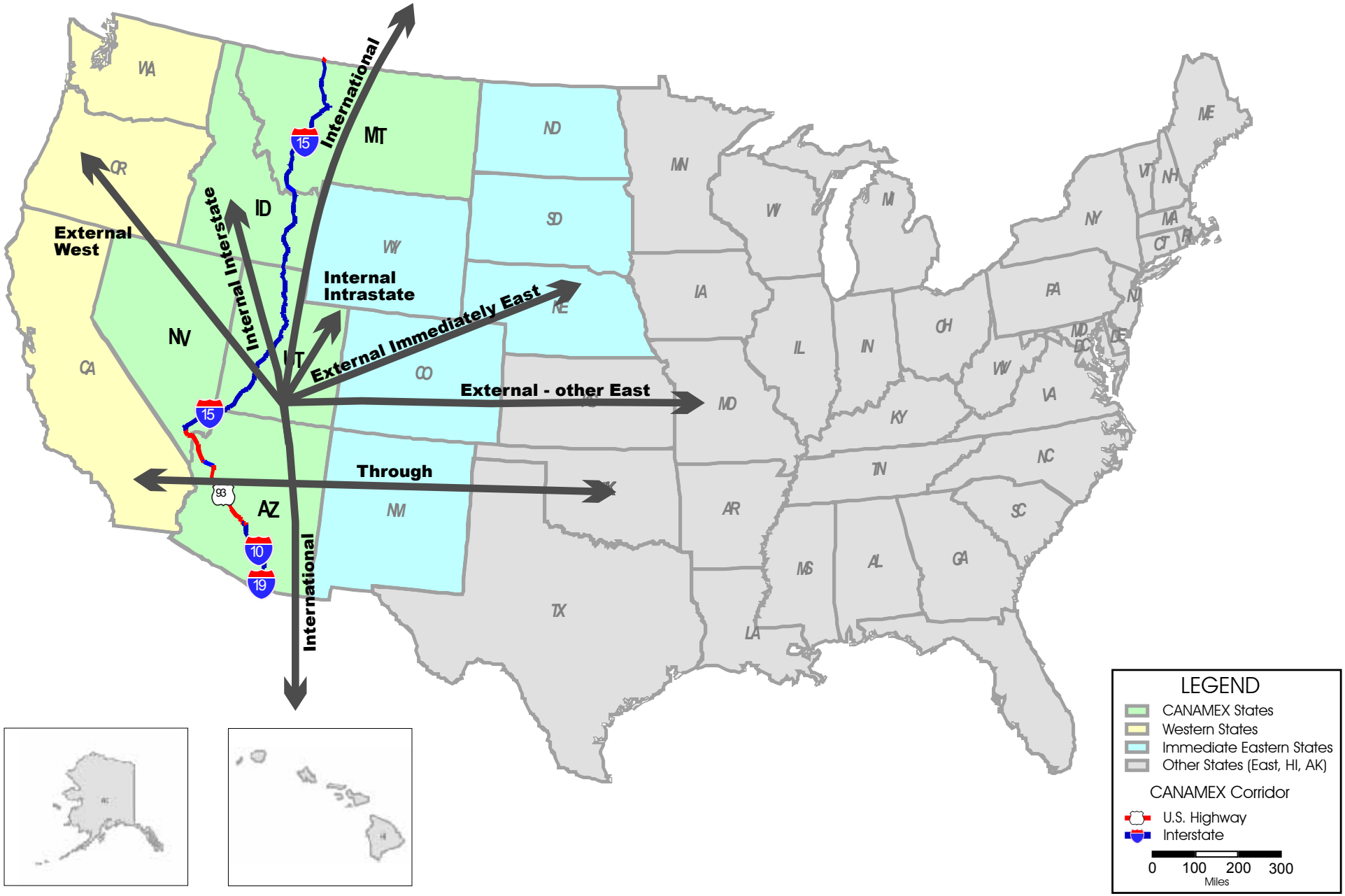
When through freight movements are included, the balance shifts more to longer-distance multi-state traffic (70 percent).

Mode of Travel

Seventy percent of CANAMEX freight moves by truck and 27 percent by rail, as depicted in Table II-16. 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 45

Figure II - 5

CANAMEX Region Freight Flow Terminology



percent of external traffic. This relationship also holds true for external traffic (Table II-17) where the split between truck and rail traffic is 53 percent and 47 percent, respectively. When reviewing international trade, it is important to remember that pipelines move gas and barges move grain. 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 II-15
CANAMEX Region Freight Flow Summary By Movement

Total Flow			1998 Volume		
			Tons	Percent of CANAMEX States	Percent of 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%**	**2.2%**
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

Commodity Types

The type of freight originating, terminating, or traveling through the CANAMEX Region can be defined in one of two ways – volume of commodity regardless of mode or origin-destination, or a commodity type by specific mode by specific origin-destination (herein called a specific trade link). Table II-18 provides information on the top commodities for internal, external and through traffic. Information on trade links

can be found in the *Task III: Transportation Strategies and Economic Impact Analysis Working Paper.*

Table II-16
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

Table II-17
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%**	

Table II-18
CANAMEX Region Domestic Commodity Flows

Top 10 1998 Commodity Movements (Millions of Tons)

Intrastate Flows

	Commodity	Volume By Rail	Truck	Total
1	Clay, concrete, glass or stone	0.808	57.950	58.758
2	Secondary traffic		48.366	48.366
3	Petroleum or coal products	0.772	28.474	29.246
4	Lumber or wood products	0.398	26.076	26.474
5	Coal	10.371	5.287	15.658
6	Food or kindred products	0.248	8.248	8.496
7	Chemicals or allied products	0.116	5.144	5.260
8	Metallic ores	2.009		2.009
9	Nonmetallic minerals	1.513		1.513
10	Waste or scrap materials	0.713		0.713

Above represents 97% of total intrastate flows

Interstate Flows

	Commodity	Volume By Rail	Truck	Total
1	Coal	3.970	0.420	4.390
2	Food or kindred products	0.157	3.608	3.765
3	Lumber or wood products	0.183	3.526	3.709
4	Chemicals or allied products	1.513	1.391	2.904
5	Secondary traffic		2.827	2.827
6	Primary metal products	0.098	1.400	1.498
7	Clay, concrete, glass or stone	0.383	1.063	1.446
8	Petroleum or coal products	0.337	1.059	1.396
9	Machinery		0.299	0.299
10	Pulp, paper or allied products	0.177	0.107	0.284

Above represents 96% of total interstate flows

External To CANAMEX States

	Commodity	Volume By Rail	Truck	Total
1	Coal	13.083	0.033	13.116
2	Food or kindred products	3.098	8.517	11.615
3	Chemicals or allied products	2.558	6.172	8.730
4	Petroleum or coal products	1.945	4.000	5.945
5	Lumber or wood products	1.903	3.894	5.797
6	Clay, concrete, glass or stone	1.597	3.848	5.445
7	Primary metal products	1.606	3.033	4.639
8	Secondary traffic		4.189	4.189
9	Pulp, paper or allied products	1.304	1.781	3.085
10	Transportation equipment	1.041	1.999	3.040

Above represents 80% of external flows to CANAMEX states

External From CANAMEX States

	Commodity	Volume By Rail	Truck	Total
1	Coal	19.246	0.314	19.560
2	Food or kindred products	2.235	9.478	11.713
3	Farm products	6.228	4.370	10.598
4	Lumber or wood products	2.490	7.979	10.469
5	Chemicals or allied products	4.726	5.621	10.347
6	Petroleum or coal products	2.239	5.722	7.961
7	Clay, concrete, glass or stone	1.833	4.885	6.718
8	Secondary traffic		5.998	5.998
9	Primary metal products	2.457	3.491	5.948
10	Pulp, paper or allied products	0.444	1.692	2.136

Above represents 90% of external flows from CANAMEX states

Through CANAMEX Region Travelling West to East

	Commodity	Volume By Rail	Truck	Total
1	Miscellaneous mixed shipments	26.783		26.783
2	Food or kindred products	6.316	9.057	15.373
3	Lumber or wood products	7.304	6.015	13.319
4	Farm products	1.140	9.575	10.715
5	Transportation equipment	1.475	2.998	4.473
6	Chemicals or allied products	1.376	3.036	4.412
7	Primary metal products	1.689	3.088	4.777
8	Pulp, paper or allied products	1.238	2.534	3.772
9	Electrical equipment	0.088	2.473	2.561
10	Fabricated metal products	0.060	2.448	2.508

Above represents 88% of flows through CANAMEX Region travelling west to east

Through CANAMEX Region Travelling East to West

	Commodity	Volume By Rail	Truck	Total
1	Food or kindred products	9.889	17.680	27.569
2	Miscellaneous mixed shipments	22.146		22.146
3	Chemicals or allied products	9.094	9.812	18.906
4	Farm products	18.307	0.556	18.863
5	Transportation equipment	4.316	5.295	9.611
6	Primary metal products	2.533	6.099	8.632
7	Pulp, paper or allied products	2.080	4.677	6.757
8	Lumber or wood products	1.635	4.070	5.705
9	Petroleum or coal products	1.385	2.548	3.933
10	Clay, concrete, glass or stone	0.977	2.335	3.312

Above represents 83% of flows through CANAMEX Region travelling east to west

The CANAMEX Corridor accommodates a variety of commodities, some heavy materials such as coal and others 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 truck 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

The differences suggest that truck size/weight issues will vary throughout the Corridor.

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.

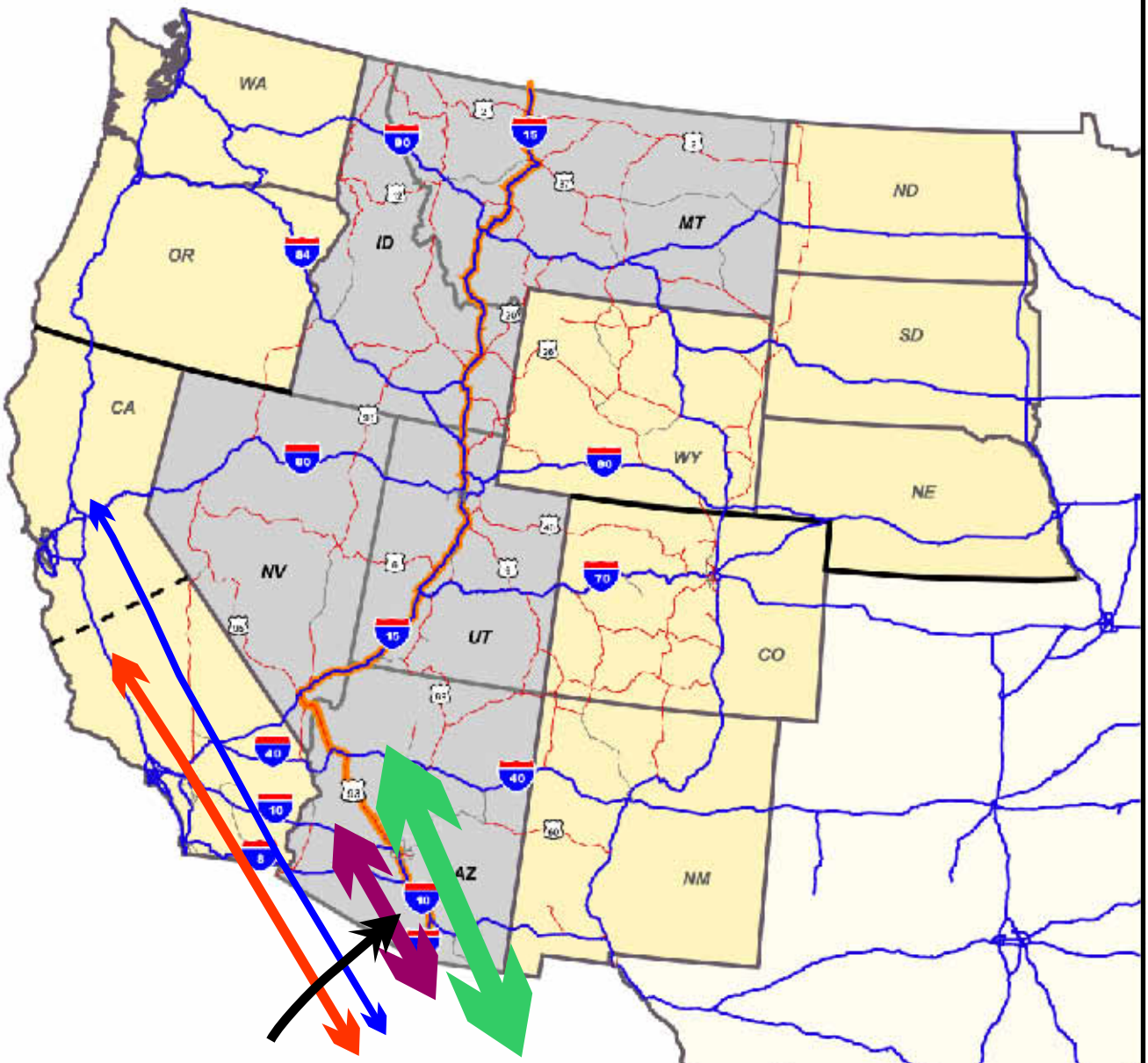
Figures II-6 through II-9 indicate the origin-destination of the freight flows on each of the four links, respectively. Pertinent observations by link include:

- 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)

Figure II - 6

Current Truck Freight Flows on I-19

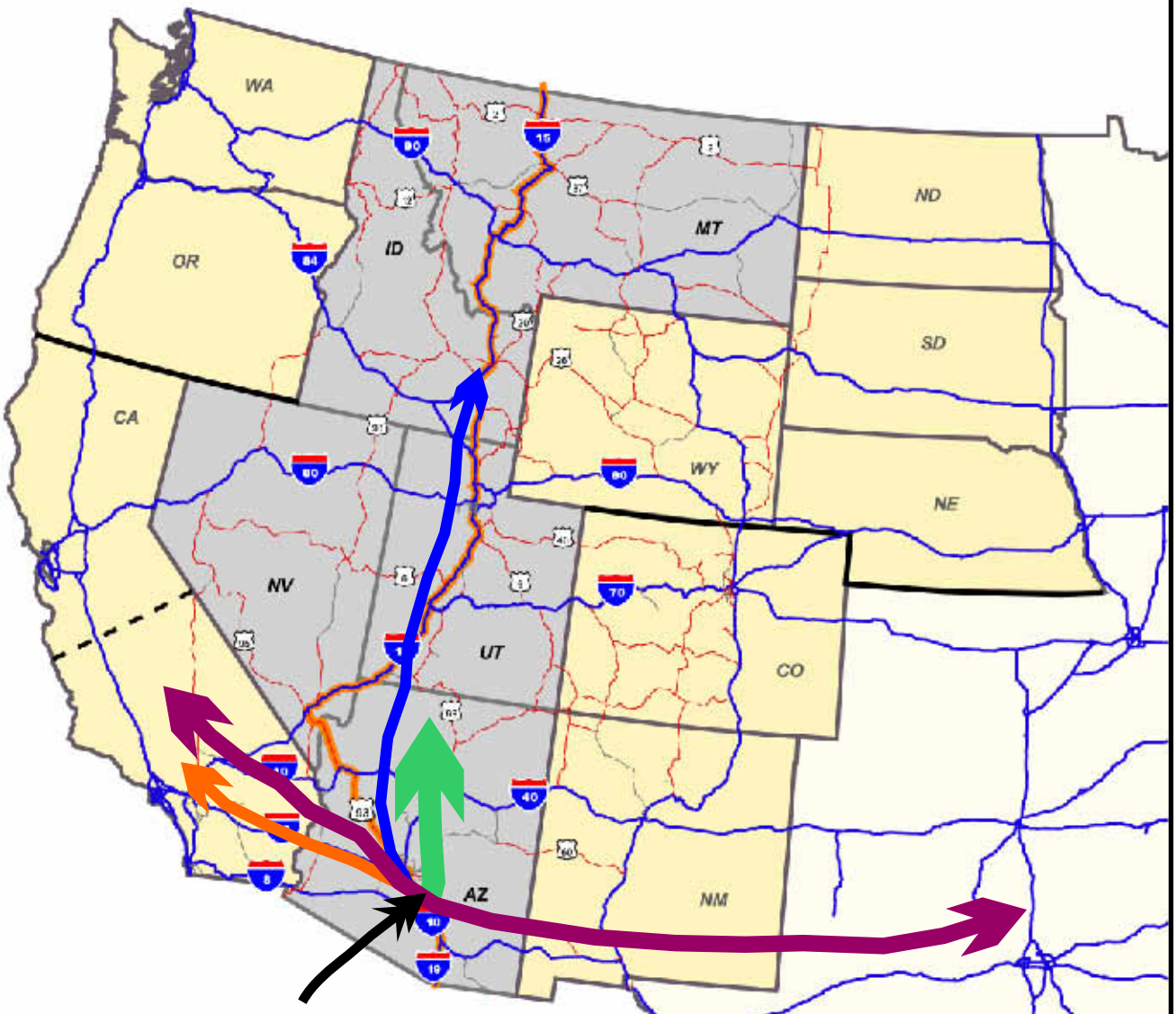


Total Annual Tons (millions)	3.3
International	83%
Domestic	17%
To, From and Within CANAMEX States	15%
CANAMEX States – Other States	2%
CANAMEX States – Outside US	70%
Through CANAMEX States	13%
Between	
- MX - AZ	69%
- Within Arizona	14%
- MX - S. CA	9%
- MX - N. CA	4%
- Other Movements	4%
(each 1% or less)	

Top four movements shown on map

Figure II - 7

Current Truck Freight Flows on I-10

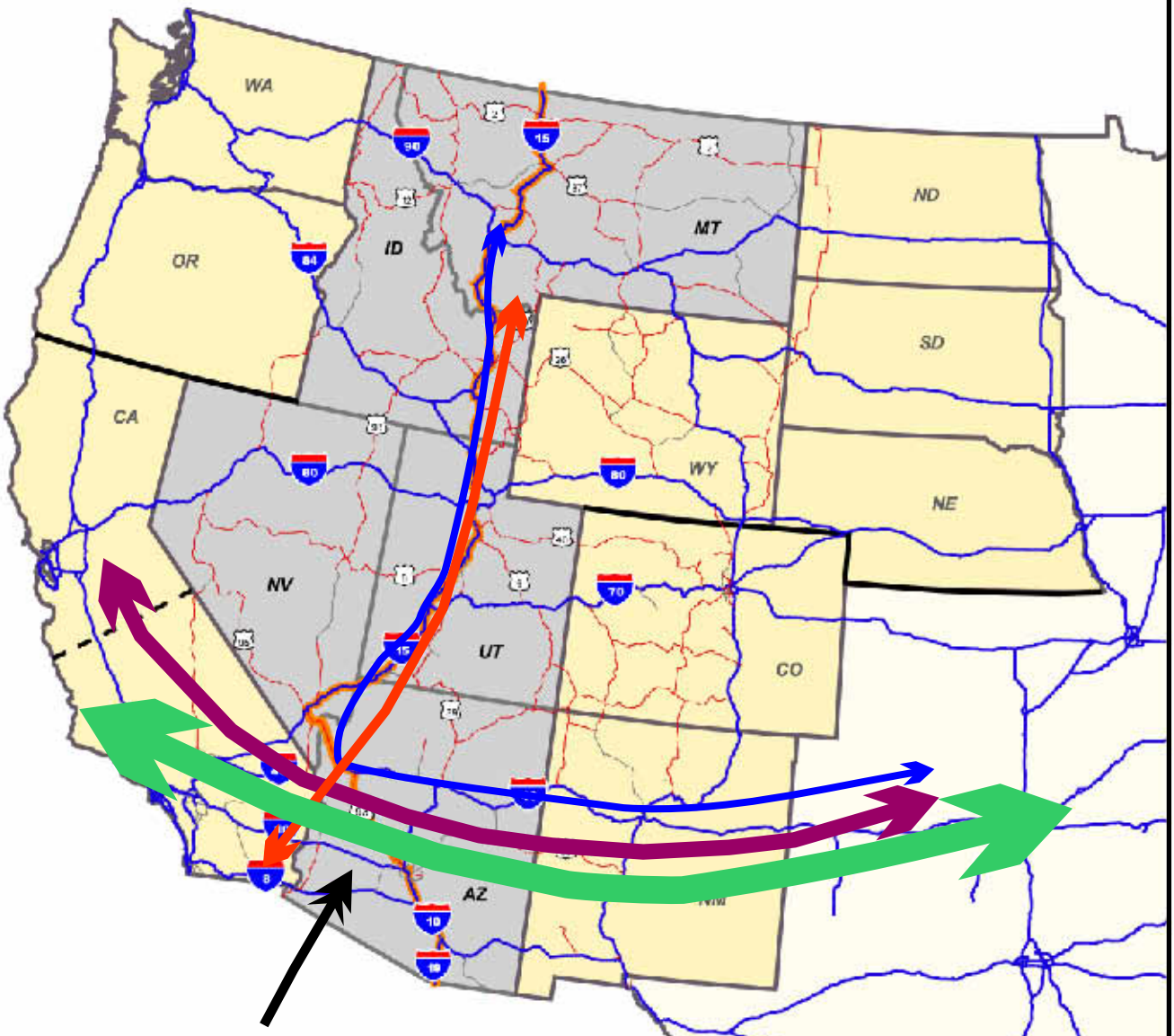


Total Annual Tons (millions)	74.7
International	10%
Domestic	90%
To, From and Within CANAMEX States	45%
CANAMEX States – Other States	23%
CANAMEX States – Outside US	4%
Through CANAMEX States	28%
Between	
- Within Arizona	38%
- S. CA - Other East	17%
- AZ – S. CA	9%
- AZ – Other CANAMEX States	7%
- AZ – Other East	7%
- MX - AZ	4%
- MX – S. CA	4%
- Other Movements	14%
(each 1% or less)	

Top four movements shown on map

Figure III - 8

Current Truck Freight Flows on US 93

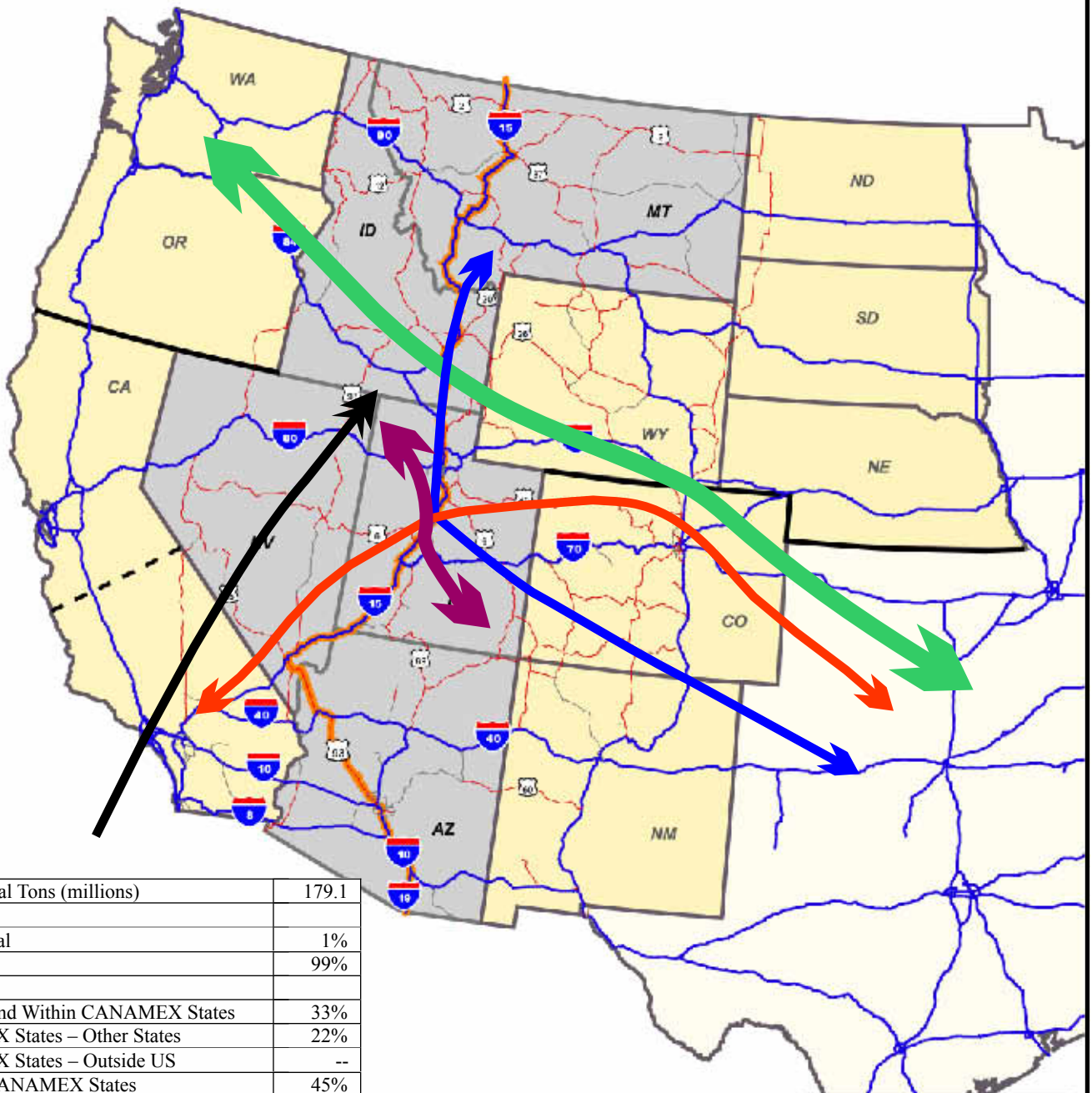


Total Annual Tons (millions)	65.4
International	1%
Domestic	99%
To, From and Within CANAMEX States	8%
CANAMEX States – Other States	15%
CANAMEX States – Outside US	1%
Through CANAMEX States	76%
Between	
- S. CA - Other East	58%
- N. CA – Other East	12%
- S. CA – CANAMEX States	9%
- CANAMEX States – Other East	4%
- AZ – Other CANAMEX States	3%
- CO/NM – S. CA	3%
- Other Movements	11%
(each 2% or less)	

Top four movements shown on map

Figure II - 9

Current Truck Freight Flows on I-15



Total Annual Tons (millions)	179.1
International	1%
Domestic	99%
To, From and Within CANAMEX States	33%
CANAMEX States – Other States	22%
CANAMEX States – Outside US	--
Through CANAMEX States	45%
Between	
- OR/WA – Other East	19%
- Within Utah	13%
- S. CA – Other East	10%
- CANAMEX states – Other East	9%
- N. CA – Other East	8%
- Between CANAMEX States	6%
- Within Montana	6%
- CANAMEX States – S. CA	5%
- Within Idaho	4%
- Within Montana	4%
- Other Movements	16%
(each 3% or less)	

Top four movements shown on map

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.

- 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 travelling to, from or through the CANAMEX Region.

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 additional trade activity.
- There are potentially many reasons why more Mexican freight on the Corridor uses ports of entry other than Nogales. 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 through the Sierra Madre mountain range is causing freight not to use Nogales. This suggests that coordination and support of road planning efforts in Mexico are warranted.

Future Freight Movements

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 other 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.

INTELLIGENT TRANSPORTATION SYSTEMS (ITS) ELEMENTS

Both the highway and freight analyses indicated the need for enhanced communications to improve the flow of people and goods, especially in urban areas.

At the same time, commercial vehicle movements through this Corridor are substantially less than on other key north-south corridors. To promote the use of this corridor as a connector of the north-south border crossings with important east-west transportation routes, a key objective is the improved efficiency in freight travel (reduced administrative delay, enhanced intermodal center information and operations). ITS provides the tools to support this improved efficiency.

State boundaries are simply jurisdictional borders, and seamless communication throughout the CANAMEX Corridor via a comprehensive "interoperable" system is highly desirable. Such an operation would enhance recreational tourist traffic as well as commercial freight movements. This section highlights ITS components that address these issues. More detail is provided in *Task IV: Emerging Technologies Working Paper.*

ITS refers to projects that improve the efficiency of personal or freight mobility utilizing communications and electronics technologies in lieu of new roadway infrastructure. 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)

Existing ITS in the CANAMEX Corridor

Several existing ITS initiatives are underway or have been completed within the CANAMEX Corridor. They can be classified as *Urban Area ITS Activities* or *Intercity/Rural ITS Activities*. Urban area activities in the Phoenix, Las Vegas, and Salt Lake City regions are in various stages of completion, with smaller scale activities occurring in the Tucson area. Specific urban area ITS activities are summarized in Table II-19.

Intercity/rural activities in general have involved traveler information systems and commercial vehicle pre-clearance and administrative systems – generally implemented through public-private partnerships**.** Most activities to date have been in Arizona, though a number of proposed initiatives have been identified in other locations in the corridor. Rural and intercity ITS activities are summarized in Table II-20**.**

Table II-19
Urban Area ITS Activities in CANAMEX Corridor

Area	Traffic Management	Traveler Information	Public Transportation
Tucson, AZ	Real-time traffic monitoring (traffic sensors and video cameras, connected by fiber optics) along I-10 and I-19. Variable message signs along I-10 and I-19. ADOT freeway management system co-located at City of Tucson's Traffic Management Center with existing traffic signal system.	Metro Networks is serving as the private sector partner with the City of Tucson in developing a Regional Traveler Information Center that will coordinate dissemination of traffic information.	Public kiosks are being deployed to provide real-time and static transit information.
Phoenix, AZ	42 miles of freeways and eight major surface streets ("smart corridors") with cameras, traffic sensors, upgraded traffic signals, and electronic variable message signs, 200-mile fiber optic communication network.	Metro Networks and ETAK workstations in ADOT Traffic Operations Center, permitting traffic reporters to more quickly disseminate information to the public via radio and TV. ADOT supplies real-time information over web site. Personalized traffic reports and information services are being provided through a series of public-private partnering initiatives.	Automatic vehicle location systems using Global Positioning Systems (GPS) on over 90 transit vehicles providing real-time traffic condition updates and schedule information. Kiosks at transit centers provide bus route, schedule and traffic condition information.
Las Vegas, NV	Deployment of traffic sensors, CCTV cameras, ramp metering and variable message signs along freeway network (including I-15 and I-515), and integration with traffic signal systems along arterial routes. New regional traffic management center to be located at the regional Nevada Highway Patrol facility.	Includes implementation of data archiving functions to permit access to historical traffic data collected by the system, and a real-time traveler information dissemination capability to support media and public information needs.	

Salt Lake / Ogden / Provo, UT	Regional Traffic Operations Center (TOC) at UDOT's Region 2 offices, satellite operations centers for Salt Lake City and Salt Lake County traffic signals. 300 miles of fiber optic communications, variable message signs, closed circuit TV, arterial signal upgrades under the I-15 reconstruction effort. Video cameras installed both by UDOT and by local television stations to monitor operations for informational purposes.		

Table II-20
Rural and Intercity ITS Activities in CANAMEX Corridor

State	ITS Planning and Architecture	Traveler Information	Incident Management
Arizona	A statewide ITS Early Deployment study is covering those areas not previously covered under prior Early Deployment Studies for the Phoenix and Tucson urban areas and the rural I-40 corridor.	Road Weather Information Systems (RWIS) locations that detect low visibility, icing and precipitation conditions, use of RWIS data in dissemination of statewide traveler information over the Internet. Traveler information services along I-40 include real-time weather, construction and incident information as well as traveler services information. Disseminated through the Internet as well at strategically-located kiosks.	Statewide incident management plan to establish consistent methods, procedures, responsibilities and communication channels among both the state-level agencies and local responders. Statewide Alternate Route Plan to provide route alternatives for all major rural highway segments during incidents, construction or weather-related closures.
Nevada	An I-80/US 395 Corridor ITS Strategic Master Plan is being developed from CA to UT state lines. In 1999 Nevada completed a Statewide ITS/CVO business plan.	25 Road Weather Information Systems (RWIS) locations have been deployed in the Reno/Lake Tahoe area (outside the CANAMEX Corridor area)	
Utah		Road Weather Information Systems (RWIS) locations that detect low visibility, icing and precipitation conditions, bridge de-icing systems; use of RWIS data in dissemination of statewide traveler information over the Internet.	
Idaho	Statewide ITS Strategic Plan developed. WTI developed Greater Yellowstone Rural ITS Priority Corridor plan involving Montana, Idaho and Wyoming and serving the Yellowstone and Grand Teton National Parks. Rural Regional Architecture has been developed.	Development of regional Traffic Management Center in Boise / Treasure valley area, road weather info systems, testing of emissions compliance measurement systems, limited variable message sign deployment.	

Montana	Statewide ITS Strategic Plan and ITS/CVO Business Plan developed. WTI developed Greater Yellowstone Rural ITS Priority Corridor plan involving Montana, Idaho and Wyoming and serving the Yellowstone and Grand Teton National Parks. Rural Regional Architecture has been developed.	Traveler Information Booths being developed by Montana Tourism and Recreation Initiative (MTRI), providing traveler services information on kiosks at tourist offices.	

Commercial Vehicle Operations (CVO)

The major national ITS program for Commercial Vehicle Operations (CVO) is Commercial Vehicle Information Systems and Networks (CVISN), largely funded through FHWA. CVISN involves the implementation of electronic administration, credentialing, and safety programs that promote efficient and safe freight movements. The program is being deployed throughout the US, with a national goal to have such systems implemented in a majority of states by 2003. The programs include the following:

- Electronic Credential Administration – provides the electronic processing of permit applications and transmission of permits/related to: International Fuel Tax Agreement (IFTA), International Registration Plan (IRP), Intrastate Registration, Single State Registration (SSRS), and Oversize/Overweight (OS/OW).

- Safety Information Exchange – provides fixed, mobile, and other inspection stations with computer access to safety information, and permits electronic collection of inspection data to be uploaded from the roadside to a data archival system such as SafetyNet or equivalent.

- Roadside Electronic Screening – provides electronic screening of commercial vehicle weights and credentials at fixed mobile and other inspection stations at either mainline or non-mainline speeds.

The status of CVISN deployment in each of the CANAMEX states is summarized in Table II-21, based on FHWA summary reports published in early 2000, representing data collected for the year 1998. CVISN deployment progress in this corridor compared to other states is illustrated in Table II-22.

As is apparent, CVISN is in the early stages of implementation throughout the CANAMEX Corridor. Most of the work to date nationally has involved both roadside electronic screening and the national data sharing with respect to truck safety information through the Safety and Fitness Electronic Record (SAFER). Of the 32 states with roadside electronic screening of weight, overheight and other information, two (Idaho and Montana) are within the Corridor. Of the 14 states connected to the SAFER database, none are in the CANAMEX Corridor, and only Colorado and Oregon in the Western U.S. were connected to this program as of the May 2000 FHWA report.

However, collection of electronic inspection data through preclearance technologies has been initiated, as discussed below. Additional Border Crossing activities have been implemented as part of demonstration tests as well.

Pre-clearance of trucks through weigh stations and ports of entry are among the most common CVO applications to date, permitting reductions both in delay to truckers and in the paperwork required for issuing credentials to freight carriers and specific freight loads. These technologies utilize automatic vehicle identification systems permitting transponder-equipped commercial vehicles to bypass designated weigh stations and port-of entry facilities. There are two primary standards in place at this time, *PrePass* and *Norpass*, both of which are represented in the CANAMEX Corridor.

The more common of the two standards is *PrePass*, operated by the non-profit consortium Help, Inc. Montana, Arizona and Nevada utilize the *PrePass* system. In contrast, the *Norpass* standard is used in Utah and Idaho. *Norpass* is operated as a private organization with public membership open to all US states and Canadian provinces. Currently, *PrePass* is capable of reading information from *Norpass* transponders, but not vice versa.

At the Nogales, Arizona border crossing with Mexico, FHWA has funded a demonstration project, Expedited Processing at International Border Crossings (EPIC). This test, now in operation, includes *PrePass* electronic trip clearance technologies to accelerate the crossing of commercial vehicles and the Department of Treasury's electronic clearance project at the Nogales border crossing. Included are integrated truck, cargo and operator pre-clearance systems, electronic transfer of administrative and credential data, as well as issuance of electronic credentialing, improved information systems on delays and congestion at the border crossing. The State of Nevada has investigated joining and use of the mobile *PrePass* system; however, to date has not deployed.

Nevada, Utah, Idaho and Montana are part of a coalition of Western states (also including Washington, Oregon, and Wyoming) that have been jointly studying methods to improve trucking regulation and enforcement. Idaho National Engineering and Environmental Laboratory (INEEL) is conducting a field operational test designed to demonstrate automated technologies that monitor the status of commercial vehicles taken out of service due to safety deficiencies detected at inspection stations (e.g., operator exceeding his hours of continuous service, necessary repairs needed to vehicle) and to aid in efficiently clearing violations once these violations have been corrected. Technologies being utilized include Automatic Vehicle Identification systems, video image processing, and database systems. The system is initially being deployed at the East Boise Port of Entry.

Various demonstration projects are addressing the streamlining of operations within Port of Entry facilities. As with other ITS activities, there has not been significant connectivity between the various states on their programs, although the national CVISN activities and the two preclearance standards serve as a basis for such connectivity.

Table II-21
CVISN Deployment Status in CANAMEX Corridor

State	Electronic Credential Administration	Safety Information Exchange	Roadside Electronic Screening
Arizona	Not implemented	Implemented at 6% of inspection facilities for collection of data	Not implemented
Nevada	Not implemented	Not implemented	Not implemented
Utah	No response provided to FHWA	No response provided to FHWA	No response provided to FHWA
Idaho	No response provided to FHWA	Electronic collection of data only - roadside facilities not connected to safety database	No response provided to FHWA
Montana	Not implemented	Electronic collection of data only - roadside facilities not connected to safety database	5% of roadside facilities equipped for electronic screening, 3% of trucks electronically screened

Source: FHWA state reports - *"Tracking State Deployments of Commercial Vehicle Information Systems and Networks"* 1998 State Reports, published April 2000.

ITS Planning and Development

ITS planning and development activities in the CANAMEX Corridor have occurred at two levels – regional and statewide. While all of the urban regions over 100,000 in the Corridor have performed some form of ITS Early Deployment Planning Study or strategic assessment, not all the states in the Corridor have done a formal Statewide ITS Plan. Three states that have developed such a plan to date are Arizona, Idaho and Montana. Regional and statewide ITS Architecture activities are another emerging activity that has occurred in the urban areas and special regions. Regional ITS architectures have already been prepared in several locales within the CANAMEX Corridor, including Phoenix, Salt Lake City, and Yellowstone National Park.

Two new Federal Notices of Proposed Rulemaking were released in draft form in May 2000, dealing with the ITS planning and development process. Specifically, one proposed regulation (23 CFR 1410) included specific requirements for incorporating multijurisdictional, coordinated ITS programs into the transportation planning process. The other proposed regulation (23 CFR 940) requires development of statewide and regional ITS architectures (coordinated information and operational frameworks) as the technical basis for the regional ITS program development identified in ITS planning efforts. Such architectures are to be consistent with the US National ITS Architecture, originally developed in the mid-1990's and now in its third release.

In general, the direction for ITS deployment has involved provision of pre-trip information (e.g., through web sites, kiosks), real-time information (through variable message signs), road weather information systems, and urban area ITS implementation activities. Thus, there are common activities – however, they have generally not involved multi-state coordination. For the CANAMEX Corridor, as discussed previously, the coordination of information for tourists, coordination and sharing of commercial vehicle operations information, and warnings concerning incidents and weather are of great use for long distance travelers in the corridor. Collectively, such services can promote the use of the Corridor by promoting services, efficiency and safety for personal and commercial travel.

To support these activities, a coordinated CANAMEX ITS program would require an architecture framework that would provide connectivity between the current regional architectures as well as consistency with the National ITS Architecture.

Table II-22
Comparison of CVISN Deployment Between CANAMEX States and Other States

CVISN Element	Number of CANAMEX States Involved	Total States Involved
Electronic Credential Administration	None involved in end-to-end processing or connection to national clearinghouse	2 states (New York, New Hampshire) connection to national clearinghouse, none involved in end-to-end processing.
Safety Information Exchange	3 (stand-alone, not connected to SAFER database)	38 (14 connected to SAFER database)
Electronic Screening	2 states (ID, MT)	32 states

ITS Vision for CANAMEX Corridor

The CANAMEX Corridor Plan contains a series of objectives that are common to all five states in the corridor (and that have relevance to cross-border movement of people and goods as well). In addition, there are some state-specific needs that have been identified both through initial Study team reconnaissance as well as through the extensive public outreach effort completed to date. This has a resulted in a series of

"Bold Initiatives" described in Section IV of this Plan. These initiatives will require the deployment of Corridor-wide, interstate ITS that achieve common objectives for all states, communities and travelers. That "ITS Vision" is summarized below in terms of key objectives. For each objective, potential ITS benefits are described.

1) Support economic viability and competitiveness in the Corridor

   - ITS can reduce both traffic congestion and the administrative constraints and delays associated with goods movement throughout the Corridor.

   - ITS can reduce personal travel delays and provide improved information on tourism opportunities and tourist services.

2) Provide safe and efficient movement of people, goods and services

   - ITS provides the tools to improve management of the existing transportation system to reduce congestion and delays (thus improving air quality), and, through privately-developed in-vehicle technologies, reduce collisions and increase travel safety.

   - ITS can increase efficiency of goods movement through standardized preclearance and administrative processes that permit legal goods movements from border-to-border, or from border to intermodal facility, without encountering delays related to weight clearance or administrative processes in each state.

   - In conjunction with transportation infrastructure improvements, ITS can support information services for goods movement that identify truck routes, provide information to dispatchers and drivers on locations of container shipments to be picked up as well as access to those facilities.

   - ITS provides the mechanism to disseminate relevant travel and weather information to tourists and unfamiliar travelers in rural, urban and park areas in the Corridor.

3) Promote coordination of information and operational activities between the Corridor states

   - Through use of common communications and interface standards as identified through the National ITS Architecture, the Corridor can provide connectivity between different systems in the corridor that provide travel information, including traffic, incidents, weather, and traveler services.

   - Through the use of common software packages and services throughout the Corridor, as well as connectivity between different regions using both the

Internet and dedicated communications links (e.g., fiber optics), the cost of deploying similar ITS activities in each state can be leveraged over the entire Corridor.

4) Support more environmentally-friendly transportation activities

- ITS can manage transportation operations in a manner which reduces pollution.

- ITS can support use of alternative-fuel or electric vehicles through preferential traffic management activities (e.g., identifying access to downtown or community centers via dedicated lanes or routes)

Candidate ITS Programs

In addressing the National ITS Program Plan (developed by FHWA and revised in late 1999), several key Corridor themes emerge with respect to the above objectives:

- *The need for some level of coordination for traveler information throughout the full corridor, as well as data collection and analysis* – Information about weather, incidents and travel status very frequently impact travel decisions outside the states from where this information is generated.

- *The need to unify interface and communications standards for commercial vehicle functions along with sharing of information for intermodal activities* – The success of the CANAMEX initiative is largely dependent on its attractiveness as an international trade corridor. One way to increase this attractiveness is through reduction in travel and inspection delays. This is best achieved through reduction or elimination of duplicative administrative processes and through enhanced exchange of credentialing and operations information

- *The need to provide expanded traffic and incident management and information functions for rural corridors and national park areas*. Rural corridors and park facilities attract substantial tourist traffic. Response to incidents is critical, especially in those areas without adequate wireless phone coverage or where the nearest hospitals or emergency facilities can be many miles away. Additionally, national park facilities have a number of similarities to urban areas in terms of congestion and demand, including roadway and parking capacity issues.

By and large, from the earlier discussion of Urban Area ITS Initiatives, it is clear that the major urban areas in the Corridor are on their way to implementing ITS– but the sharing of data for use by intercity travelers would be highly useful, particularly for commercial vehicle operators and for tourists. The I-95 Corridor Coalition in the northeastern US has developed an initial data sharing system (the Information Exchange

Network) involving the various state DOT's. That system is in the process of becoming a real-time system. Similarly, the Southern California Priority Corridor and the Gary-Chicago-Milwaukee Corridor have developed the Showcase and Gateway systems, respectively, to provide a similar multi-regional traveler information function.

The CANAMEX Corridor provides a similar opportunity, with a greater emphasis on rural and national park area travel information to be disseminated along with urban conditions in the region. *One of the first steps toward developing the programs defined below will be establishing a system architecture framework that incorporates the other system architecture programs and systems that have been implemented or are being developed.*

In essence, many elements of the CANAMEX ITS infrastructure exist, but are not oriented beyond the regions or states in which they have been deployed. *CANAMEX ITS programs thus will emphasize the integration of, and information-sharing between, different systems in the five states.*

Two Corridor-wide programs have been proposed for the CANAMEX Corridor –Smart Tourist and Smart Freight. Both of these require some means of Corridor-wide management activities. As a precursor to these activities, a Corridor ITS Architecture Study is required to identify the requirements for coordinating the various different local, regional and state ITS programs into a cohesive whole, permitting both sharing of technologies being implemented in specific locations as well as development of Corridor-wide standards for future transportation technology deployments for tourist and freight mobility in the Corridor. The proposed Corridor ITS Architecture would be the basis for a Corridor Transportation Management and Information Network (CT-MAIN).

CT-MAIN, Smart Tourist and Smart Freight are each described below in conceptual form. More detail would be developed as part of the next phase of this effort, the development of the Corridor ITS Architecture.

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 sates 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, such as:

<u>Examples of static information</u>

- 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

<u>Examples of real-time information</u>

- 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.

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, wither 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, such as:

<u>Examples of static information</u>

- 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

<u>Examples of real-time information</u>

- weather conditions (current and forecast)
- highway blockages and anticipated delays due to construction

Figure II-10

CANAMEX Corridor

National Parks

- 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 neat 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.

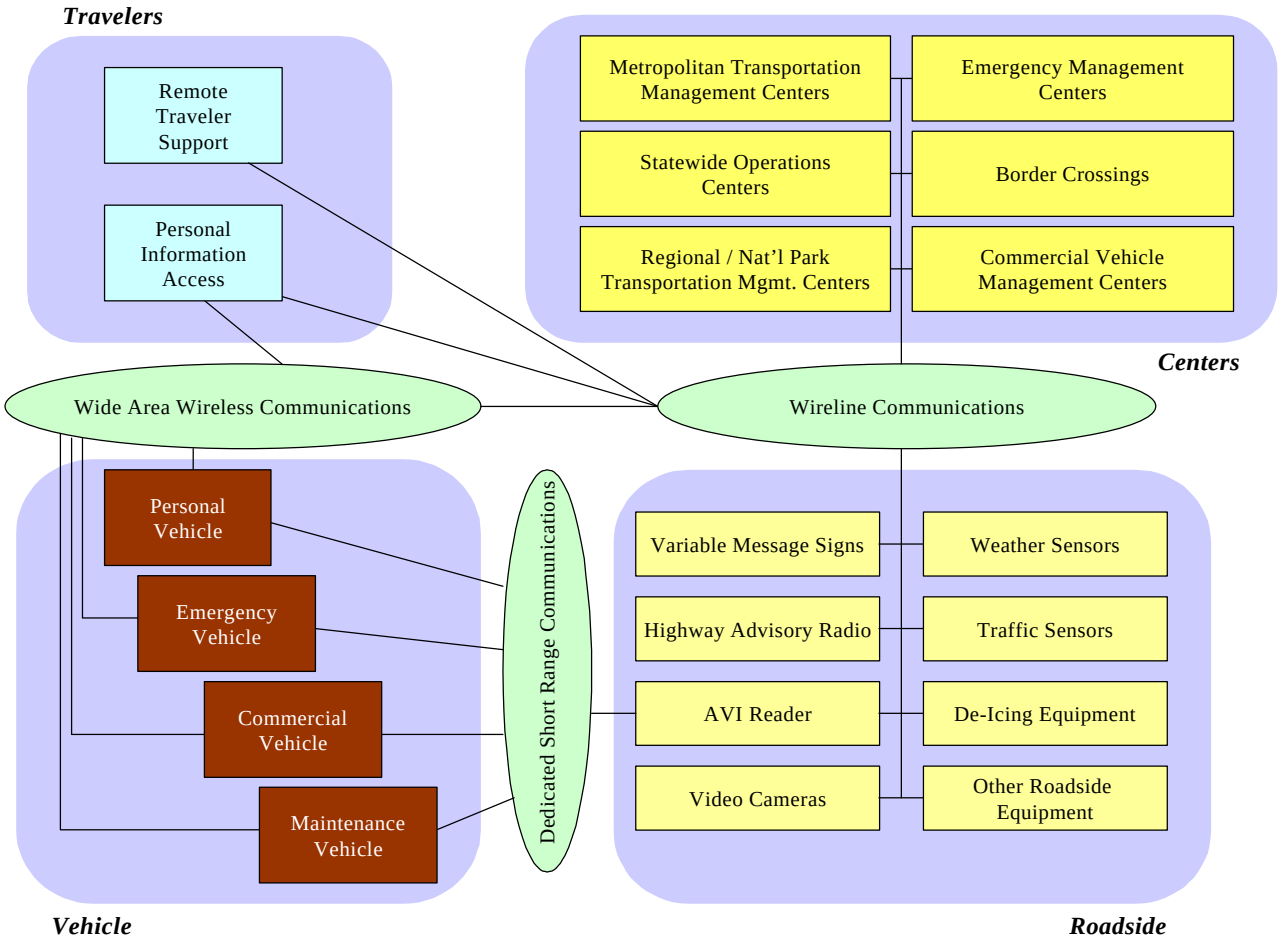
Evaluation of ITS Investment Strategies

The conceptual CANAMEX Corridor ITS Architecture is illustrated in Figure II-11 in the format of the National ITS Architecture "sausage" diagram. Included are specific statewide and infrastructure elements and a definition of users that would benefit from the various ITS activities.

Figure II-11
CANAMEX Corridor Architecture Framework

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.

It is expected that a single team would be selected for development of the Corridor ITS Architecture, with the remaining programs developed either through (a) selection of designer and later, system managers/integrators; or (b) through a design/build process that permits design and implementation to be accomplished with one team. For design/build efforts, it is recommended that a knowledgeable state agency with ITS deployment experience and expertise be utilized to oversee the work being carried out by the design/build contractor.

Deployment Assumptions for Costing Purposes

CT-MAIN - CT-MAIN is intended to serve as the component that networks all existing and new ITS deployments throughout the CANAMEX Corridor in a manner that supports integrated transportation information and management strategies for personal and freight travel. The system would include electronic sharing of real-time congestion information, weather advisories, major incidents, and other information of significant interest to long-distance travelers in the corridor (e.g., those traveling outside metropolitan areas as well as those traversing more than one state within the corridor. Partners will include current metropolitan, statewide, and national park ITS operators, and components to be connected will include Advanced Traffic Management Systems, Advanced Traveler Information Systems, and rural deployments that include incident management and weather information system activities.

Estimated costs for CT-MAIN are based on a candidate deployment which includes interfaces to state and metropolitan ITS systems (existing and future), a data warehouse function (either centralized or shared between agencies) that permits access to real-time or historical information, and a web server that provides an integrated information access mechanism oriented to tourists or commercial travelers. CT-MAIN includes both 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 - Smart Tourist 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). Future interfaces will include wireless and in-vehicle systems, provided through industry-standard communications interfaces and deployed through public-private partnering initiatives.

The cost estimate for Smart Tourist 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.

- 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. Technology may be utilized to integrate existing activities such as those in Arizona involving similar types of traveler information kiosks.

Smart Freight - Smart Freight will provide Corridor agencies with interfaces to CVO-related information to help expedite the clearance and safety checks of commercial vehicles using the corridor. The system will permit exchange of commercial vehicle data between all states in the CANAMEX Corridor through interfaces between CVISN systems. The system will be implemented through the CT-MAIN program and information will be exchanged through both CT-MAIN and Smart Tourist to provide commercial vehicle operators with route, weather and congestion information pertinent to them, as well as expediting information regarding freight movements and rail connections through intermodal centers.

Smart Freight will include interfaces with existing Norpass and PrePass electronic clearance systems, interface with Canadian and Mexican CVO information at Border Crossings, as well as the appropriate international and state clearinghouses for fees and taxes. Smart Freight, through 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 CVISN systems. (It is assumed at this time the states will develop CVISN programs in conjunction with the national initiative, not under this specific program.)

Specific cost estimate elements include information at border crossings provided as follows:

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

Providing similar information to in-vehicle information providers may be accomplished through public-private partnerships using information being generated for VMS and HAR dissemination.

Strategy Costs

The cost of the ITS strategies was estimated and distributed by state to facilitate the economic evaluation. Table II-23 reflects the capital costs for the different components. Table II-24 summarizes the capital as well as annual operating and maintenance costs by state by time period. The ITS investment should not be viewed as a one-time investment. Capital costs will recur every 10 years due to the finite life-cycle of the hardware and the constantly improving software. Both capital and annual operations/maintenance costs are in current dollars, and assume consistent levels of investment, independent of inflation.

It is also noted that these costs reflect public sector investment – much of the success of ITS in the long run will be through the ability to pass travel information to private sector information service providers, who in turn would support the various emerging in-vehicle and handheld communication technologies resulting from the expansion of wireless Internet capabilities in the coming years. The proposed CANAMEX architecture and programs will need to incorporate basic interfaces, standards, and policies related to disseminating information to service providers.

Implementing just a Smart Tourist 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 Smart Tourist, the overall costs include implementation of both the above programs, along with CT-MAIN. The 2010 capital costs total $5.4 million.

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.

Table II-23
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)				
	Total Price	O & M Cost Factor	Annual O&M	AZ	NV	UT	ID	MT	AZ	NV	UT	ID	MT
CT-MAIN Program													
TOTAL	$1,365,000	0.372	$507,750	$273	$273	$273	$273	$273	$101.55	$101.55	$101.55	$101.55	$101.55
SmartTourist Program													
TOTAL	$3,185,000	0.100	$318,500	$1,033	$373	$813	$593	$373	$103.30	$37.3	$81.3	$59.3	$37.3
SmartFreight Program													
TOTAL	$815,000	0.100	$81,500	$295	$75	$75	$75	$295	$29.5	$7.5	$7.5	$7.5	$7.5
Corridor ITS													
Development of Architecture	$250,000			$50	$50	$50	$50	$50					
TOTALS	$5,615,000		$907,750	$1,651	$771	$1,211	$991	$991	$234.3	$146.3	$190.3	$168.3	$168.3

Table II-24
CANAMEX Corridor ITS Project Costs

State	Year	Capital Cost	Annual O&M
Arizona	2010	$1,601,000	$234,350
	2020	$1,601,000	$234,350
	2030	$1,601,000	$234,350
	Subtotal	$4,803,000	$703,050
Nevada	2010	$721,000	$146,350
	2020	$721,000	$146,350
	2030	$721,000	$146,350
	Subtotal	$2,163,000	$439,050
Utah	2010	$1,161,000	$190,350
	2020	$1,161,000	$190,350
	2030	$1,161,000	$190,350
	Subtotal	$3,483,000	$571,050
Idaho	2010	$941,000	$168,350
	2020	$941,000	$168,350
	2030	$941,000	$168,350
	Subtotal	$2,823,000	
Montana	2010	$941,000	$168,350
	2020	$941,000	$168,350
	2030	$941,000	$168,350
	Subtotal	$2,823,000	$505,050
Total	2010	$5,365,000	$907,750
	2020	$5,365,000	$907,750
	2030	$5,365,000	$907,750
	Total	**$16,095,000**	**$2,723,250**

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 Corridor 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

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

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 percent 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. Rural routes, particularly in isolated areas, are highly vulnerable to closures as well, so this type of information is also highly valuable, and can reduce delays to travelers as well.

Advance Weather Information - Estimates with respect to advanced weather information services provided in Finland yield an approximate benefit-cost 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 percent for transponder-equipped vehicles, and may range from 30

seconds per non-equipped vehicle (at 20 percent market penetration) to 8 minutes per non-equipped vehicle (at 80 percent 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 plus Smart Tourist: 40 percent 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 plus Smart Freight: 40 percent 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 alone: 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. There is also a 5.4:1 benefit-cost ratio for border crossing related ITS improvements, based on prior operational tests performed for initiatives at the US-Canada border.

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

Table II-25 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 costs serve as inputs to the economic evaluation.

Table II-25
Annual CANAMEX ITS Project Benefits

	Total	Arizona	Nevada	Utah	Idaho	Montana
2010						
VHT Reduction (millions)	**17.99**	**5.62**	**1.23**	**10.98**	**0.07**	**0.08**
Accident Cost Reduction ($) - incident info	**$ 7,600,864**	**$ 2,443,626**	**$ 1,239,974**	**$ 3,430,183**	**$ 237,211**	**$ 249,871**
Estimated Benefit($) - weather info	**$ 1,050,000**	**$ 337,568**	**$ 171,293**	**$ 473,853**	**$ 32,769**	**$ 34,518**
2020						
VHT Reduction (millions)	**49.43**	**10.65**	**2.46**	**36.06**	**0.12**	**0.15**
Accident Cost Reduction ($) - incident info	**$ 14,293,006**	**$ 3,693,164**	**$ 1,993,760**	**$ 7,963,654**	**$ 306,590**	**$ 335,839**
Estimated Benefit($) - weather info	**$ 1,050,000**	**$ 271,309**	**$ 146,467**	**$ 585,030**	**$ 22,523**	**$ 24,672**
2030						
VHT Reduction (millions)	**123.20**	**19.81**	**5.59**	**97.38**	**0.19**	**0.23**
Accident Cost Reduction ($) - incident info	**$ 27,554,576**	**$ 5,822,055**	**$ 3,693,647**	**$ 17,232,071**	**$ 386,571**	**$ 420,234**
Estimated Benefit($) - weather info	**$ 1,050,000**	**$ 221,856**	**$ 140,751**	**$ 656,649**	**$ 14,731**	**$ 16,014**

Long Term ITS Opportunities

Over the next 20 to 30 years, it is difficult to predict the nature of both transportation and communication technologies. Ten years ago, at the outset of the national ITS initiative, there were no written references to the emergence of the Internet infrastructure as a nearly universal means of transferring electronic information between individuals, businesses, and public agencies. This has substantially reduced the investment required for a transportation-related communications infrastructure particularly as it relates to traveler information services.

Future advances will build on the emergence of several technologies in the next several years:

- Extensive use of wireless Internet standards for transfer of data and information to travelers (tourist and commercial operators) through in-vehicle or handheld information tools.

- Integration of common payment systems utilizing mobile telephones or integrated smart cards, supporting common media for parking payment, transit usage, and road tolls (where applicable), particularly in metropolitan areas

- Implementation of intelligent in-vehicle sensor systems that reduce accidents through sensing of unfavorable driving conditions, objects in the road, or enhancing driver capabilities (e.g., collision warning systems, automated cruise control to maintain safe vehicle headways, and night vision support systems, currently available in some higher cost luxury cars)

- New technologies for vehicle propulsion, e.g., gasoline-electric hybrids, hydrogen, natural gas powered-vehicles

- More universal implementation of in-vehicle service systems such as GM's OnStar, which include GPS tracking services, provide automatic dialing of emergency dispatch centers in the event of an accident (air bag deployment), and provide mobile connections to OnStar service centers in which operators assist in route guidance and travel information.

- Expanded programs that promote the transfer of container shipments from trucks to rail facilities, particularly in congested corridors

Longer term opportunities may include the ability to utilize CANAMEX travel information to assist in automated travel navigation systems within the vehicle, as well as to support automated control of vehicles. The latter would require improved vehicle sensing of travel conditions as well as the ability to analyze downstream travel information within the vehicle.

Public agencies increasingly will utilize automated maintenance tools, such as automatic road and bridge de-icing systems as have been tested in a number of locations, including Utah. Automated guidance for snow plow operations will result in more efficient and safe plow paths relative to vehicle lanes. These vehicles increasingly are being tracked using GPS-based Automatic Vehicle Location systems, permitting more efficient management of resources.

Intelligent public transportation services may become more common in populated areas as well as in activity centers such as National Parks. Tools such as self-guided compact tour vehicles using electric or other reduced-emissions propulsion media may be useful for traveling through National Parks as a means of eliminating automobile and bus travel within the park and reducing pollution.

In small metropolitan areas, in lieu of less cost-effective fixed-route transit services, smart shuttles can provide personalized transit services based on personal schedules, origins and destinations. These shuttles could provide, through advanced dispatch and vehicle tracking capabilities, quick-response services without substantial advance planning.

"Station cars" (electric or alternative propulsion media) may permit rail or bus travelers in metropolitan areas to access a nearby final destination in a flexible fashion. Such

technologies are being tested in Europe and Japan as well as on a more limited basis in Northern California. Such services are particularly useful for individuals not living in metropolitan areas but requiring some kind of transit service to reach places of employment that might be within metropolitan areas.

RAIL AND AIRPORTS

This transportation assessment extends beyond just road infrastructure for moving people and goods. It includes an appraisal of other major existing modes, namely rail and air. The assessments of these modes identify current conditions and future issues that need to be considered.

Existing Rail Service

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 of 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 MGTM/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 MGTM/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 MGTM/M Great Falls to Shelby, and less than 5 MGTM/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.

Rail Route Issues

CANAMEX Rail Corridor issues are best understood by breaking 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 one, two or more days 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.

While Phoenix is comparatively near Las Vegas by highway, it is a long way from Las Vegas by rail. This is because there is no direct line between the two cities that follows a course similar to US 93. Nevertheless, there are three possible combinations of 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 MGTM/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 MGTM/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. A 66-mile UP route to Nogales from Tucson provides the southern connection. The Nogales line connects to Grupo Ferroviaria Mexicana (GFM) and the Mexican rail system in Nogales.

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 the 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.

Competition with CANAMEX Rail Corridor

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 CAMAMEX 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, and there are no plans to relocate the rail line. 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 study[1], this relocation would 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. However, at the time of this writing, UP continues to operate on the existing alignment and no plans are in place to relocate the rail line.

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 stacked one on top of another. Articulated five-unit double-stack cars can handle up to 10 40-foot-plus containers.

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

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.

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 Phoenix 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, Phoenix and Salt Lake City. A Tucson facility was 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, AZ and Shelby, MT.

From the lists above, it is 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.

Amtrak

Amtrak currently has four regular passenger service routes that cross the CANAMEX Corridor. Currently, there is no Amtrak service along the CANAMEX Corridor itself. The four routes that cross the Corridor, from north to south are: the *Empire Builder* between Seattle/Portland and Chicago on BNSF: the *California Zephyr* between the San Francisco Bay Area and Chicago on UP through Salt Lake City; the *Southwest Chief* between Los Angeles and Chicago on BNSF; and the *Sunset/Texas Eagle* between Los Angeles and Jacksonville, Florida, on UP via Tucson.

The north-south service, provided by Amtrak to the west of the CANAMEX Corridor, is the *Coast Starlight* between Seattle and Los Angeles; and to the east of the Corridor, service is provided between San Antonio and Chicago.

There is potential for north-south service in selected segments of the CANAMEX Corridor, e.g. Los Angeles-Las Vegas-Salt Lake City and Phoenix-Tucson-Nogales. However, given light population densities and lack of good, direct through rail routes, complete service along the CANAMEX Corridor is unlikely.

Local Rail

Several communities along the CANAMEX Corridor are implementing local rail service. Salt Lake City has an initial 14-mile North-South Light Rail "TRAX" system operating. A spur line from downtown, east to the University of Utah is presently under construction. An extension of the North-South line and additional spur lines have been planned. Utah has recently committed $100 million in funding to move forward on a 120-mile Commuter Rail link between Ogden-Salt Lake City-Provo. Total cost estimates for the commuter rail program are $300 million.

Phoenix recently passed a referendum to fund light rail in the metropolitan area. Private developers in Las Vegas are moving forward with construction of a 3-mile monorail along "The Strip".

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. 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 will go to one or another 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. This would 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 originating in Alberta, Canada and headed for manufacturing or assembly plants in Sonora, Mexico or Sonora products bound for Calgary, Edmonton or Regina.

To facilitate these moves, CANAMEX states should encourage the four US railroads in the CANAMEX Corridor to craft marketing and operational agreements that would minimize the potential delays caused by 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.

The need for rail service as an alternative to the predominant highway/truck mode will increase as the CANAMEX Corridor states grow and freight flows increase. The next step is to encourage the four railroads to improve coordination of service and to minimize delays on existing routes. Continued evaluation and improvement of rail connections at the Mexican and Canadian borders should be pursued.

Airports

The CANAMEX Corridor includes four (4) airports listed in the Airport Council International's top 100 US Airports for total passengers and cargo activity. The 1990 and 1998 data for enplanements and air cargo for the commercial airports along and adjacent to the CANAMEX Corridor are listed in Table II-26 below. The four international commercial airports along the corridor are also identified in the table.

Not all airports are ideally located for truck access. Though located near I-10, Phoenix Sky Harbor Airport is surrounded by development and served by an existing surface street system through which trucks destined for the airport must maneuver. The other major airports in the Corridor are served by interstate highways that connect directly into the terminal or cargo areas. The Corridor's smaller airports have significantly less of a truck access issue.

Planned Airport Improvements

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 additional 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 air cargo activity at the major airports in the Corridor, rural airports provide emergency response, improved safety and prompt cargo delivery capability for the rural portions of the Corridor. Many rural areas throughout the Corridor have limited access to convenient air service. Convenient air service is essential to rural area economic development because such service supports many aspects of electronic commerce and enables a larger population to enjoy a rural lifestyle while being connected to larger business centers. Investment in these smaller

community airports is important in order to maintain the economic viability of the more rural portions of the CANAMEX Corridor.

Table II-26
Commercial Airport Activity

Airport (International)	Code	Aircraft Opns 1998	Total Passengers		Air Cargo (Metric Tons)	
			1990	1998[1]	1990	1998[1]
Along CANAMEX Corridor						
Tucson, AZ (Intl-Commercial)	TUS	266,428	2.6 Million	3.5 Million (68)	17,300	35,629 (82)
Phoenix-Sky Harbor, AZ (Intl-Commercial)	PHX	519,663	21.7 Million	31.8 Million (9)	114,200	332,638 (27)
Kingman, AZ	IGM	1,040	2,372	2,680	-------	-------
McCarran-Las Vegas, NV (Intl-Commercial)	LAS	470,707	18.6 Million	30.2 Million (14)	30,300	73,846 (58)
St. George, UT	SGU	10,190	13,673	26,447	-------	-------
Cedar City, UT	CDC	8,393	5,762	7,649	-------	-------
Salt Lake City, UT (Intl - Commercial)	SLC	366,171	11.2 Million	20.3 Million (26)	115,700	249,838 (31)
Pocatello, ID	PIH	16,075	31,000	39,579	-------	-------
Idaho Falls, ID	IDA	26,399	123,033	119,199	-------	-------
Butte, MT	BTM	11,578	32,578	43,836	688	100
Helena, MT	HLN	15,740	51,455	74,528	638	667
Great Falls, MT	GTF	21,454	116,443	125,747	1,212	852
Adjacent to CANAMEX Corridor						
Sierra – Vista, AZ	FHU	5,944	10,555	10,528	------	------
Prescott, AZ	PRC	5,127	9,932	7,844	------	------
Laughlin – Bullhead City, AZ	IFP	5,663	50,216	29,912	------	------
Twin Falls, ID	TWF	9,344	36,627	32,396	------	------
Bozeman, MT	BZN	37,572	127,977	217,308	370	386

Sources: Airport Council International Statistics; Federal Aviation Administration; State DOTs
[1] Number in parentheses is ACI Ranking for US Airports
[2] Montana Cargo Data from 1993

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 their existing airports have physical constraint to expansion to

accommodate demand growth. This Mesquite to St. George portion of the Corridor is projected to have a very high growth rate. Additional passenger and cargo capacity will be required within the 30-year planning horizon. Evaluation of a single, joint location for both communities in the tri-state (NV, AZ, UT) area may be beneficial.

McCarran International in Las Vegas is also constrained from additional expansion. Las Vegas is moving to accommodate future demand growth by purchasing property around Ivanpah Valley Airport south of Las Vegas. To maintain the viability of long-term airline service for Las Vegas, Ivanpah Valley (approximately 32 miles south of Las Vegas) has been selected after several years of study to be developed for full commercial operation. The site is near I-15 and the Union Pacific railroad tracks. Clark County has identified $60 million, initially for purchase of the property. The Air Space Utilization Plan for the new airport is currently being conducted.

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

Major Improvements - The following paragraphs highlight some of the major improvements committed or projected at Corridor airports.

Tucson International - Tucson International Airport has initiated construction of a $66 million terminal expansion and rental car facility upgrade scheduled for completion in 2003. Other projects include land acquisition for noise abatement ($11.0 M), land acquisition for parallel runway ($4.2 M), apron and taxiway reconstruction ($2.8 M), taxiway construction ($3.2 M), access road and taxilane construction ($0.6 M) and apron construction ($1.4 M).

Phoenix - Sky Harbor - Phoenix Sky Harbor International Airport has been undergoing an aggressive expansion program that includes 78 construction projects, at a cost of $619 million. A third runway south of the existing South Runway was 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 the Economy Parking lot 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 growth, a new 172,600 SF Cargo facility opened in 2000. Renovation and reuse of existing cargo facilities are 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 M), land acquisition for noise abatement ($5 M), land acquisition for access ($80 M), common rental car facility ($60 M), drainage / storm-water improvements ($5 M) and taxilanes and utilities (Westside hangar) ($1 M).

Cargo activity at McCarran Airport has nearly doubled in the past six years. In 1995, the airport handled 56,685 tons of cargo. This year (2000) the projection is for the airport to handle 108,185 tons of cargo, a 91 percent increase. Despite the increase in cargo activity, the airport's capacity is based on the number of passengers that the airport can accommodate. This capacity of approximately 55 million passengers is anticipated to be reached in the year 2012.

There are presently four runways at McCarran. Being surrounded by the Las Vegas Strip, a college campus, extensive residential, industrial and commercial development, interstates and railroads, further expansion of McCarran would be very costly. Existing expansion plans will sustain the airport for short and mid term planning horizons.

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 Improvements

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 ($770 K) 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. *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 ($3.2 M) and taxiway ($850 K).

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).

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.

Airport Issues Summary

The major airports along the CANAMEX Corridor have substantial passenger and cargo activity and need to expand to keep pace with passenger and cargo volume growth. Investment should continue to accommodate the expected growth and to improve the highway / rail access to the cargo facilities at these airports. Smaller airports in rural communities enhance the safety, efficiency and emergency response of the rural areas of the Corridor. Investment in these airports should continue to maintain the viability of essential air service critical to economic vitality.

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 of the Corridor Plan 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 though 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 1-19 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. The life expectancy of Nogales III will probably not change substantially considering the anticipated growth in trade.

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 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-27 shows the different requirements for trucks traveling along the corridor. Longer Combination Vehicles (LCV or "triples") are also listed in the table.

Table II-27
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	--	--
Mexico	136,600	--	--

* 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 Mexican 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.

International 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.

Little progress in implementing the provisions of NAFTA, concerning cross-border trucking, has been made. No specific dates or timelines exist for the elimination of existing restrictions. The methods for processing and transporting goods across the borders continue to be accomplished in the same manner as has been in place since the 1980s. The US negotiators are moving to ensure that when the border is opened to tri-national trucking, that the concerns over public safety, detriment to US roadways and inundation of international trucking are fully alleviated.

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.

Studies and Initiatives

The signing of the NAFTA on December 17, 1992 forced government and the private sector to seriously reevaluate trade connections at the international borders. In the subsequent years, a large number of task forces were organized and studies conducted related to improved efficiency at international ports of entry. Ports of entry along the southwest border received most of the attention of these efforts.

These studies included:

- ISTEA Sections 1089 & 6015 Assessment of Border Crossings and Transportation Corridors for North American Trade, 1993.
- Arizona Trade Corridor Study, 1993.
- Border Infrastructure and Facilitation (interagency) Task Force, Recommendations for Improved US Border Operations, 1994.
- Arizona Port Efficiency Study, (APES) 1997.
- Bi-national Planning and Programming Study, 1998.
- Interagency Task Force on the Economic Development of the Southwest Border, Empowering the Southwest Border Communities to Meet the Challenges of the 21st Century, 2000.

Many of these studies made similar recommendations. Most of these recommendations are still valid. Some of the findings and recommendations included:

- Arterials leading to border crossing sites are under stress and will probably not be able to handle the significant greater amounts of traffic. Improvements will be needed.
- Delays in traffic, air quality, safety risks associated with commercial vehicles and deterioration of infrastructure will negatively affect border communities.
- Delays at borders are due to trade volumes, inspections requirements, lack of traffic management and cargo clearance procedures.
- Infrastructure and facilitation planning is fragmented and inadequate. Planning should be bi-national and apply to northern and southern borders.
- The harmonization of border crossing procedures and inspection criteria.

- Operational improvements; e.g. coordination of hours of operation, staffing levels, paperwork processes, and the use of automated systems and new technologies.
- Redesign and restructure of the Mariposa commercial cargo facility; including the redirection of traffic flows, deployment of Superbooths and the increased participation in Gate-to-Gate programs.
- Develop a dedicated commuter lane (DCL) at the Mariposa passenger facility.
- The law enforcement community should continue to work with federal, state and local partners and build on existing relationships with the government of Mexico to reduce crime along the border and to advance cooperative efforts with an aim towards creating a stable environment for economic growth and prosperity.
- Continue to support the *Border Coordination Initiative* as the primary means for increasing agency coordination and effectiveness along the Southwest Border
- Develop a comprehensive strategic plan for the Southwest Border Region that encourages sustainable economic development.

North American Trade Automation Prototype (NATAP) was a demonstration project of the North American trade processes and systems of Mexico, the United States, and Canada and how it could function more effectively through the use of common data elements, documents and processes for commercial customs clearance. NATAP was the closest attempt to the development of harmonized customs processes. NATAP proved a success in many ways, but the ultimate concept of harmonizing customs processes has been substantially abandoned in North America.

The only initiative currently being explored is the G7 Customs Initiative. In June 1996 the G7 heads of state launched an initiative for the harmonization and simplification of Customs procedures at the global level. The United States and Canada are involved in this program. Mexico has accepted the concept even though it is not a G7 nation.

Current Institutional and Regulatory Environment

United States land ports do not utilize a true pre-clearance process. The trader submits import data to US Customs via the Automated Broker Interface (ABI). Goods are not released for entry into the United States, however, until the conveyance is presented at the US port of entry. Until they are released, Customs officials may request to inspect the goods for any irregularities they identify.

In Nogales, Arizona, customs brokers actually operate at the Mariposa port of entry. They provide customs documentation to the truck driver as he approaches the primary inspection booth. A majority of these transactions import agricultural commodities. The carriers that transport Mexican produce into the United States are typically owner-

operators or otherwise, small motor carriers. In many instances, the grower provides his own trucks.

In Mexico, the system is more closely identified with a pre-clearance process. All the customs information is submitted to Mexican Customs prior to the entry. All tariffs and duties are to be paid prior to the arrival of the goods at the port of entry.

A primary difference between the two systems is that the Mexican Customs inspects cargo based on a computer generated random selection of conveyances. After the conveyance is inspected, it must submit to the random selection system again. If it is selected again, then an independent inspection company performs a secondary inspection.

The Arizona Department of Agriculture (ADA) performs many of its inspections in Mexico. ADA inspects fruits and vegetables south of border pursuant to agreements with produce facilities in Nogales. This cooperation expedites the movement of goods through the port of entry. There exist other cooperative possibilities, such as the issuance of commercial vehicle permits and vehicle inspections, that could streamline the processing of commercial vehicles at the port of entry.

Transportation Environment

United States and Canada permit motor carriers to freely operate in each other's countries. In addition, motor carriers domiciled in one country may establish a motor carrier in the other country for purposes of delivering domestic and international freight. Pursuant to NAFTA, these same rules were to apply to all three countries by the year 2000. However, due to disputes between the United States and Mexico, motor carriers domiciled in one country are not permitted to operate in the other country except for small commercial zones within the United States.

United States and Canadian motor carriers register, license and pay fuel taxes in both countries with little if any differences. Many carriers providing international services are also members of the International Registration Plan (IRP). The IRP provides a system that allows motor carriers to provide registration information and funds to a single home state. The home state then distributes the registration fees to those other member states in which the motor carrier operates. All of the CANAMEX states in the United States and Canada are members of IRP. The registration of motor carriers and their vehicles is a matter of federal jurisdiction in Mexico. There have been efforts to include Mexico in the IRP. These efforts have not succeeded thus far. Incorporating Mexico into the IRP would bring substantial administrative savings to both carriers and states. It also presents an excellent opportunity to harmonize the registration process in North America.

Mexican motor carriers that operate in the commercial zone in Arizona utilize two means of registering their vehicles. A trip permit allows the carrier to enter Arizona and return the Mexico for a single trip. The other means for registering a commercial vehicle is to obtain an annual registration and fuel tax license.

All motor carriers are required to adhere to motor carrier safety regulations. The Arizona Department of Public Safety (DPS) inspects Mexican motor carriers entering the United States at the port of entry. DPS inspects as many commercial vehicles as their resources will permit.

The process for moving goods across the border involves multiple motor carriers. This is due to the restriction of the movement of Mexican trucks to the border commercial zones since 1980 and the exclusion of US carriers from Mexico. The typical movement of goods across the southern border includes three separate motor carriers. The first carrier delivers the goods to the origin side of the border. The second carrier, commonly referred to as a drayage carrier, transports the goods from one side of the border to the other. The third carrier transports the cargo from the border to its destination.

Initially, NAFTA was intended to eliminate this problem by allowing Mexican, US and Canadian motor carriers to pick up and deliver cargo in the United States and Mexican border states. NAFTA permits Mexican motor carriers to establish operations in the United States for the sole purpose of transporting international cargo between points in the United States. NAFTA provides the same authority to US and Canadian carriers investing in operations within Mexico.

The old system has been sustained due to the delay in the implementation of NAFTA. Implementation of the terms of NAFTA will greatly reduce congestion and improve the efficiency of all aspects of moving cargo across the southern border.

Motor carriers are concerned with the security of their equipment, drivers and cargo. The United States and Mexico have serious problems with the hijacking of commercial shipments. In the United States this problem is concentrated in ocean ports, while in Mexico, the problem is prevalent. Security could be greatly improved through an effective means of the cross-border exchange of information regarding stolen cargo, by reducing Cellular dead spots throughout the CANAMEX Corridor; and by developing safe and secure rest stops along the CANAMEX.

One of the disadvantages to using CANAMEX Corridor to transport cargo from central Mexico to the United States is the length of time the cargo remains in Mexico. The distance between central Mexico and Laredo or El Paso is half that distance from central Mexico to Nogales. Exporters and importers want to reduce the amount of time the goods remain in Mexico due to security concerns.

Institutional Programs

There are currently a number of programs designed to reduce the institutional barriers at border ports of entry. Some of the most relevant to CANAMEX are described below.

Border Release Advanced Screening and Selectivity (BRASS) is a program in which the cargo is released from Customs at the primary inspection without need for further inspection of documents or the conveyance. BRASS is intended to expedite the clearance of cargo by having the importation information submitted to customs prior to the conveyances arrival at the port of entry.

Canada Customs Self Assessment Program (CSA) (Spring 2001) is a pre-screening system that requires that the importer, the carrier, and the driver all be participants in the program.

Customs Automated Forms Entry System (CAFES) is a pilot project for a new automated option for In-Bond cargo. The new system will use "2D" bar codes on the current In-Bond document (Customs Form 7512). It is hoped that this will expedite the data capture and release for in-bond cargo.

International Trade Data System (ITDS) is a project for the development of a system to collect all information for the US Federal processing of trade that crosses our borders. The concept is that all trade data will be submitted in a single transmission to the Federal government. Important goals of the ITDS are conversion to electronic interchange of trade data between the trade community and the US Government.

Border Coordination Initiative (BCI) is a plan developed by the US Customs and the INS for increased cooperation on the Southwest Border to enhance the interdiction of drugs, illegal aliens, and other contraband.

Canada Customs Accelerated Customs Release Operations Support System (ACROSS) and Other Government Departments (OGD): ACROSS uses advanced electronic technology to streamline the way goods are imported into Canada. Under ACROSS, importers and brokers exchange information electronically with Canada Customs thereby removing the requirement to present hard copy release packages. Further enhancements to ACROSS introduced the capabilities of allowing traders to transmit release information to other government departments (OGD).

Commercial Vehicle Operations Traffic Management System (EPIC 2) involves the installation of AVI readers at control locations throughout the Mariposa port of entry. The primary focus of this project is to monitor and control the movement of commercial vehicles throughout the facility.

One of the biggest reasons for the failure of automated systems at the international borders has been the lack of participation of traders, carriers, and other parties. The original EPIC project is a good example. The project only registered an average of 2.9 events per day for 92 days. This did not provide sufficient data to properly test the effectiveness of the system. Therefore, the enrollment of participants in ITS and other automation projects must be considered a critical element in the planning and evaluation of any project.

Regulatory Programs

The three North American countries have been striving to harmonize trade regulations since the passage of NAFTA. The primary focus of these harmonization efforts has been in the area of transportation safety. The only substantial effort made to harmonize customs procedures was the NATAP program. Each country is now developing its own automated customs programs and there does not appear to be any discussion related to the harmonization of customs regulations.

The United States and Canada began the process of harmonizing transportation safety regulations after the passage of the United States – Canada Free Trade Agreement. Those efforts have been largely successful. Harmonization with Mexican motor carrier safety standards has been a more difficult task.

To facilitate the harmonization of transportation regulations and laws, NAFTA created the Land Transportation Standards Subcommittee (LTSS). In addition, the three Secretaries of Transportation agreed to the creation of the Transportation Consultative Group (TCG) to identify and harmonize other irregularities in transportation. The work of the LTSS has been moderately successful. All three countries have agreed to recognize the validity of the their respective commercial drivers licenses (CDL). They negotiated reciprocity of driver's medical standards. In July, 2000, Mexico issued its first standards related to the minimum safety standards of commercial vehicles. In addition, Mexico has recently passed standards related to log book requirements for drivers operating in Mexico.

Potential Opportunities

The following projects/tasks should be pursued or reinforced to improve efficiency along the CANAMEX Corridor:

- improved access from Nogales III to I-19.
- continued coordination between US, Mexican and Canadian officials and inspectors over inspections, automated pre-clearance, documentation and hours of operation.
- improved truck storage near the ports.

- priority for international ports of entry for ITS and other automation projects. Automation has proven very effective in reducing trade barriers due to its need for the harmonization of standards.

TRANSPORTATION FUNDING

Every state faces its own transportation funding issues. Maximizing potential federal funding sources is something to be considered at this strategic planning stage. As projects develop, there may be opportunities for public/private partnerships or innovative financing techniques. At this stage in the planning process, a review of how proposed projects would be viewed from the federal level is timely and appropriate.

By Federal Fiscal Year (FFY) 2003, it is estimated that the CANAMEX states will receive on average an estimated $227 million per year per state as a result of Transportation Act for the 21st Century (TEA-21) Title I (Federal-Aid Highways) funding. What the next reauthorization will bring is unknown, but trends show increased funding with each reauthorization. Therefore, current FFY 2003 estimates are referenced as an indication of what at least could be expected on an annual basis.

The highway and ITS projects that are part of the CANAMEX improvements are eligible for federal funds under many programs. Major discretionary programs include the Sections 1118 and 1119 National Corridor Planning and Development and Coordinated Infrastructure Program (Corridor and Border Program), the Section 5208 ITS Integration Program and the Sections 5209 and 5203 (b)(6) ITS Commercial Vehicle Infrastructure Deployment Program. Summaries of these programs and recent awards can be found on the FHWA web site (http://www.fhwa.dot.gov/discretionary). Though projects are eligible for different funding programs, each state has other significant highway improvement projects, off the CANAMEX Corridor, which will also compete for these funds. CANAMEX Corridor projects will be prioritized in the typical manner used within each state. Most of the *planned* projects submitted in this report do not have funding sources identified. These projects along with the new *proposed* projects will be increase the funding deficiencies within each state, which will increase the need to identify new sources of highway improvement revenue.

Implicit in the Corridor and Border Program selection criteria is multinational and multistate cooperation. A coordinated approach, considering the other transportation needs of each CANAMEX state, needs to be taken to determine what program to pursue for funding of CANAMEX projects. Some general suggestions include:

- incorporation of ITS improvements into conventional roadway improvements or reconstruction, rather than as stand alone projects;
- coordination of regional metropolitan needs along the Corridor; and
- joint development of ITS projects by CANAMEX states;

Other multi-state corridor studies have successfully transitioned into subsequent planning stages with federal funds. Three examples are the I-35, I-5 and I-69 trade corridors. Both the I-35 and I-5 projects have received several grant awards in FFY 1999, 2000 and 2001 for road and interchange design, ITS project implementation and/or study, environmental studies and initial planning studies. While the I-69 corridor is focusing on highway projects, the other two corridors are pursuing a combination of ITS and highway improvements.

The Corridor and Border Program has provided much-needed front-end planning monies as well as money to fund implementation. With the next reauthorization imminent, CANAMEX states should be aware that it is unlikely that current funding levels of the Corridor and Border Program will be adequate as corridors that have received planning money now transition into more costly implementation. To improve the federal funding outlook, CANAMEX states can:

- lobby the American Association of State Highway and Transportation Officials (AASHTO) to support continued funding of the Corridor and Border Program; and
- submit an engineering project for funding through TEA-21.

Many high profile projects such as I-69 and 1-35 are further along in the planning/implementation process. CANAMEX states would be in a more favorable funding position if investment in the CANAMEX Corridor was more advanced. Once a commitment is made to start funding implementation, it is more likely that funding will continue. Therefore, CANAMEX states should identify a suitable project for which to request implementation funds.

In the coming years the ITS funding outlook is likely to place even more emphasis on construction projects. Money for planning is likely to stay at current levels, but interest at the federal level and increases in funding are expected to focus on construction. ITS funding is typically earmark funds, so it is important for CANAMEX states to have their congressional delegations actively support funding requests. Hence, it would be prudent for the CANAMEX states to seek funds for the system architecture as soon as possible so that emphasis during the next reauthorization would be on implementation. A sizeable local state / local match also improves ITS fundability. The match can be hard cash or a supporting ITS project that is being implemented without federal funds.

In addition to traditional federal assistance there is the Transportation Infrastructure Finance and Innovation Act (TIFIA) that provides federal credit assistance to major transportation investments of critical national importance, including expansion of multi-state highway trade corridors. An eligible project must cost at least $100 million or 50 percent of the state's apportionment of Federal-aid funds, whichever is less. The amount of federal credit assistance cannot exceed 33 percent of total project costs.

Another way to improve the potential for federal funds is to have a significant local share contribution. This may require an increase in state revenues, the primary source for which is the gasoline tax. With the exception of Arizona, all the CANAMEX states have state gas tax rates above the national average of 22.2 cents.

In summary, even though the mechanisms for financing transportation improvements have increased and changed in the last decade, federal funds remain a substantial component of transportation financing. The highway and ITS projects that are part of the CANAMEX Corridor improvements are eligible for federal funds under many programs. A coordinated approach within and between CANAMEX states will facilitate funding opportunities.

III: INTO THE INFORMATION AGE AND BEYOND

INTO THE INFORMATION AGE

The United States economy has been undergoing a transformation from the industrial age to the information age. The industrial age was best symbolized by the assembly line production techniques initially popularized by Henry Ford. It had a hierarchical production structure with industrial workers performing routine and repetitive tasks. It led to the creation of massive industrial plants and large urban populations to sustain those plants. At the beginning of the 20th century, two-thirds of working US citizens earned their living by making "things," many of which were manufactured in these large industrial plants.

Today, due to changing technology, two-thirds of working US citizens earn their living by processing information and making decisions. The technology changes of the last half of the 20th century have intensified global competition. The globalization of commerce, pushed by relentless market competition, has caused the United States and world economies to change in several fundamental ways:

- The production of commodities that still require a substantial labor component largely have moved to lower labor cost Third World countries

- To offset the higher labor cost in this country, we have developed production techniques that are more knowledge and capital intensive and less labor intensive.

- Being at the forefront of this information revolution, US firms have a competitive advantage in knowledge intensive industries and are able to export that knowledge on a worldwide basis.

- Third World countries have been able to leap frog several generations of technology change experienced by the US and Western European countries. The narrowing income gap has favorable international tourism implications for the CANAMEX states.

- The national economic boom of the past eight years has resulted in severe labor shortages in many of the Western states. The job opportunities in CANAMEX states like Arizona, Nevada and Utah have attracted many foreign in-migrants. The increase in the numbers of bi-cultural and/or multi-lingual Americans facilitates American business penetration of foreign markets.

The transformation into the information age has been accelerated by network connections that allow more direct access to information. The power of accelerated access to more market information has allowed businesses and individuals to make more cost effective and therefore more productive decisions.

THE FIVE STATE REGION

The economies of five CANAMEX states have entered into this new technology driven information age at varying levels of intensity. Utah had a long tradition in software development, but Montana has more recently begun to participate in high technology manufacturing. Led by Nevada and Arizona, this five-state region has grown rapidly in population. The CANAMEX Corridor region now has 11.3 million residents as compared to 6.8 million only 20 years ago. Nevada's population increased by two and one-half times over this period, and Arizona's increased by 80 percent. In terms of absolute growth, the southern states in the Corridor are growing much faster than the northern states. The total employment in this region now stands at 6.5 million.

Population (1,000)	**1980**	**2000**	**Growth**
Arizona	2,738	4,927	2,189
Nevada	810	2,065	1,255
Utah	1,473	2,158	685
Idaho	948	1,272	324
Montana	789	905	116
Total	**6,758**	**11,327**	**4,569**

Source: Department of Commerce

A brief discussion of the economy of each state is presented below.

ARIZONA

Arizona has transformed during the past 50 years from an economy based heavily upon agriculture and mining, to a diversified mix of rural and urban businesses covering virtually every sector. Agriculture alone accounted for nearly a quarter of the state's earnings as recently as 1955, while today it accounts for about three percent. Since the mid 1960s, Arizona's economy has transformed into something similar in composition to the nation as a whole. The state differs in its greater emphasis on services, construction, and real estate and its comparatively lower share of manufacturing activity.

The Phoenix and Tucson metro areas accounted for approximately 82 percent of population growth in the state since 1980. They also accounted for almost 95 percent of Arizona's employment growth during the 1980s, and nearly 88 percent of job growth during the 1990s. The smaller rural communities have not benefited comparably in Arizona's growth over the past 20 years.

High Technology Industries

High technology industries are driving the majority of Arizona's manufacturing sector and accounting for some of the fastest growing employment fields in the state. Arizona's high tech industries are concentrated in four areas of manufacturing: 1) electronic components and accessories (principally semiconductors), 2) aircraft and parts, 3) guided missiles, space vehicles and parts, and 4) search, detection, and navigation instruments and equipment. The electronics and instruments sector grew by 15 percent annually between 1986 and 1997, far surpassing growth in any other manufacturing sector in the state. Gains in the computer and data processing services sector led to high growth in high technology services overall. The state's 2,400 software firms employ over 28,000 workers, or approximately two percent of the workforce. The broader information technology sector, of which software is a component, employs over 100,000 workers in the state.

The state's largest high technology companies are manufacturers employing between 5,000 and 10,000 workers. They include: Intel, the world's largest computer chip maker and manufacturer of assorted computer, networking, and communications products; Raytheon, builder of missile systems and electronics; recently merged Honeywell, designer and developer of space and aviation control hardware, and AlliedSignal, manufacturer of aerospace hardware, engines, and aircraft systems; and Boeing, builder of aerospace products. These companies are all concentrated in the greater Phoenix and Tucson metro areas, as are the vast majority of the state's high technology firms.

Tourism Industry

The tourism industry plays a key role in Arizona's economy, generating $12 billion in annual impact and 350,000 jobs. The state's warm weather, natural amenities, and developed attractions bring in visitors from northern states as well as other parts of the world for golf, outdoor recreation and Old West/Native American history and heritage. International air carriers now provide direct service into Arizona from Canada, Germany, England and Mexico. Grand Canyon National Park, one of the most popular in the nation, draws about five million visitors annually. Park visitation supports some 2,000 rooms in hotels, motels, lodges, and other resort accommodations. Numerous additional parks, natural monuments, and wildlife preserves attract visitors as well.

CANAMEX Corridor Region

The CANAMEX Corridor crosses through Arizona's most populated areas including Tucson and Phoenix. The Corridor runs from Nogales to Tucson along Interstate 19, from there to Phoenix along Interstate 10, and through Kingman to Las Vegas on US Route 93. The Corridor traverses some of the state's fast-growing high technology areas as well as major warehousing and distribution centers.

Nogales is the largest port of entry for winter fruit and vegetables in the US: produce imports through the port amount to some 1,200 truckloads per day during the growing

season. Nogales also serves as a key retail hub for Northern Mexico, with nearly 50,000 Mexican shoppers crossing into the city on an average day. Along with its sister city, Nogales, Sonora, Mexico, Nogales forms one of the largest clusters of cooperative manufacturing (maquiladoras) along the US-Mexico border.

Phoenix

Once the retirement mecca of the country, the Phoenix Metropolitan Area has been named the number one "entrepreneurial hot spot" in the nation by Cognetics, Inc. for the third consecutive year, as measured by the percentage of new companies with at least five workers and the percentage of young companies adding workers. The area is a center for high technology manufacturing and the west side has become an increasingly important warehousing and distribution center for products such as apparel and electronics. Arizona State University in Tempe, with branches in Mesa and Phoenix, has played an important role in the area's high technology sector development in addition to serving as the largest local institution for higher education.

High technology manufacturing companies such as Philips are planning to expand local operations in semiconductor production, Maxwell may expand its DVD manufacturing plant, and distributors such as Avnet (electronics) are growing as well. Significant back-office operations such as Metris (credit card marketing center), McCord Consumer Direct (travel management call center), PCS Health Systems (call center), and DHL Worldwide Express (customer service center) are growing in the area.

Tucson

Tucson has undergone strong population and job growth since 1980, but to a less pronounced degree than the state as a whole. Population increases ranged from one to three percent per year and employment grew by just over three percent annually. Greater Tucson's manufacturing sector is focused on a number of high technology industries such as aerospace, bioindustry, plastics and composite materials, optics, and others.

Tucson's concentration of high technology industries has resulted in part from the strength of the University of Arizona Science and Technology Park—currently ranked as the sixth largest in the country in terms of both square footage and number of jobs. The Technology Park is continuing to expand, and spin-offs from the Park are an important factor in spurring development of local technology firms. Local defense industries are clustered around Davis Monthan Air Force Base, which itself employs about 7,500 people and collectively supports an estimated 4,000 additional workers.

Tucson's role as an international cargo hub has increased in recent years as trade with Mexico has grown. Growth in Mexico's manufacturing industries in northern states have translated into heavy flows of products through areas such as Tucson which are near the border and accessible to rail, air, and highway transport systems. The Tucson-Mexico Project is aimed at increasing trade ties between northern Mexico and Tucson. The organization supports development of an integrated cargo hub at Tucson International

Airport to accommodate trade and distribution growth.

NEVADA

Nevada has had one of the fastest growing economies in the nation during the past two decades. Gaming and related tourism growth continues to drive the state's economy. Although some degree of diversification has followed from overall expansion, total employment remains heavily focused in tourist services. The Las Vegas metropolitan area (defined as Clark County) continues to account for the majority of the state's population and employment—nearly three quarters of Nevada residents live in the area. Throughout the state, mining remains a relatively important industry, although to much less of a degree than in previous years. High technology industries have begun to locate in the state, with an emphasis on aerospace technologies and a geographic focus around the Nevada Test Site well to the northwest of Las Vegas. Some major warehousing facilities have taken advantage of favorable tax laws and distances to population centers in neighboring Southern California and Arizona, although this industry remains relatively small at present. In rural areas of the state, the importance of tourism has increased as mining employment levels fluctuate.

Gaming and Tourism Industry

As a national and international center for gaming and related tourist industries, Las Vegas continues to expand and evolve. New, continually more extravagant resorts and gaming casinos are added every year, so that within the past decade the Las Vegas Strip has literally been reinvented. The ten largest hotels in the US are all located in Las Vegas, each of them containing over 3,000 rooms. Seven of them were built within the past decade, including Mandalay Bay and the Venetian, which were just completed in the past year. The growth in hotel rooms alone has driven a large share of the state's employment growth by providing a large number of service as well as construction jobs. The inventory of rooms within Greater Las Vegas has increased dramatically, doubling since 1986 to over 123,000. Las Vegas now has more hotel rooms than any city in the world. Employment in hotels, gaming establishments, and recreation accounts for 26 percent of total jobs in Clark County.

The success of the local tourism industry has been astounding. Gaming revenues in Clark County amounted to over $7 billion in 1999, twice the level achieved a decade earlier. Despite enormous growth in the number of hotel rooms, hotel occupancy levels have actually increased. Occupancy in Clark County has remained above 90 percent since 1993, reaching 92 percent during the past year—well above almost every hotel market in the country. Las Vegas received almost 34 million visitors in 1999, and smaller gaming centers in the state attracted large numbers as well. Laughlin, to the south of Las Vegas near the Arizona border, attracted almost 4.5 million visitors and over $500 million in gaming revenues. Mesquite, located to the northeast of Las Vegas at the Utah border, attracted 1.7 million visitors and over $90 million in gaming revenues.

The Las Vegas area draws visitors from around the world through a combination of

gaming, entertainment, and shear spectacle, as well as convention and other business. The Las Vegas Convention Center, one of the largest in the US at over 1.2 million square feet, competes with the top tier of meeting hubs in the country such as Los Angeles, Chicago, Atlanta, and San Francisco. According to the Las Vegas Convention and Visitors Authority, visitors to Las Vegas stay an average of 3.3 nights, and almost half arrive by plane. Approximately 13 percent of visitors come from outside the US. California accounts for nearly one third of visitors to the area, while Arizona adds another five percent. Southern California alone accounts for 28 percent of area visitors. California's economic well being has a very significant impact on the Nevada tourist industry. The impact of the booming Southern California economy since 1995 has driven a large share of gaming and hotel demand growth in Las Vegas and surrounding cities.

High Technology Industries

Nevada's high technology sector is currently focused on aerospace-related research and development. A few firms have located between Las Vegas and the Nevada Test Site. Nevada's high technology undertakings have historically been centered around the Nevada Test Site, a 1,350-square-mile area to the northwest of Las Vegas established as the Atomic Energy Commission's on-continent proving ground and used for more than four decades of nuclear weapons testing. Since the nuclear weapons testing moratorium in 1992, under the direction of the Department of Energy (DOE), test site use has diversified into other programs such as hazardous chemical spill testing, emergency response training, conventional weapons testing, and waste management and environmental technology studies.

CANAMEX Corridor Region

The CANAMEX Corridor enters Nevada at the Hoover Dam along US Route 93 from Arizona. After passing through Boulder City and Henderson, it transitions to Interstate 15 in Las Vegas and heads northeast through Mesquite. The Corridor passes through southern Nevada's fast-growing Las Vegas Metropolitan Area, which contains 69 percent of the state's population and employment.

Light Industrial and Distribution Space Growth

A combination of factors have led to high growth in light industrial and warehouse distribution uses in the Greater Las Vegas area. Relatively low land costs, low energy costs, and high population growth have fueled development of industrial space in North Las Vegas, Henderson, and the southwest Las Vegas/McCarran Airport area. Between 1990 and 1999, local population increased by approximately 61 percent. During the same period, industrial and warehouse space increased from 25 million to 59 million square feet, growing over 130 percent.

Local industrial and warehousing operations serve the growing needs of a booming population and construction industry in Las Vegas as well as surrounding metropolitan areas in Southern California and Arizona. Las Vegas has advantages such as a large 24-

hour work force and lower outbound shipping costs due to the high number of trucks entering the area with goods for the booming economy and leaving without cargo. Internet-based operations such as CyberBills have begun to locate distribution facilities in the area and more are expected.

North Las Vegas has seen the majority of industrial space development during the past decade, with large projects such as Dermody Business Center containing over six million square feet of light industrial and distribution buildings. In the vicinity of the Las Vegas Speedway, located north of Las Vegas directly alongside the CANAMEX Corridor on Interstate 15, large amounts of industrial space have been developed and industrial land prices remain highly competitive. Land alongside Nellis Air Force Base is becoming available for industrial and warehousing uses. In the southeast area, including Henderson, warehousing and distribution development is appearing in anticipation of the completion of the I-215 beltway project. The region's largest industrial project with at least ten million square feet of space, Black Mountain Industrial Center, is continuing to expand. The southwest area near McCarran Airport includes a mix of light industrial, distribution, and flexes industrial/office space. The area is poised for industrial development, as the airport will release land for sale in the near future.

UTAH

Utah has made a significant shift toward information technologies and service industries during the past two decades. Following the contraction of local energy, mineral, and agricultural industries, the state has strengthened its position as a center for high technology electronic components manufacturing, software development, and biotechnology. Tourism employment has continued to strengthen as well, with the industry now accounting for nearly one in nine jobs in the state.

High Technology Industries

Utah's high technology-based employers cover a diverse range of industries, most notably: computer software, aerospace, electronic components, medical supplies, and automotive components. During the past decade the software industry has expanded in the state, reaching nearly 23,000 workers in 1999—about two percent of total jobs. But the industry's expansion has continued despite the disappointing experience of the state's largest software development employers, Novell and WordPerfect. This is due to the expansion in other areas such as computer programming services and Internet access providers.

During the past five years, both Intel and Micron have planned new facilities in the state. Micron has indicated a commitment to build a memory chip plant in Lehi, south of Salt Lake City, employing up to 3,500 workers. Intel acquired a 154-acre site in Riverton for development of a computer chip research facility which would employ up to 8,000 workers at build out. The company broke ground on the project in 1999. If fully built out, these additions will nearly quadruple Utah's employment in electronic components.

Utah's aerospace industry has been significantly transformed during the past decade as a result of reductions in military spending. The state's aerospace industry, once the largest component of local high technology activity, now employs fewer than 6,000 workers—half its level of a decade ago. This restructuring has created opportunities for automotive components manufacturing. Autoliv ASP, a spin-off during the early 1990s from one of the state's largest aerospace companies, has continually expanded its operations to reach 6,500 workers at present. The company builds trigger devices for air bags in automobiles. Similarly, medical instruments and supplies manufacturers have enjoyed success, expanding at a rate of over seven percent annually during the past decade.

Tourism Industry

Travel and tourism continue to be one of Utah's top five economic activities, along with manufacturing, trade, services, and government. Tourism covers a broad range of activities ranging from primary services, lodging, retail trade and transportation to secondary impacts such as construction and real estate. Utah's tourism industry has kept pace with the overall economic growth in recent years, with the number of visitors increasing by two to three percent annually. Visitor spending increases have outpaced growth in arrivals, possibly indicating a shift towards higher quality tourism overall. The Salt Lake Convention and Visitors Bureau has specifically targeted higher end convention attendees in an effort to further upgrade the local tourist market. Utah's tourism industry is diverse, including a wide offering of federally administered national parks, monuments and recreation areas along with world-class ski areas and local cultural events. The Church of Latter-Day Saints (LDS) plays an important role in attracting tourists to the state, acting as a major draw bringing in visitors from around the world.

The 2002 Winter Olympics will make Salt Lake City a center of attention around the world for several weeks. The Olympics will be immediately followed by the Para-Olympics which will also garner a large amount of attention. Utah visitor numbers are expected to rise dramatically during the months surrounding the Games and the tourism and recreation industry hopes the exposure will carry over into following years as well. In contrast to many past Winter Olympics sites, the Salt Lake events will be highly concentrated around the metropolitan area, further increasing the city and region's exposure. In terms of direct expenditures in preparation for the Games, the Organizing Committee is working with a budget of $1.35 billion to cover a range of building projects and planning activities.

CANAMEX Corridor Region

The CANAMEX Corridor runs the entire length of Utah along its main north/south highway, Interstate 15. The vast majority of Utah's population is concentrated along the Corridor in the cities and towns along the Wasatch Front. The Wasatch Front encompasses the string of communities stretching from the Ogden Metropolitan Area on the north to the Provo Metropolitan Area on the south. This six-county area accounts for over 78 percent of Utah's population and 82 percent of employment. Founded by Mormon pioneers, Salt Lake City remains the state's spiritual and administrative center

of the LDS Church. The Wasatch Front also serves as the center of Utah's high technology industries, including electronics hardware, software, and biotechnology.

The University of Utah Research Park, located in Salt Lake City, has served to create a center of high technology development within the region. The Research Park was founded in 1968 in order to attract and promote the growth of industrial technology by providing an environment conducive to research with strong links to the university. More than 40 companies are currently located at the park employing over 5,500 workers. Expansion of existing facilities is currently under way.

Many of the region's high technology firms are clustered between Salt Lake City and Provo in Lehi, Orem, and American Fork, as these areas provide access to the labor pools in both the Salt Lake and Provo Metropolitan Areas, as well as access to Brigham Young University and the University of Utah. On the west side of Salt Lake City another industry, warehousing and distribution, is clustered around access to the interstate highway network and rail depots.

Salt Lake City-Provo was named the number two "entrepreneurial hot spot" in the nation for 1999 (second to Phoenix) by Cognetics, Inc., as measured by the percentage of new companies with at least five workers and the percentage of young companies adding workers. Back office call centers, among others, are representative of high growth industries which have sprung up in the Wasatch Front. The majority of the state's call centers are concentrated in Salt Lake County, where 23,000 workers—almost four percent of the local workforce—are employed. Call centers have been drawn to the region by the high quality of labor, low labor and facility costs, the Mountain Time zone (within one hour of both the coastal and central zones), and the neutral local accent.

IDAHO

Idaho's economy continues to expand from its traditional core industries, natural resource extraction and farming, into a more diverse range of manufacturing and service sector roles. Idaho's traditional natural resource industries remain important. Agriculture, mining, forest products, and food processing together still constitute the largest segment of the economy. But the last two decades have brought increases in such areas as electronics, paper products, printing and publishing, electrical machinery, construction, hospitality, and health services. Areas in the western and northern parts of the state around Boise and Coeur d'Alene have enjoyed the greatest benefits of economic growth, along with, to a slightly lesser degree, the eastern centers of Pocatello and Idaho Falls. Smaller rural communities throughout the state have continued to struggle.

Manufacturing Sector

Growth in Idaho's manufacturing industries have been especially notable. Between 1988 and 1997, the state gained nearly 16,500 new manufacturing jobs for an annual average growth rate of 2.8 percent. During this period in the US as a whole, manufacturing employment declined slightly. Important changes have taken place in the mix of the state's manufacturing industries during the past two decades. The state's traditional

manufacturing-based industries, food processing, lumber, and primary metals, have become far less dominant. These three sectors accounted for 43 percent of Idaho's manufacturing jobs in 1997, down from 64 percent in 1980. The number of jobs in these categories remained relatively stable during the period, while "high technology" industries accounted for most of the state's manufacturing growth. Idaho's non-electrical machinery and electronics and electronic equipment manufacturing sectors surged from about 8,000 jobs in 1986 to nearly 24,000 in 1998. Machinery and electronics accounted for nearly 60 percent of Idaho's manufacturing job gains during the past decade. The vast majority of these high tech jobs have been concentrated in the Boise Metropolitan Area and around Pocatello and Idaho Falls.

CANAMEX Corridor Region

The CANAMEX Corridor traverses Eastern Idaho along Interstate 15. The Corridor encompasses the largest cities in this part of the state, Idaho Falls and Pocatello, along with a number of smaller towns to the immediate north and south of these cities. Eastern Idaho is home to the Idaho National Engineering and Environmental Laboratory (INEEL), a world-renowned research facility administered by the Department of Energy. INEEL encompasses a 890-square-mile area to the west of Idaho Falls and numerous research and support facilities are located within that city. A number of high technology manufacturing facilities located in the Idaho portion of the Corridor are associated with INEEL operations or personnel.

The Fort Hall Native American Reservation is located on I-15, encompassing land on both sides of the highway. Idaho State University is located in Pocatello and Eastern Idaho Technical College, a two-year school, is located in Idaho Falls. Both schools emphasize applied technical skills and vocational programs, qualifying many students for work at INEEL and local high technology manufacturing firms. In many respects, the Eastern Idaho economy and its culture are oriented to Salt Lake City because the direct I-15 freeway connection brings Eastern Idaho closer to Salt Lake City than to Boise.

Established in 1949 as the National Reactor Testing Station, INEEL is the site where nuclear fission was first used to produce electricity. Today there are three companies, Bechtel, B&W Idaho, and Argonne National Laboratory-West, under contract to perform research, waste processing, and support functions for the Department of Energy. INEEL is widely considered a leading center for nuclear safety research, defense programs, nuclear waste technology, and advanced energy concepts. The 8,000 workers at INEEL account for over ten percent of the households in the region's largest cities. Nearly 45 percent of INEEL workers are employed in high technology research applications. A number of spin-off companies, many started by former INEEL workers, are locating in the newly built Bonneville Technology Center which is located directly across the street from the INEEL labs.

The American Microsystems Inc. (AMI) plant in Pocatello, maker of semiconductors, represents the largest high technology manufacturing site in Eastern Idaho. With 1,600 employees, AMI accounts for a significant portion of the state's fast-growing electronics

components industry. Other Eastern Idaho high technology manufacturing firms cover a wide range of applications such as computerized welding, fertilizer utilization, and zero-added waste approaches. Non-manufacturing high technology firms make up a much smaller share of the Eastern Idaho employment base. The Eastern Idaho Forum for Information Technology serves as an industry advocate and sounding board for local software development and telecommunications enterprises.

Tourism and Recreational Amenities

The CANAMEX Corridor aids access to a number of natural amenities in Eastern Idaho. The Grand Teton Range, lying mostly on the Wyoming side of the eastern border, can be viewed in the distance from much of the region. Second home development in the foothills on the Idaho side has increased in recent years. The terrain leading up to the Tetons includes portions of the Snake River, Targhee National Forest, and Mesa Falls Scenic Byway—passing by a number of waterfalls. Travelers access Yellowstone National Park largely in Wyoming via the Corridor as well. Eastern Idaho is renowned for its fly fishing opportunities found throughout the Henry's Fork portion of the Snake River and its many tributaries. Other tourism attractions include Craters of the Moon, City of Rocks, and significant portions of the Oregon Trail.

MONTANA

Montana has become less dependent on traditional resource-based industries such as agriculture and mining, and has expanded its range of manufacturing functions beyond food products, metals refining, and lumber and wood products. Although agricultural and mining outputs have not declined in the state, the number of workers employed in these industries has been reduced. The greatest shift in employment, reflecting a national trend, has been toward service sector industries such as professional services and healthcare.

Montana continues to supply some of the most competitively priced electricity and natural gas in the country. Low energy costs have drawn new manufacturing firms to the state, including high technology firms such as Advanced Silicon Materials and others makers of electronic devices and machinery. Tourism plays an expanding role in the state economy as resource industries become increasingly less labor intensive.

Montana experienced a period of employment decline during the early to middle 1980s related to energy industry restructuring in the Rocky Mountain region. As the state with the lowest average incomes and the highest proportion of workers holding second jobs in the US, Montana continues to faces significant economic challenges. Much of the state's economic and population growth has been centered in a relatively small number of counties. Just over one quarter of the state's counties have experienced significant growth during the past decade, while almost a quarter—all mainly rural areas—have lost significant population.

High Technology Industries

Although still a relatively small portion of total employment, high technology firms have a growing presence in Montana. Local manufacturers produce computer chip components, aerospace tools and parts, optical equipment, dental instruments, and diet supplements among other products. Advanced Silicon Materials brought 200 new jobs to Butte during the past two years. The firm's 100-acre plant produces polycrystalline silicon and silance gas, two key materials used in the production of silicon wafers for use in semiconductors. Advanced Silicon Materials fills a primary role in the semiconductor manufacturing chain, essentially purifying raw materials to the extremely high standards required for high-speed processing chips. Electronics components are also produced by S & K Electronics north of Missoula and Semitool in Kalispell. Summit Design & Manufacturing engineers and fabricates aerospace components at their facility in Helena.

Research and development functions in Montana are carried out through university partnerships. The Center for Biofilm Engineering at Montana State University in Bozeman generates medical applications and technologies for handling toxic compounds. The Center works with 19 industry partners and has aided in the creation of new local high tech firms such as a group of companies focused on optics technology. Big Sky Laser Technologies, for example, creates laser products covering a range of uses such as dermatology, remote sensing, and chemical agent detection. The Mine Waste Technology Program at Montana Tech in Butte develops solutions to environmental problems created by mining and smelting operations.

Tourism

Glacier National Park, in the northwest area of the state, and Yellowstone National Park to the south, create a corridor of tourist travel between them. Glacier draws some two to three million visitors per year while Yellowstone averages closer to four million. Many tourists come to Montana for world-renowned trout fishing as well as hunting, camping, and rafting trips. Numerous ski areas and outdoor resorts serve a growing number of outdoor enthusiasts.

CANAMEX Corridor Region

The CANAMEX Corridor crosses through the western portion of Montana along Interstate 15. The Corridor crosses through Butte at the Interstate 90 connection, and up through Helena and Great Falls. Tourist traffic between Montana's main draws, Glacier and Yellowstone National Parks, passes along the Corridor between the north and south ends of the state. The Sweet Grass border station at the Corridor's northern extreme serves as many as 1,000 trucks a day hauling products including oil, grain, cattle, and used vehicles among others. Truck traffic has been increasing at 10 percent annually, and the crossing serves as a major livestock certification center. The border station has plans to rebuild and expand.

Further south of the border along the Corridor, the town of Shelby has developed an intermodal transportation facility in conjunction with a foreign trade zone. The facility, operated by the Port of Northern Montana, serves as the connection point between truck and rail transport at the intersection of Interstate 15 and Burlington Northern East-West and North-South rail lines. Warehouse and grain facilities serve storage and transfer needs on site.

Helena

Helena's 29,000 residents (approximately 50,000 in the greater Helena valley) are principally employed by federal, state, and local government agencies and larger institutional employers such as the school district, hospitals, and area colleges. The University of Montana College of Technology is located in Helena, and two tax increment finance zones serve as local economic development tools.

Great Falls

At a population of 80,000, Great Falls and surrounding Cascade County represent the largest community along Montana's portion of the CANAMEX Corridor. The area's population has remained relatively unchanged during the past two decades while non-agriculture employment has increased at just under one percent annually on average. Since 1980, wholesale trade has shifted from over ten percent of total employment to under six percent, while services have increased from about 24 percent to almost 32 percent. Overall, the Great Falls economy depends upon the basic industries of agriculture, manufacturing, and military spending. Malmstrom Air Force Base is by far the largest employer in the area, accounts for approximately 12 percent of local jobs. The area's reliance on this single employment source, however, causes concern. The community has welcomed Federal Express's recent decision to operate a regional hub out of Great Falls Airport.

Butte

The population of Butte numbered nearly 100,000 in 1917, making it the largest city in the west between Seattle and St. Louis. Butte was the world's biggest copper producer in its day, and it remained focused on labor-intensive underground mining up through the 1950s. Open pit mining followed, a more capital-intensive practice which created the city's most visible landmark: a 1,800-foot deep pit measuring over a mile long and nearly a mile wide. Mining in the pit ceased in 1982, but toxic mine tailings have polluted the water in the pit and created a threat to ground water. ARCO, owner of the mine property, has been working with the Environmental Protection Agency to address the problem.

With a current population of about 33,000 residents, the city has a legacy of 4,000 historic buildings—more landmark structures than any US city outside of New Orleans. A number of grand structures, such as the Copper King Mansion, have been well maintained and are currently open to tours. Thousands of others remain unrealized assets.

INTERNATIONAL PORTIONS

The concept of the CANAMEX Corridor was originally conceived of as a three nation corridor stretching from **Can**ada to **Ame**rica and **Mex**ico. At the Arizona border, the Corridor heads south into the Mexican states of Sonora, Sinaloa, Nayarit, Jalissco and Michoacan. It is the primary highway corridor linking the western provinces of Mexico. Mexico City, the Capitol of Mexico, serves as the southern terminus of this Corridor.

Sonora, Arizona's southern neighbor, now has a population of approximately two million. The state's economy is anchored by agriculture and ranching. The most significant crops include wheat, cotton, grapes, nuts, safflower, sorghum and soybean. Beef and dairy cattle are raised for the domestic and foreign markets. A number of food processing, manufacturing and assembly plants are located near the Arizona border, with the Ford plant being the largest in the state. Enjoying a coastline of 1,000 kilometers, fishing is also an important economic activity in Sonora. Its capitol is Hermosillo, and the other important cities include Santa Ana, Guaymas, and Ciudad Obregon.

From the Montana/Canadian border station of Sweet Grass, the Corridor heads north into the Province of Alberta. Alberta, with a population of approximately three million, has an economy based upon natural resource extraction. Energy production, the largest sector of the economy, accounts for 19 percent of Alberta's gross domestic product (GDP). Its leading exports during 1999 were natural gas, crude petroleum, and forest products. Alberta also has a rapidly growing manufacturing sector that is closely tied to resource extraction. Nearly two-thirds of Alberta's manufacturing output consists of value added resource products.

Alberta recorded the fastest growing economy of the provinces in Canada during the past five years. It now has 1,500 knowledge based companies that employ 40,000 people. Some of its strategies for the future include:

- Encourage the innovative application of new technologies to resources based industries to sustain future competitiveness.

- Expand the knowledge-based economy including the information and communications technology industry.

- Develop the information and telecommunications infrastructure.

Calgary and Edmonton, Alberta's largest and most important cities, are on the Canadian portions of the CANAMEX Corridor.

THE IMPORTANCE OF TELECOMMUNICATIONS

As these five state economies transition into 21st century economies, new infrastructure investment is of paramount importance. The construction of the Transcontinental

Railroad and related network of railroads accelerated development of the American West during the 19th century. During the 20th century, the interstate highway network and airport development, enabled by automobile and aircraft technologies, carried the infrastructure burden of America's economic growth. The essential infrastructure for economic growth for the early part of the 21st century is telecommunications infrastructure.

Telecommunications networks permit the transmission of sound, video, computer data or other information between telephones, computers, fax machines, etc. Telecommunications networks consist of transmission systems (the means of passing information from one point to another), switching systems (allowing the transmission systems to connect two or more specific parties at a given time), and signaling systems (informing switching systems of the destination and type of connections to make). New advances in telecommunications equipment have steadily increased the speeds and efficiencies of each of these component systems.

The focus in the Corridor Plan is on transmission systems, the physical infrastructure carrying signals through cities and rural areas. Areas of the country and specific districts of cities are increasingly differentiated according to the types of transmission infrastructure available. Telecom companies are currently 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—DSL (copper wire), coaxial cable, wireless, and fiber optics—are described below.

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.

Digital Subscriber Line (DSL)

DSL technology utilizes the established telephone infrastructure—comprised of twisted pairs of copper wire connecting virtually every household and business address in the country to a phone company central switching station—to achieve higher speed signals. Using a DSL modem plugged into a regular phone jack, in combination with DSL equipment located at the central switching station which increases the signal capacity, this technology can receive data at anywhere from 0.4 to 1.5 megabits per second (and up to 2 or more megabits per second in some circumstances) depending on a variety of distance and equipment factors. Most DSL connections fall into the lower end of this scale.

The advantage of DSL for telecom companies is the ubiquity of the existing copper phone system and the comparatively low cost of implementing the service. DSL systems rely heavily on existing networks of phone lines, with minimal reliance on new backbone technologies such as fiber optics. Theoretically, DSL is more cost effective than other broadband technologies at present. DSL can also guarantee a fixed amount of bandwidth, unlike some competing technologies that share transmission lines and are subject to slowdowns during periods of high usage. The limitations of DSL, however, and potential for increased costs, are many. DSL signals degrade over distance, so only users located within three miles of a central switching office can access the service. More importantly, the speeds achieved are quite limited compared with the capacities of competing technologies. DSL speeds are highest at the receiving end, and generally half as fast on the sending side. For residential users mainly concerned with downloading data, this is less of an issue, but businesses attempting to upload data to the web are hindered by DSL's slow sending speeds.

For residential service DSL offers a substantial improvement over most existing service levels—on the order of 10 to 25 times the capacity of common 56k dial-up modems. But for businesses both receiving and sending massive amounts of data, DSL provides considerably less capacity than competing technologies. In addition, complications result from utilizing a transmission system of copper wires that dates back many decades and now includes an undocumented maze of complicated tangles. Copper wires act like antennas and therefore suffer from electromagnetic interference—crosstalk—which can seriously impair DSL deployment. High-cost technicians must literally track down points of interference, foot by foot, to establish clean lines in many cases: a time-consuming and costly exercise. Newer networks, by contrast, do not have to deal with these complicating legacies.

Cable Systems

Cable wiring is larger in diameter and capacity than traditional copper phone lines because it was deployed to carry more data-intensive video signals (cable TV) at high speeds rather than just audio signals. The existing cable infrastructure serves a majority of households in the US, thus offering an alternative established network to compete with the existing copper phone network. Three main differences distinguish cable from DSL: 1) cable offers slightly higher speeds (under ideal circumstances) than DSL, but cable routes are shared by a number of users within a given area, and thus data "traffic" can slow unpredictably during times of high usage; 2) cable networks are simpler, newer, not prone to electromagnetic interference, and their signals do not degrade as quickly over long distances; 3) cable networks require telecoms to upgrade an entire neighborhood group at once, rather than line by line as with DSL, thus imposing high up-front costs on cable system implementation and forcing companies to be more selective about which areas receive the service.

Cable operators advertise data speeds of 3 megabits per second, or about 50 times the traditional 56k dial-up modem. Reports of speeds ranging from 1 to 2 megabits per second are more common, however; and in practice, due to sharing of cable traffic, speeds can be much slower at certain periods. As with DSL, even the top advertised

speeds fall well short of data capacity needs for many commercial users. Cable serves residential and small company users at present, although future data demands among even households may force a higher speed connection.

The main drawback of cable, the shared nature of the system, is being managed by an increasing number of fixed-bandwidth solutions offered by service providers. Under these approaches, a larger commercial user may be guaranteed a certain bandwidth within the network for a given price. Cable systems currently serve cable TV needs as well as growing demand from data users, and thus the allocation of capacity is simply a question of economics—who will pay more for the service.

Cable systems are in practice often hybrid in nature, with cable lines serving a given neighborhood area and linking into a much higher capacity fiber optic backbone. The backbone connects with extremely high speed, generally fiber optic, networks linking national and international destinations. In the market for residential broadband users, cable systems currently enjoy the lead. Cable serves approximately 4 million US customers compared with 1.7 million DSL users; DSL usage is growing more quickly however, and many expect it to surpass cable in the next three to four years.

Fixed Wireless

Fixed wireless systems bridge the last mile between end users and the backbone network via radio signals. Fixed antennas (as opposed to mobile devices) on the roofs of homes and businesses provide the link to send and receive signals to and from a central broadcast tower. Within a given building, the rooftop antenna is simply connected to the phone box to make signals accessible to end users. Upstream, the central broadcast tower may be connected to the larger network via fiber optic lines or an additional wireless link to the backbone.

Two principle ranges of radio waves comprise the fixed wireless transmission spectrum. At more limited bandwidths (lower data capacity) and lower radio frequencies, MMDS (Multichannel Multipoint Distribution Service) technology is largely targeting the residential and small business markets. The larger telecom companies such as Sprint and WorldCom have bought up the majority of US licenses for MMDS frequencies to pursue this market. At the higher-frequency end of the radio spectrum, LMDS (Local Multichannel Distribution Service) offers much greater data capacity. The much higher costs of this service have relegated it to the large business user market, where a number of smaller telecoms are buying up licenses.

MMDS service can travel further distances between the end user and the central transmission tower, on the order of 35 miles, which makes it much more economical in lower density metropolitan fringes and rural areas. Clear sending and receiving of signals depends on line of sight, with quality suffering from interference by buildings and hills. In hilly areas, a greater density of transponders is required to navigate the topography and establish clear lines of sight. Dense urban settings create similar challenges. Similar to DSL technology, MMDS data speeds currently reach about 1.5 to 2 megabits per second

Figure III-1

CANAMEX Corridor

Fiber Optic Cable Lines

on the receiving end while experiencing much slower upstream speeds of about 0.25 megabits.

LMDS service requires a far greater density of transponders as the high frequency transmissions fade in adverse weather conditions and even under clear skies are limited to 2.5 mile distances. Telecom companies such as Nextlink are setting up sophisticated systems that relay signals from rooftop to rooftop along a network of antennas in order to deal with these limitations. The benefit of LMDS is extremely high bandwidth, second only to fiber optics in data capacity. The higher costs associated with the service, however, limit its likely users to larger companies with considerable data transmission needs.

Fiber Optics

Fiber optic technology relies on pulses of light sent through extremely fine strands of glass fiber (as opposed to electric pulses used in coaxial cable and copper wire systems). Fiber optic lines consist of hundreds or even thousands of fine optic fibers bundled into a single protected cable. Fiber optics represents by far the highest capacity medium for transmitting data at present, providing speeds hundreds to thousands of times faster than DSL and cable technologies. At the lower end of the fiber optic cost spectrum—where costs per connection are comparable to DSL and cable systems according to at least one industry specialist—speeds of 100 megabits per second are common. For this reason, fiber optics currently serve as the high capacity backbone component of most networks utilizing technologies such as cable, wireless, and even DSL to establish last mile connections. The major fiber optic trunk lines linking the CANAMEX Corridor are shown in Figure III-1.

In contrast to copper phone wires and cable, however, networks of fiber optic lines were not laid in the ground or strung alongside roadways during earlier technological eras. The earliest fiber optic cables were laid down in the late 1980s, with the first Trans-Atlantic line established in 1988. The higher cost associated with fiber optics results from both the cost of transmission gear needed to operate the system (although these costs are falling) and the requirement of physically establishing a new network: digging trenches to bury cables or stringing them along roadways and other rights of way.

Fiber optics principally serve as the backbone component of networks, but their superior data transmission qualities have made them increasingly popular among companies seeking as much bandwidth as possible. Direct fiber connections resolve the bottlenecks created when large quantities of data need to pass from a business to the network via DSL and cable technologies. End users with direct links to fiber are still relatively limited, but the number is growing quickly. It is estimated that only three to five percent of US office buildings are currently wired via fiber, but these buildings represent many of the largest, most valuable office properties in larger metropolitan areas. Among residential users, direct connections to fiber are extremely limited with the exception of a few residential developments now including this amenity in their new projects.

Emergence of a "Network" Economy

Communications capacity has risen to the forefront of the economy as increasingly powerful computers, software, and networking capabilities enable companies and individuals to collaborate and compete in complex new ways. Goods and services are now transferred throughout stages of production and ultimately to users at increasingly rapid speeds or even instantly via electronic channels. Growing connectivity expands more and more markets to the global scale, forcing competition among a larger array of players and forcing them to maintain up-to-date communications technologies. As communications capacity grows and tools such as the World Wide Web allow for a range of media—data, voice, audio, and video—to be utilized, the need for highly reliable access at much faster speeds increases as well.

The Internet is creating an unprecedented demand for communications capacity. By the end of 1999, nearly 260 million people were online throughout the world, with a disproportionately high number of them concentrated in North America. This figure is expected to quadruple to one billion people, with far greater distribution around the globe, by the year 2005. The speed at which people are accessing the Internet, and the amount of time they are spending online per day is growing. More and more activities—electronic commerce, education, healthcare, government services, reading the news, checking financial information, listening to music, etc—are conducted over the Internet. The volume of transactions over the web is expected to increase tenfold during the next six years, from over $100 billion in 1999 to over $1 trillion by 2005.

This "network" economy has produced a fast-growing technology sector made up of companies that create, build, and support the communications infrastructure—computers and hand-held devices, network components, software, and technical support services. Internet businesses, dot com companies, have sprung up during the past five years to take advantage of the dizzying array of possibilities for business and personal services, sales, entertainment, new media development and any number of niche opportunities created by the emergence of a powerful new medium. Telecommunications companies have also grown rapidly as demands for varied communications services and the range of available technologies continues to expand.

In addition to this first rung of direct technology-related companies, the influence and importance of communications technology and the Internet is becoming apparent across an increasingly broad range of industry sectors. The number of computer specialists employed in office operations of all types is growing as companies' reliance on technology for a range of needs—producing reports, tracking information, communicating with suppliers, marketing, etc—continues to increase. Jobs performed by administrative support staff are now done in a computerized environment, causing a general technology orientation to emerge among nearly all levels of office work. Industrial production and warehousing/distribution facilities are increasingly technology dependant as well, with "just in time" production and delivery demanding constantly changing, up-to-date information at all points of the production and distribution process.

Business Telecommunications Infrastructure Needs

The need for extremely high capacity communications networks varies according to the nature of a given business. Overall, however, the range of companies requiring the highest speed broadband access is increasing. No longer do just Internet companies, whose business depends completely on reliable and high-speed connectivity, demand direct fiber optic connections. Internet businesses, call centers, research-intensive companies, and the data centers which house servers and other Internet and telecommunications-related equipment are among the most dependant upon extremely fast connections. In addition, companies which require the collection and dissemination of a lot of time-sensitive information, such as banks and financial institutions of all types, also place communications infrastructure high on their list of necessities.

For businesses, fast access refers to speeds of ten megabits per second or greater, currently possible using fiber optic lines or higher cost LMDS wireless technologies. In addition to having access to such speeds, companies whose business depends on connectivity much prefer to have multiple, redundant connections from more than one telecom service provider. This serves two important purposes. First is competition, with greater choice among sources providing for better negotiating position and driving prices for the initial connection and ongoing services down. The second reason companies requiring fast connectivity prefer multiple service providers is the safety net made possible by a back-up provider in case one system is interrupted for some reason.

In order to establish an extremely fast connection to an office building which is not currently linked to any fiber optic network, a tenant and/or landlord must negotiate with the owner of a nearby fiber optic line to establish who will cover what portion of the cost to establish this last mile link. With multiple telecom companies running lines nearby, competition to establish the connection will significantly aid the office building in its negotiations. Faced with only one possible choice, the telecom company maintains a considerable advantage.

STATES' ROLE IN FACILITATING E-COMMERCE

As more and larger transactions move onto the Internet, much efficiency gained by e-commerce are often negated since our legal systems continue to require paper documents and hand written signatures. Most of our laws were written during an era when paper was the only realistic medium for the execution and documentation of transactions. Each national, state or local law or regulation that requires original paper documents and written signatures inhibits e-commerce.

At the end of June 2000 President Clinton 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. In addition, the law seeks to promote domestic and international e-commerce by clarifying the legal significance electronic transactions. E-sign 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. One of the most significant aspects of E-Sign is that it is technology-neutral and does not promote the use of specific technologies for either e-signatures or e-records. 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. In addition, E-sign requires that consumers explicitly agree to the use of all electronic contracts and records prior to the initiation of any transactions that involves an electronic signature or results in official electronic records.

E-sign 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 electronic commercial transactions.

LOOKING AHEAD

The Internet, with its vast array of websites, is becoming not only a storehouse of information but also a worldwide marketplace. An increasing share of purchases will be made online, including both business and consumer purchases.

Changing Pattern of Retail Goods Movement

With the Internet, an increasing percentage of consumer retail purchases will be made online. The transactions are more like mail order purchases without the cost of printing and distributing colored catalogues. In this model, consumers do not travel to the retail outlet. Rather the e-commerce companies receive the order and ship the products from central distribution facility directly to the consumer's residence or place of work. This business model of shipping from distribution centers directly to consumers, Business to Consumer (B2C), greatly increases the need for truck transport, particularly from the smaller Class I to IV variety of trucks.

At this point in development of e-commerce, the cost advantages of shipping individual parcels directly to the consumer, as compared to having the consumer come into the retail outlet to make the purchase, are not fully proven. However, even if only 10 to 15 percent of all consumer purchases of retail goods and services move online, the transformation means that the need for additional retail space will slow and the need for distribution space will accelerate.

Business to Business E-commerce

With the B2C model still not proven in terms of sustainable profitability, many in the investment community believe that Business to Business (B2B) e-commerce holds the greatest promise. With the use of the Internet, buyers are able to search for suppliers faster and over a larger geographic area. The Internet also allows groups of buyers to consolidate their orders to gain leverage on suppliers. The cost advantage of the B2B business model over the B2C model is more consolidated shipping.

The growth of B2B e-commerce will accelerate the growth of freight movement. More products will be shipped over longer distances. All types of freight transport will benefit from this increase in demand, although we expect the primary mode beneficiaries to be air freight and trucking, because these two modes tend to handle the smaller, higher value and more time sensitive shipments.

Freight Movement and Distribution Activity Will Grow

E-commerce will substantially increase and diversify both the origin and destination of freight shipments. As a consequence, truck and air freight volumes are expected to increase at above historic rates over the next 10 to 15 years. Distribution areas that offer convenient truck access to major metropolitan population centers along with low land costs, low tax burdens and low labor costs will grow. For example, Amazon.com located a major distribution facility in Fernley, Nevada just east of Reno to take advantage of its overnight trucking accessibility to most West Coast population centers. In addition, Nevada offers lower tax rates and lower land and labor costs as compared to West Coast population centers.

Within the larger CANAMEX metropolitan centers, the following areas will flourish as regional truck based distribution centers over the next ten to fifteen years due to their "hub" locations relative to the highway transportation network, rapid population growth, increase in e-commerce and relatively inexpensive land:

- The west side of the Salt Lake Valley, inside the loop formed by I-80 on the north, I-15 on the east and I-215 on the west and south.

- The north side of the Las Vegas metropolitan area, within the "V" formed by US-95 and I-15 and in the Apex area—a few miles south of the junction of H-93 and I-15.

- The west side of the Phoenix metropolitan area along I-10. Once the new Hoover Dam crossing is in place and US-93 is upgraded to a four lane restricted access highway, some distribution facilities will find the Us-93 corridor attractive as well.

- The south side of Tucson immediately south of Tucson International Airport. This area enjoys easy access to I-19, I-10, two rail lines and the airport and benefits from the proximity to Mexico.

The increasing importance of these major metropolitan areas as distribution centers will increase freight flows along the CANAMEX Corridor. While much of the short and intermediate haul freight will go by truck, the importance of airfreight will increase for high value, low volume and longer haul shipments. Great Falls, Montana expects to benefit from the growing demand for airfreight service, including the air freight demand generated by e-commerce. Because of its low air traffic volumes, generally favorable

flying climate, and low land and labor costs, Federal Express has selected to locate its new Northwest regional distribution facility in this city.

With the Puerto Nuevo project, Tucson intends to take advantage of its growing linkage with Mexico and its ability to offer a large amount of acreage with convenient air freight service, north/south and east/west interstate highway access and two rail line access to stimulate job growth and regional economic development in Southern Arizona.

The New Economy and Office Location

Although shakeouts in the technology sector is expected over the next several years, the Bureau of Labor Statistics projects that the percentage of the United States workforce in technology-related fields will increase to 49 percent by 2006 from 44 percent today. In actual numbers of employees, information technology workers will increase from 46 million to 56 million over this period. Since a majority of these employees will be housed in office buildings, demand for office space is expected to increase at a brisk pace over the next five to ten years in metropolitan areas that have a strong technology component to their economies.

The type and location of office space preferred by these new economy companies are very different from that preferred by old economy companies such as law firms, financial institutions, insurance companies, and manufacturing firm headquarters. In the new economy, the life cycles of products and systems are extremely short, often lasting no more than 18 months. Success depends upon getting the idea or product to market first to establish position and gain the scale necessary for market dominance.

These firms employ young workers who are able to work long hours because they have few competing commitments. Given intense pressure to succeed, often fueled by stock options, this workforce has little time for commuting, cooking meals, recreation and social interaction. The preferred office environment has housing, restaurants, recreation, social and entertainment opportunities nearby so a minimum amount of time is lost traveling. This is in contrast to the prestigious office buildings in grand settings preferred by old economy firms. The communities along the CANAMEX Corridor offer few urban mixed use districts similar to those in San Francisco (South of Market Street) or Seattle (Bell Town) that have proved to be popular with this information age workforce.

TOURISM AS AN INSTRUMENT OF RURAL ECONOMIC DEVELOPMENT

As new technologies have accelerated the pace of economic change, policy makers at the state and national levels have grown concerned that rural communities are not benefiting from this economic progress to nearly the same extent as more dynamic urban centers. This concern is certainly present in all five CANAMEX states, where rural economies have been largely dependent upon mining and agriculture. Many of the communities with historic dependence on mining are now struggling as ore fields become exhausted or as new environmental standards cause past mining techniques to become no longer viable. With increasing global competition and the application of more labor efficient

farming techniques, communities historically based upon agriculture have a surplus of labor and few new employment opportunities.

Tourism, anchored by visitation to the National Parks, has been an important part of the economy of the CANAMEX region for decades. With the expected healthy rate of population growth for in the American West and improving global communications and transportation, tourism is an expanding opportunity area for rural economic development in all five CANAMEX states. Considering the explosive growth of information technology, changing consumer values and narrowing income disparity between the United States and many foreign countries, no aspect of the tourism industry will remain unchanged as we move into the 21st century.

The strategic implications of this economic change for the tourism industry in the CANAMEX states include:

- The CANAMEX Corridor has numerous additional natural and historic assets that can be developed into new and more exciting tourism products.

- The five-state Corridor provides an opportunity for branding and cooperative marketing.

- The tourism industry within this region benefits from increased use of information technology.

LOOKING BEYOND THE INFORMATION AGE

Longer term economic progress during the 21st century will depend upon knowledge and innovation, and an efficient telecommunications infrastructure is essential to a knowledge-based economy. Unlike the old industrial economy model of a vertically integrated hierarchical organization, where decisions were largely centralized and employees were valued for loyalty and stability, the new economy model requires knowledge specialization and encourages employee innovation. Based upon a detailed comparison between Silicon Valley in Santa Clara County, California and the Highway 128 Corridor outside of Boston in Massachusetts[1], the key characteristics of Silicon Valley that simulated a much higher rate of innovation included:

- A well educated and very talented workforce – although this type of workforce clearly was also present within the Highway 128 Corridor, including Harvard and the Massachusetts Institute of Technology (MIT).

- A very culturally diverse workforce – Silicon Valley had a much greater foreign and immigrant worker presence, and their presence tended to broaden the range of

[1] Annalee Saxenian, "Regional Advantage – Culture and Competition in Silicon Valley and Route 128," Harvard University Press, 1994.

ideas and markets considered.

- The presence of a large number of small and medium sized organizations, each with its own specialization – rather than vertically integrated organizations that performed a number of functions reasonably well, these smaller firms survived and prospered because they were the best at their respective specialized niches.

Innovation often occurred when a series of systems and products produced by these smaller firms were integrated in incrementally new ways - innovation did not typically occur in large steps but rather in a rapid sequence of many small steps.

For the CANAMEX states to catapult into the forefront of the new economy, long term state and local economic development policies need to place emphasis not only on infrastructure development but on retaining and attracting talented and well educated workers with a range of experiences and ideas. The communities that are best able to educate, attract and retain a highly qualified workforce capable of sustaining innovation will emerge as the leading communities of the 21st century economy. In looking ahead for the next 30 years, as information technologies pervade the global economy, the factors that will differentiate one region from another in terms of long-term economic growth will be quality of education institutions and quality of community.

Importance of Education Institutions

Communities that are able to sustain innovation tend to have many linkages to top quality advanced education institutions. Much of the success of Silicon Valley has been attributable to its many linkages with Stanford University. Texas' decision some 20 years ago to invest heavily to attract top notch faculty to the University of Texas has paid dividends in the Austin area. The successful development of the Raleigh-Durham area in North Carolina was integrally related to the locations of Duke University, the University of North Carolina at Chapel Hill and North Carolina State University. The Microsoft Campus in Redmond, Washington is only a few miles from the University of Washington. World class universities not only attract top quality faculty and students to the community, they also increase the propensity for the talented graduates to remain and contribute to the local economy. Advanced research laboratories, like INEEL, would tend to have a similar influence.

Attributes of Successful New Economy Communities

The telecommunications advances driving the new economy have provided knowledge based firms and workers with increasing choice of location for both residence and business. The communities that are best able to attract and retain this leading edge workforce will need to offer a high quality living and working environment. In addition to having good advanced education institutions, the communities that will have easiest time attracting and retaining a workforce capable of sustained innovation will tend to have the following attributes:

- Quality primary and secondary schools – these knowledge based workers, particularly as they have families, will select their communities in a good part on the basis of the quality of the schools. For the Corridor communities that aspire to be at the forefront of the new economy, the quality of the primary and secondary schools are of paramount importance.

- Comfortable climate and attractive natural setting – government policy will not have great impact on these attributes. State governments may wish to use their most attractive areas as economic development lures; however, protecting the character of those areas will be of long term importance.

- Clean air and clean water – these are some of the more important reasons for migration to the CANAMEX States. Higher levels of traffic congestion, resulting in greater amounts of air pollution, will challenge the long-term economic interests of the CANAMEX communities.

- Attractive cultural, entertainment and recreation opportunities – this includes restaurants, entertainment venues, museums, performing arts facilities, libraries and well-maintained parks.

- Areas of permanent open space – these are important to offer outdoor recreation opportunities and to define community boundaries or provide buffers.

- Quality planning and urban design – this could include protecting the integrity of residential neighborhoods, establishing land use goals to minimizing land use conflicts, the under-grounding of utilities, improving streetscape, promoting quality building design and investing in attractive public urban spaces.

- Environmental protection – this could include taking measures to protect the environment, including wetlands, agricultural lands, scenic and natural resources, cultural and historic resources, and sensitive habitat areas as appropriate. Such measures are normally considered and incorporated into the approval process for projects.

- Responsive municipal services – this usually means low crime rates and short fire response times.

- Efficient transportation and telecommunications infrastructure – in the new and highly competitive global economy, neither major employers nor valued employees will tolerate communities that are not able to provide efficient transportation and telecommunications infrastructure systems.

- A reasonable tax burden – state and local taxes are necessary to gain most of the above attributes, but an uncharacteristically high tax burden will place the community at a competitive disadvantage.

- A well planned and targeted business friendly attitude – many of the higher quality communities are ambivalent about rapid growth. Those communities need to define the types, locations and possibly the rate of growth desired so that interested businesses are able to respond to a well defined set of rules or guidelines.

- High quality telecommunications and transportation infrastructure – broadband access will be essential for participants in the new economy, and having sufficient highway, local roadway and transit capacity will keep the cost of doing business competitive.

In the next two sections, the Corridor Plan recommends a series of Initiatives that will serve to drive five-state regional economy more deeply into and then beyond the information age. Rather than focusing in on possible strategies by individual states, the Plan suggests a number of cooperative multi-state opportunities and analyzes their economic benefits.

IV: PLAN INITIATIVES

Using the highway corridor as the unifying element, this CANAMEX Corridor Plan is to be a bold and forward looking document intended to guide infrastructure investment and long term economic development in the five-state region. Flowing from the transportation, telecommunications and economics analysis summarized in the preceding sections, the Plan proposes five 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.

While the individual states may be working on elements of each of the following Initiatives, implementation of this Corridor Plan provides the opportunity for the five states to develop common standards to address cross-jurisdictional issues and the interoperability of information systems. The result is a more efficient transportation corridor, improved emergency response capability, and more economic benefit for the region as a whole.

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, 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.

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 this plan to establish local alignments or project priorities within the participating states. The states recognize that projects identified as part of this Corridor Plan have continued to evolve during the development of this document. The current list of projects presented in this plan 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 statues 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.

V: ECONOMIC IMPACT OF PLAN INITIATIVES

This section presents an economic impact analysis of five of the major Plan 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 Plan 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 Plan 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 Plan 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.
- Each REMI forecast predicts the difference between the growth that would normally have occurred in the Base Case and growth with the Plan Initiative being analyzed.

- In this analysis, we have used employment gain as the key determinant of economic performance. There are of course other variables that measure the performance of a state or regional economy, and these include total gross domestic product (GDP) or income. The more detailed analysis covering a range of variables is presented in *Task III: Transportation Strategies and Economic Impact Analysis Working Paper.*

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 Sections II and IV. This initiative does not include the highway improvements recommended by the Corridor Plan and 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.
- ITS capital expenditures recommended by this Corridor Plan were detailed in Section II. 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 timesavings 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-$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 Bold Initiative No.1 on each of the states and the five-state region are presented in Tables V-1 through V-6. 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 IV. 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 Bold Initiative No. 2 on each of the states and the five-state region are presented in Tables V-1 through V-6. 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 tele-medicine, 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. The importance of education and the attributes of successful new economy communities are discussed in greater detail at the backend of Section III. 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.

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 II. 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 II. 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.

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 spent 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 Bold Initiative No. 5 on each of the states and the five-state region are presented in Tables V-1 through V-6. 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 PLAN INITIATIVES

The five major Initiatives recommended in the CANAMEX Corridor Plan, 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 Initiatives recommended by the CANAMEX Corridor Plan 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 Table V-6.

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**