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The University of Texas at Austin

TECHNICAL REPORT

RAIL CAPACITY AND MARKET DEMAND ON THE SOUTH ORIENT RAILWAY

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Robert Harrison
Author

ACKNOWLEDGEMENT

The authors wish to acknowledge the valuable assistance provided by Gil Wilson, (MMO) and Doug May (Fort Stockton Economic Development). Others who contributed information include Ajay Shakaver. P. E. (Odessa District), John Helsley (Community Rail Development Corporation), and Jim Blaze (ZETA-TECH Associates, Inc.).

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Background and Executive Summary

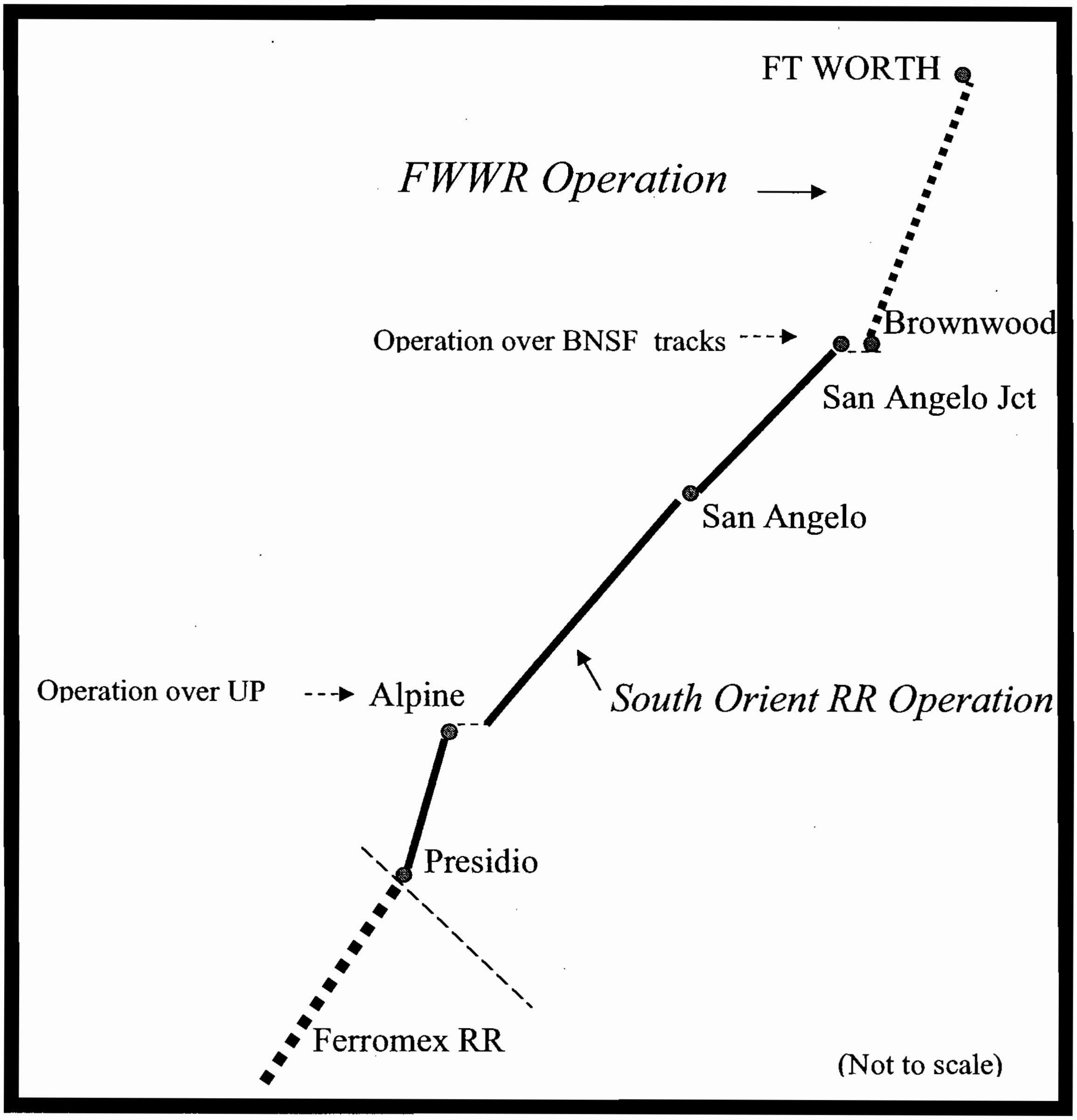
This report is the result of several activities undertaken at CTR in an effort to assist Texas Department of Transportation (TxDOT) staff at the Multi-Modal Office (MMO) who manage the South Orient Railway (SOR). A schematic of the SOR alignment is given on the following page. It is an unfunded activity and was completed during the period October 2004-March 2005.

The report is structured to help MMO staff and its Director address two issues, namely: (a) what is the current capacity of the facility, and what needs to be done to increase it; and (b) is there enough potential customer demand to justify further investments?

These two elements are the traditional components of a business investment, after deriving supply functions and then demand estimates, both to be considered when considering various investment packages that TxDOT might support in a variety of ways, including partnership with other agencies or entities.

The report is in three parts which, though interrelated, are treated separately for reasons of efficiency. We believe the reader can make the connections between the material without undue effort. It begins with a section on SOR capacity written by Randy Resor with technical advice provided by Gil Wilson. The second section is a border commodity analysis based on the Presidio Gateway, written by Michael Bomba (with some assistance from Robert Harrison) for the Fort Stockton community. Permission has been given by Doug May to reproduce this in its entirety. It provides the macro picture on goods movement which could form the base of new railroad business, essentially moving freight from highways to rail – an important TxDOT strategic objective. It is based on the latest available Bureau of Transportation Statistics (BTS) data and complements the final section.

SCHEMATIC OF SOUTH ORIENT RAIL CORRIDOR



The third part is the micro picture and deals with SOR customer base, commodities, and original destination (O/D) data. Complicating this issue is the movement of goods on the current system which is confined to the northern part of the network. Forecasting future traffic when there is no baseline data is difficult but some data on rate requests to SOR are used, together with forecasts for new international trade provided by Texas Pacifico Railroad, to form a demand estimate for future SOR services.

The good news is that there appears to be both demand and capacity to get freight moving over the SOR network. And, modest investment in railroad track improvements will raise speed and reliability over the system. Finally, as Table 1 shows estimated demand is substantially greater than capacity, so even if the demand estimates are not fully realized, flows over the system are still constrained by railroad operations and capacity, not demand.

TABLE 1. Consolidated Forecasted Traffic (revenue tons, 00) VS. Capacity

Scenario 1 (10 mph) Nine locomotives 3-3-3	TxPF Forecasted	Zeta-Tech Capacity
LOCAL[1]	1600	
INTERNATIONAL[1]	4680	
NEW US[2]	1350	
TOTAL	7630	4056

Scenario 2 (25 mph) Nine locomotives 3-3-3	TxPF Forecasted	Zeta-Tech Capacity
LOCAL	1600	
INTERNATIONAL	7400	
NEW US	3770	
TOTAL	12770	6084

Scenario 3 (40 mph) Nine locomotives 2-5-2	TxPF Forecasted	Zeta-Tech Capacity
LOCAL	1600	
INTERNATIONAL	10400	
NEW US	5590	
TOTAL	17590	13260

NOTE:
1. TXPF Forecasts
2. US Regional rate requests (Source May, 2004)

PRESENT AND FUTURE TWO SCENARIO CAPACITY REPORT ON THE SOUTH ORIENT RAILWAY

Randy Resor, ZETA-TECH Associates, Inc.

BACKGROUND

ZETA-TECH Associates, Inc. was asked to review a 2003 inspection report on the South Orient Railway and provide a technical note estimating its present capacity and its capacity under two future scenarios:

1. Entire railroad rehabilitated to FRA Class 2 (25 MPH) condition
2. Entire railroad rehabilitated to FRA Class 3 (40 MPH) condition

The following sections address the capacity of the railroad, and some related issues. It should be understood that no ZETA-TECH employee has conducted a physical inspection of the property. Conditions are known to us only from the 2003 inspection report and from conversations with CTR and TxDOT.

1. Determinants of Railroad Line Capacity

The capacity of any railroad line is determined by three factors. In order of importance, these are:

- Maximum operating speed
- Ruling grade
- Location and number of sidings

I will address each of these individually. The following section will address these factors as they affect the South Orient Railway.

Operating Speed

This is the most basic determinant of capacity. All other things being equal, the faster trains operate, the more of them can be operated per unit time.

With freight railroads, the range of operating speeds is relatively narrow, typically from 10 MPH up to perhaps 60 MPH (or in a few cases, 70 MPH) maximum. The higher speeds enable rail equipment and crews to be more productive by taking less time to make each trip, but of course higher speeds also require higher maintenance standards.

Ruling Grade

The "ruling" grade is the steepest grade on a particular segment of railroad line. The ruling grade limits maximum train size (unless "helper" locomotives are used to assist the train – which requires additional crews and locomotives). In the absence of helper operations, the ruling grade determines the maximum train size that can be handled by available motive power.

The other factor related to ruling grade is the strength of couplings and drawbars used to connect railroad cars into a train. In general service, maximum drawbar force cannot exceed 250,000 lbs. This sets an upper limit on train size even if additional locomotives are added – again, unless helper locomotives are used (these usually push on the rear end of the train, reducing drawbar forces).

Sidings

The number, length, and location of sidings will determine how many trains can operate simultaneously on a single-track railroad line. If there are no sidings at all between terminals, then of course trains can operate only in one direction at a time. Following movements are possible. However, all movements in one direction must be completed before any trains operate in the opposing direction.

The number of sidings, their length, and the type of control system used will all influence the number of trains that can operate simultaneously on a single-track railroad line.

2. The South Orient Railway

The South Orient Railway operates between San Angelo Junction and Presidio, TX, a total distance of about 385 miles. It is owned by TxDOT and operations are leased to Texas Pacifico Railroad (TXPF). At present, due to the need for track rehabilitation, operations are conducted at a minimal level. However, with additional track rehabilitation and additional motive power, the capacity of the railroad could easily be increased.

The purpose of this analysis is to quantify the present capacity of South Orient Railway, and its capacity if speeds are raised to, first, 25 MPH throughout, and then 40 MPH throughout.

Train size calculations in this analysis have been based on information supplied by TxDOT concerning ruling grade, maximum operating speeds, and available motive power.

It is ZETA-TECH's understanding that current operations are conducted in three zones, as follows:

- San Angelo – San Angelo Junction and return: two to three trips per week
- San Angelo – Alpine and return: currently not in operation, but one round trip per week is planned to begin shortly
- Alpine to Presidio (Mexican border): three trips per week. NOTE: Currently not in operation, but one round trip per week is planned to begin shortly. Current state of the infrastructure would support three trips per week.

The railroad's motive power consists of nine GP38-2 locomotives. For the purpose of this analysis, we will assume three of them will be used on each train. Thus, the maximum train size will be limited by the 156,000 lbs. of tractive effort produced by the three locomotives.

There are no passing sidings between San Angelo and Alpine, or between Alpine and Presidio, so all "meets" between trains will occur in the yards at San Angelo or Alpine, or at the Presidio or San Angelo Junction terminals.

Considering these various parameters, the following conclusions may be drawn regarding the current capacity of the railroad.

3. Current Capacity, South Orient Railway

Operating Speed

Table 1 shows the current conditions and speeds that prevail on the South Orient Railway.

Table 1: Current Operating Speeds, South Orient Railway

MP From	MP To	Speed	Notes
0.0	69.5	10	San Angelo Jct. to San Angelo Yd.
714	738.1	10	Currently excepted track
738.1	869.1	25	Mostly CWR
869.1	945.0	10	Parts are out of service
967.0	1029.1	10	Alpine to Presidio

Train crews are limited, by Federal law, to a maximum of 12 continuous hours on duty, followed by eight hours of rest. What this means for current South Orient operations is the following:

- One crew can make a one-way trip from San Angelo to San Angelo Junction (counting time to switch the train in San Angelo and deliver cars to interchange at San Angelo Jct.) in a 12-hour shift. They must then go off duty and return no less than eight hours later to make the return trip. Functionally, this means a crew can make at most three round trips per week on this segment of the line.
- Between San Angelo and Alpine, even considering the 131 miles of 25 MPH track, total trip time will be approximately 16 hours (about 2.5 hours from San Angelo to MP 738.1, 5.25 hours to MP 869.1, then 7.6 hours to MP 945).. Of course, this exceeds maximum on-duty time and doesn't allow for any time to assemble a train, perform a brake test, etc. at San Angelo. This means that a crew will have to take two days (interrupted by at least eight hours' rest) to move a train from San Angelo to Alpine. Thus one round trip per week (or perhaps one and one half trips) is the most that is feasible under current conditions.
- The final 62 miles from Alpine to Presidio can be covered by a single crew, but a round trip within 12 hours is almost certainly impossible. Thus, a maximum of three trips per week can be made.

Ruling Grade

To determine the current capacity of the railroad, we need to determine the maximum operable train size (number of cars). To do this, we have assumed that the nine operable locomotives on South Orient have been divided equally between the three segments, with three locomotives covering each service.

From correspondence with TxDOT, we learned that the ruling grade is 1.25%. We do not know the exact location of this grade, so we have assumed that it is located in the middle section between San Angelo and Alpine. This is the most capacity-constrained segment in any case. If in fact the 1.25% grade is located elsewhere, capacity will be somewhat greater than calculated here. However, we are aware that the Continental Divide passes very close to Alpine, so grades may be expected to be most severe in this area.

In any case, use of the Davis train resistance equations yields the maximum feasible train size for three GP38-2 locomotives on a 1.25% grade. These three locomotives can move a 5,200 ton train, or about 39 "100 ton" cars (132 tons each, gross weight). Cars carry 100 tons of cargo each.

Sidings

These are not an issue, since only one train at a time operates on each segment of the railroad.

Capacity Calculation

On the middle section of the railroad, three GP38-2 locos can move a 39-car train. Each car carries 100 tons of product, and trains run once per week in each direction, for a total of 52 trips per year.

Capacity of the railroad at present for through traffic is thus 3,900 * 52, or 202,800 revenue tons of traffic per year. With tri-weekly operation, each of the shorter segments of railroad can move three times this traffic, or 608,400 tons per year.

Options exist to increase this total somewhat. For example, the railroad might wish to use five GP38-2s on the San Angelo to Alpine segment, giving a maximum train weight of 8,600 tons or 65 cars. This would increase annual capacity to 6500*52, or 338,000 tons per year.

This strategy, though, would require using only two locomotives on each of the shorter segments, reducing maximum train size to 3,400 tons or 25 cars. With three round trips per week, these segments could then handle 530,400 revenue tons annually.

Each of these calculations does assume the train is made up of 100% loaded cars. In practice, each train will probably be a mix of loads and empties. These numbers should be reviewed against actual traffic (if available) to determine the best operating strategy.

4. The Effect of Increased Track Class

If operating speed can be increased, capacity of the railroad can be increased substantially, even without adding side tracks for meets between trains. The following analysis assumes that trains can meet only at Presidio, Alpine, San Angelo, and San Angelo Junction. The same nine locomotives are used.

In the first case, speed is increased to 25 MPH throughout. In the second, speed is increased to 40 MPH between MP 738 and MP 869, but remains at 25 MPH elsewhere. An increase in speed to 40 MPH throughout would, in ZETA-TECH's opinion, require replacement of all 70# and 90# rail with a minimum of 115# CWR. Table 2 shows the expected running times.

Table 2: Running Times with Higher Operating Speeds, South Orient Railway

MP From	MP To	Speed	Running Time (Hrs.)	Speed	Running Time (Hrs.)
0.0	69.5	25	3	25	3
714	738.1	25	1	25	1
738.1	869.1	25	5.25	40	3.25
869.1	945.0	25	3	25	3
967.0	1029.1	25	2.5	25	2.5

If speeds are raised to 25 MPH throughout, daily round-trip service becomes possible between San Angelo and San Angelo Junction, and between Alpine and Presidio. Between San Angelo and Alpine, a single crew can now complete the one-way trip in less than 12 hours (11.75 hours at 25 MPH and 9.75 hours with a 40-MPH segment). However, with any sort of delay for train makeup at terminals or en-route switching, at 25 MPH the train will "go dead on hours" before reaching its terminal. At 40 MPH, there is a cushion of more than two hours for such work.

If a one-way trip can be *reliably* made from San Angelo to Alpine with one crew in less than 12 hours, service frequency can increase from one train per week to three trains per week. This will have a substantial effect on capacity, as shown below in Table 3. Note that "daily" service here means five round trips per week or 261 per year. Tri-weekly service is three times per week, 52 weeks per year.

Table 3: Line Capacity at Three Times per Week All Capacities in Revenue (Net) Tons

MP From	MP To	Frequency	Train Size	Annual Capacity	Train Size	Annual Capacity
0.0	69.5	Daily	39	1,017,900	25	652,500
714	738.1	Tri-weekly	39	608,400	65	1,014,000
738.1	869.1	"	39	608,400	65	1,014,000
869.1	945.0	"	39	608,400	65	1,014,000
967.0	1029.1	Daily	39	1,017,900	25	652,500

What Table 3 indicates is that, if two additional locomotives can be obtained, the railroad will have a maximum capacity of just over one million net tons in each direction if the following conditions are met:

- Speed is increased to 25 MPH throughout
- Speed is further increased to 40 MPH between MP 739 and MP 846
- Two additional locomotives are leased or otherwise obtained, so 39-car trains operate at the ends of the line and 65-car trains (with five locos) over the middle portion

These steps will "balance" capacity between the end segments and the middle segment, and permit some fairly significant flows of traffic. One million net tons equates to 10,000 cars per year in each direction.

Further increases in capacity beyond what is shown in Table 3 will require the installation of passing sidings so trains can meet each other between San Angelo and Alpine. With the relatively short five- to six-hour round trips between Alpine and Presidio and between San Angelo and San Angelo Junction, it should be possible to schedule additional daily train frequencies without constructing additional sidings, if locomotives and crews are available. For example, with additional crews each set of locomotives could make two round trips per day between the end points of the shorter segments. However, to balance this with the capacity of the middle section, a siding would have to be installed somewhere between San Angelo and Alpine so that two tri-weekly trains could meet each other at the midpoint of the line. This would double capacity to approximately two million revenue tons per year, and would only require additional crews and one siding long enough for a 65-car train (about 4,200 feet). However, the introduction of a meet would create the possibility of additional delays, which might in turn cause one of the crews to run short of time before completing a one-way trip.

At one million revenue tons per year, the railroad would be handling about 30 loaded cars per mile. At two million revenue tons, it would handle about 60 loaded cars per mile. This is relatively light traffic. If the South Orient is to have a future, density must probably increase even further, and this will require additional investment.

An Analysis Of U.S. – Mexico Trade Patterns In The West Texas Region

Michael Bomba, Ph.D. CTR

Robert Harrison, CTR

NOTE: This work was first prepared for The Fort Stockton Economics Development Corporation. The authors are grateful to Doug May for permission to use the material.

INTRODUCTION

International trade has become a critical component of the economies of the United States and Texas, as both have become increasingly intertwined within the global trading system. The value of the merchandise the United States has traded, in relation to our country's gross domestic product (GDP), almost doubled between 1990 and 2001. Similarly, Texas' trade with the world presently accounts for more than 25 percent of its total State Product. Within these figures, we find that the United States engages in trading relationships with more than 200 countries in the world, but its trade is concentrated with a small number of them. In fact, the top fifteen of these countries account for more than three-quarters of the total U.S. trade. Among the top fifteen countries, Canada and Mexico are ranked number one and number two, respectively, and combined they made up 32.7 percent of total U.S trade in 2002. Additionally, we know that U.S. trade moves along a variety of transportation networks, with the majority of the United State's international trade moving by maritime services. However, in 2001, trucks accounted for 21.0 percent of the country's total trade by value and 11.0 percent by weight. It is trucks that move the vast majority of the United State's surface trade with Mexico.

In the West Texas region, it is Mexico that is the United States dominant trading partner and the following pages of this report will show that this trading relationship has begun to change over the last few years. These changes are due to ongoing structural adjustments in the world economy, which are driven by the decisions of transnational corporations, as they react to a modestly growing U.S. economy, a growing reliance on equipment to replace workers in Mexico and cheaper labor costs in other parts of the world. As a result of these changes, firms are holding transportation costs to a higher scrutiny and some are starting to consider practices that may well alter current logistical patterns. For example, a major transportation journal recently reported that mass merchandisers might take over their key vendor supply chains. This would mean that a retailer like Wal-Mart may soon buy a Chinese product from a firm in Shanghai and then develop its own supply chain from China to its U.S. distribution system, potentially bypassing the traditional logistical routes developed by transportation carriers.

It will soon no longer be sufficient for a location sited on the supply chain (such as a border port of entry), to justify its role using historic, rather than economic, reasons. Firms will continue to minimize their transportation costs by traveling the routes that are most efficient and which offer the greatest opportunities to reduce costs and maximize profits. At the same time, global efforts to improve international supply chain performance have included the development of inland ports at strategic points. Since Fort Stockton lies on or close to important NAFTA highway corridors, it may well be in a position to provide such services. Yet at this moment, little has been done to evaluate the location of this community as a potential inland port.

The topic of inland ports has been the subject of growing attention in trade journals and academic literature. Specific to Texas, the Center for Transportation Research at the University of Texas at Austin recently completed a series of reports investigating inland port development. These reports identified the traits that characterize communities at various points as they pursue the development of an inland port. Furthermore, the researchers developed a guide to identify which information communities might be expected to produce, before they could make a convincing case to those considering the planning consequences. A summary of these characteristics is provided in Table 1 and they essentially focus on developing a convincing business plan that will be supported by key members of the community and able to withstand rigorous evaluation.

Table 1: Marketing and Implementation Plan

- Market analysis (demand forecasts, commodity origins and destinations)
- Location advantage (identify anchor tenants, access to markets)
- International trade facilitation (Free Trade Zones, tax incentives)
- Funding (capital, marketing operations, mechanisms: public/private partnerships)
- Multimodal transportation (identity transport facilities needed)
- Community outreach
- Planning horizons (modes, TxDOT, investors)
- Identify future constraints

Source: Leitner and Harrison, 2002.

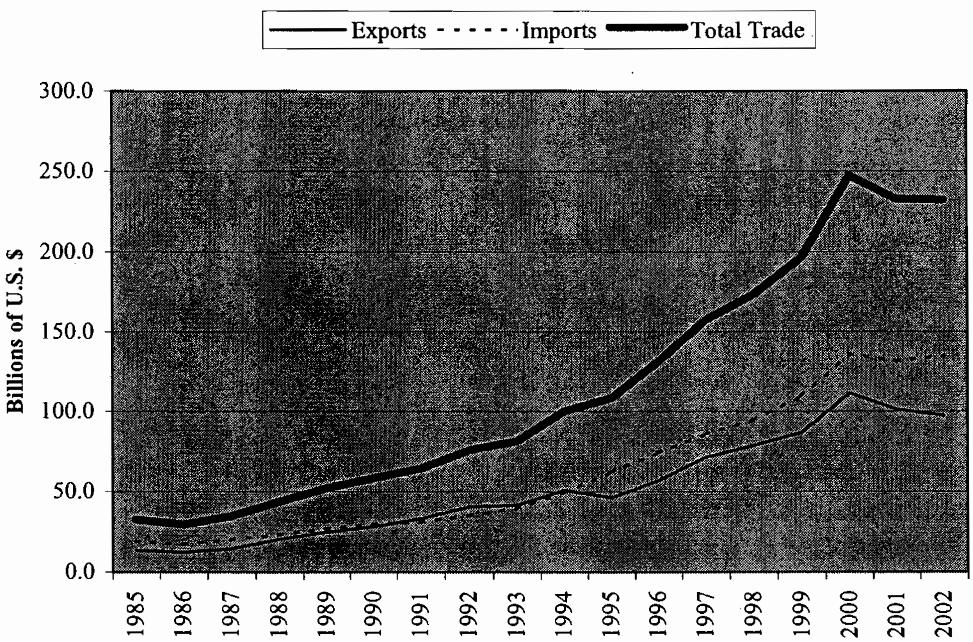
When producing a strategic plan to pursue the development of an inland port, a market analysis plays a critical role. Such a plan should describe the potential demand that firms could have for the services provided at an inland port at a specific location. The Fort Stockton Economic Development Corporation (FSEDC) has requested that the authors provide an analysis of current, publicly available U.S.-Mexico trade data to initiate an exploration into the reasonableness and appropriateness of an inland port in Fort Stockton. If the initial research and analysis justifies further work, then the next step of this effort would be to develop a strategic plan for creating an inland port in Fort Stockton that pursues three overall goals:

1. Redirect export-import trade flows from El Paso through Presidio and Fort Stockton
2. Develop manufacturing facilities with economic linkages to Mexico and other regions of Texas and the United States.
3. Develop warehousing and distribution facilities in Fort Stockton to serve northern Mexico, Texas, and the southwest United States.

U.S.-MEXICO TRADE PATTERNS

Trade between the United States and Mexico has risen dramatically since 1986, when Mexico entered into the General Agreement on Tariffs and Trade (GATT) (See Graph 1). The implementation of the North American Free Trade Agreement (NAFTA) in 1994 only intensified this growth. However, the U.S. recession that began in 2000 brought an abrupt end to rising trade between the two countries and total trade actually declined between 2000 and 2002, falling from $247.3 billion to $232.1 billion. Since 2000, most of the decline of the United States' trade with Mexico has resulted from a fall of U.S. exports to Mexico, although the growth of U.S. imports from Mexico has also stagnated. Finally, Graph 1 shows that there has been a growing trade imbalance in Mexico's favor. In 2002, the United States imported $37.1 billion more goods than it exported to Mexico during the same year.

Graph 1: U.S. Trade with Mexico, 1985-2002



Source: U.S. Census Bureau – Foreign Trade Division, 2003.

TEXAS-MEXICO TRADE PATTERNS

Mexico is unquestionably Texas' largest export market and in 2002, the State exported $41.6 billion worth of goods to the nation (See Table 2). Exports to Mexico accounted for 43.6% of Texas' total exports to the world in 2002, falling modestly from almost 46.0 percent in 2000. Between 2001 and 2002, Texas' exports to Mexico also declined in total value (due to deteriorating economic conditions) and as a percentage of total exports.

Table 2: Texas' Export Trade in Billions of U.S. Dollars, 1999-2002

Value of Total Export Trade	***Mexico***	***World***
1999	*$37,860.9*	*$83,177.5*
2000	*47,761.0*	*103,865.7*
2001	*41,647.8*	*94,995.3*
2002	*41,647.0*	*95,396.2*

Percentage Share of Total	***Texas' Export Trade to Mexico***	***Texas' Share of U.S. Export Trade***
1999	*45.52%*	*12.00%*
2000	*45.98%*	*14.98%*
2001	*43.84%*	*13.70%*
2002	*43.66%*	*13.76%*
Percentage Change 2001-2002	*0.00%*	*0.42%*

Source: U.S. Bureau of Census – Foreign Trade Division, 2003.

Table 3 shows Texas' surface export trade with the individual Mexican states. The term "surface export trade" is defined here as Texas exports to Mexico carried by trucks, rail, pipelines, or mail service, as opposed to trade that moves by airplanes or ships. There are several observations worth noting from this table. First, the top ten export markets in Mexico accounted for 95 percent of Texas's surface trade exports in 2002. Second and more importantly, the Mexican state of Chihuahua, which is adjacent to West Texas, is Texas' largest export market for surface trade and accounts for more than 36.0 percent of the total or $13.6 billion.

Table 3: 2002 Texas' Top Ten Surface Trade Export Markets in Mexico

Rank	Mexican State	Total Value 2002	Percent of Total
1	Chihuahua	$13,658,877,741	36.26%
2	Tamaulipas	$6,634,023,282	17.61%
3	México	$3,970,289,102	10.54%
4	Coahuila	$3,459,251,159	9.18%
5	Nuevo León	$2,500,603,067	6.64%
6	Guanajuato	$2,384,701,438	6.33%
7	Distrito Federal	$1,720,722,981	4.57%
8	Jalisco	$994,452,660	2.64%
9	San Luis Potosí	$235,225,066	0.62%
10	Querétaro	$229,663,136	0.61%
	Subtotal - Top 10	$35,787,809,632	95.00%
	Total	$37,673,041,726	**100.00%**

Note: These figures are based upon origin of movement data, which attempt to only identify exports that were produced in Texas and minimizes the inclusion of goods that are simply traveling through Texas on their way to Mexico.

Source: U.S. Bureau of Transportation Statistics, 2003.

TRAVEL MODES FOR FREIGHT MOVEMENT

Trucks are used to transport the vast majority of surface trade between Texas and Mexico. In 2002, almost 90.0 percent of Texas' surface trade exports to Mexico and more than 91.0 percent of the State's imports from Mexico were transported using trucks (See Table 4). The second most important mode of transport was rail, which moved almost 9.0 percent of the state's exports to Mexico and approximately 3.0 percent of Texas' imports from Mexico.

Table 4: Texas Surface Trade Exports to and Imports from Mexico by Mode, 2002

Texas Surface Trade Exports To Mexico		
Mode	**Value**	**Percentage**
Mail	$171,490	>0.01%
Truck	33,611,077,865	89.22%
Rail	3,370,367,017	8.95%
Pipeline	567,927,109	1.51%
Other or Unknown	123,498,245	0.33%
Total	**$37,673,041,726**	**100.00%**

Texas Surface Trade Imports from Mexico		
Mode	**Value**	**Percentage**
Truck	$22,822,669,530	91.82%
Rail	826,057,678	3.32%
Other or Unknown	696,833	>0.01%
Free Trade Zone	1,207,749,569	4.86%
Total	**$24,857,173610**	**100.00%**

Source: U.S. Bureau of Transportation Statistics, 2003.

The available data for truck crossings at the border cities between Eagle Pass and El Paso are limited and are reported below (See Table 5). Although the number of years of data is few, several interesting characteristics are discernable. First, El Paso has, unquestionably, the highest number of truck crossings. In 2002, there were more than 700,000 northbound truck crossings.[1] Eagle Pass and Del Rio were the next busiest truck crossing cities, but with a fraction of El Paso's traffic. Presidio had 6,605 northbound crossings, in 2002, or roughly 26 trucks a day during a normal workweek, compared to roughly 2,700 a day for all the bridges in El Paso. The number of southbound crossings in Presidio was not available for analysis.

Table 5: Number of Northbound and Southbound Truck Crossings, 2001 through August 2003

Northbound Crossings	**2001**	**2002**	**2003 YTD**
Del Rio	59,942	72,039	45,429
Eagle Pass	97,658	89,856	57,960
El Paso	666,910	704,199	430,100
Fabens	108	n/d	n/d
Presidio	7,104	6,605	3,311
Texas Total	**2,913,165**	**3,014,672**	**2,057,737**

Southbound Crossings	**2001**	**2002**	**2003 YTD**
Del Rio	71,082	77,993	49,554
Eagle Pass	96,072	87,284	63,760
El Paso	344,023	307,203	158,428
Fabens	n/d	n/d	n/d
Presidio	n/d	n/d	n/d
Texas Total	**2,531,252**	**2,550,066**	**1,642,317**

Notes: n/d denotes that data were not available.

Northbound truck data provided by U.S. Customs Service for El Paso.

Southbound data provided by U.S. bridge operators in cited cities and compiled by Texas A&M International University, Texas Center for Border Economic and Enterprise Development

Truck information includes only 2 to 6 Axle loaded and unloaded commercial vehicles

Source: Texas Center for Border Economic and Enterprise Development, Texas A&M International University, 2003.

[1] This large discrepancy between the number of northbound and southbound crossings in El Paso is likely a result of how the trucks are counted (e.g. empty vs. loaded) or with the accuracy of southbound data collection.

Rail car crossing data are also difficult to obtain and are only available for a few cities along the border (See Table 6). Laredo is the primary crossing point for rail cars into Mexico, although Eagle Pass is another important rail car crossing. There are only data available for northbound rail crossings in El Paso, which amounted to more than 30,000 rail cars in 2002.

Table 6: Northbound and Southbound Rail Car Crossings 2001-2003 YTD

Northbound Rail Car Crossings	2001 Total	2002 Total	2003 YTD
Brownsville†	11,415	7,832	19,989
Eagle Pass‡	31,392	24,208	8,527
El Paso†	17,310	30,437	11,810
Laredo†	167,376	174,862	102,906
Total	**227,493**	**237,339**	**143,232**

Southbound Rail Car Crossings	2001 Total	2002 Total	2003 YTD
Brownsville†	40,935	50,309	26,604
Eagle Pass‡	86,038	86,331	43,577
El Paso	n/d	n/d	n/d
Laredo†	182,244	190,974	129,135
Total	**309,217**	**327,614**	**199,316**

Notes: n/d denotes that data were not available
† Railcar counts through August 2003
‡ Railcar counts through July 2003

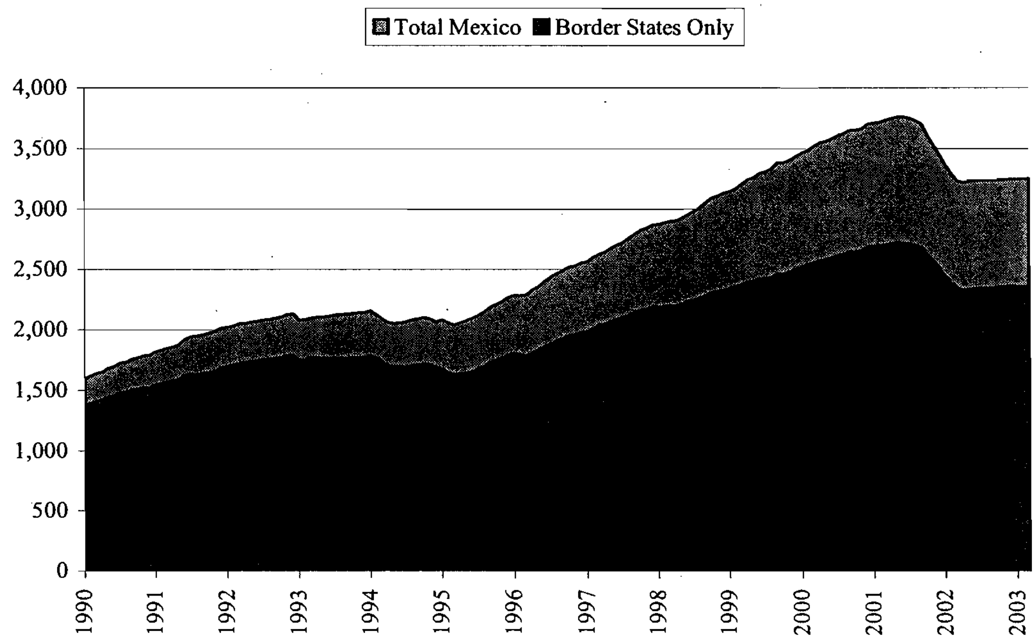
Source: Texas A&M International University, Texas Center for Border Economic and Enterprise Development, September 2003.

MEXICO'S MAQUILADORA SECTOR

Presently, Mexico's maquiladora sector is undergoing significant cyclical and structural changes that have manifested into a falling number of facilities and workers. The cyclical effects on the Mexican maquiladora sector are the result of the 2001 economic recession in the United States and the slow economic growth that has followed this recession. The structural effects, according to officials in Chihuahuan state government, are the result of efforts to replace labor with machinery, higher worker productivity, and a movement of maquiladoras to China and other Southeast Asian countries to reduce labor costs.

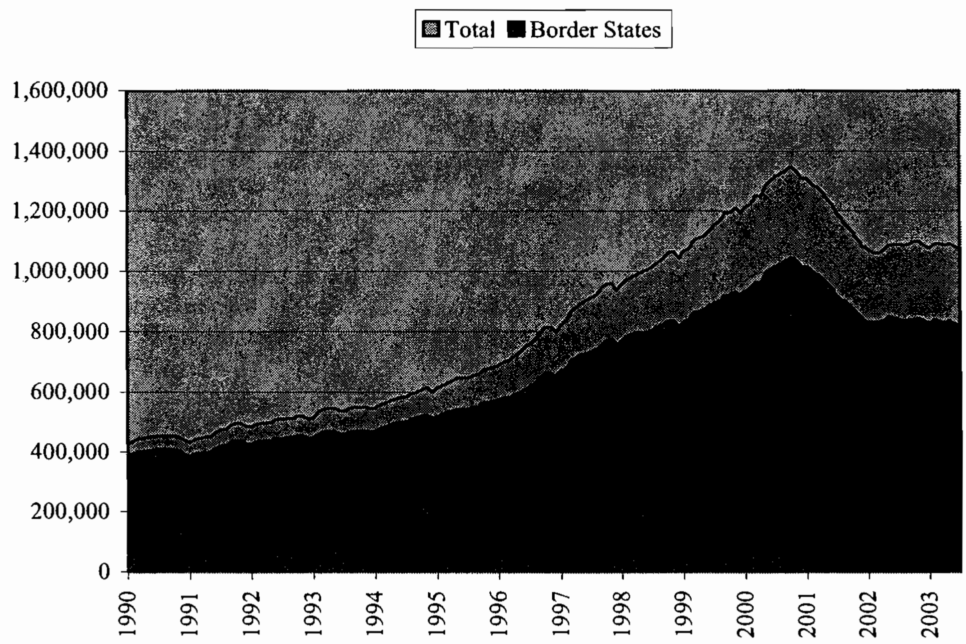
The total number of maquiladoras in Mexico began to fall during mid-2001, after reaching a zenith of 3,761 facilities and, by March 2003, that figure had dropped to 3,251 (See Graph 2). The number of maquiladoras located in Mexican states along the U.S. border has also declined, from 2,721 in May 2001 to 2,359 in March 2003. It is also worth noting that these historic figures show that a growing share of maquiladoras are being located away from the Mexican border states and into the interior of the country.

Graph 2: Total Number of Maquiladoras, January 1990 to March 2003



The number of workers in Mexican maquiladoras has also declined; in fact the falling number of worker preceded the reduction in the number of facilities (See Graph 3). The highest number of Mexican maquiladora employment occurred in October 2000, when there were 1,347,803 workers. Among them, 1,045,410 were employed in maquiladoras that were located in Mexico's border states. After this point, maquiladora employment dropped dramatically until early-2002, when it began leveling off. In July 2003, total maquiladora employment in Mexico equaled 1,071,400 workers, a decline of approximately 276,000 employees in less than three years. Similarly, maquiladora employment in the Mexico's border states also fell and totaled 821,500 workers in July 2003, a decline of almost 250,000 workers from its peak in October 2000.

Graph 3: Number of Maquiladora Workers in Mexico, January 1990 to July 2003



Source: Instituto Nacional de Estadística Geographía Informática, 2003.

Table 7 shows the number of maquiladora facilities in various Mexican cities during May 2003. Tijuana has the largest number of maquiladoras in Mexico with 646 facilities, while Ciudad Juarez had the second most with 301 maquiladoras. Chihuahua City had 82 maquiladoras as of March 2003 and Torreón had 47. The Mexican government's statistics did not report any maquiladoras being located in the city of Ojinaga.

Table 7: Number of Maquiladora Manufacturing Facilities in Mexican Cities as of May 2003

City	Mexican State	Number of Facilities
Agua Prieta	Sonora	21
Ciudad Acuña	Coahuila	54
Ciudad Juarez	Chihuahua	301
Ciudad Chihuahua	Chihauhua	82
Guadalajara	Jalisco	38
Guadalupe		24
Matamoros	Tamaulipas	131
Mexicali	Baja Norte	175
México and the Federal District (Mexico City)	México and Distrito Federal	74
Monterrey	Nuevo León	20
Nuevo Laredo	Tamaulipas	56†
Nogales	Sonora	79
Piedras Negras	Coahuila	33
Reynosa	Tamaulipas	141
Tecate	Baja Norte	132
Tijuana	Baja Norte	646
Torreon	Coahuila	47

† March 2003 data.

Source: Instituto Nacional de Estadística Geographía Informática, 2003.

MAQUILADORA SECTOR TRENDS

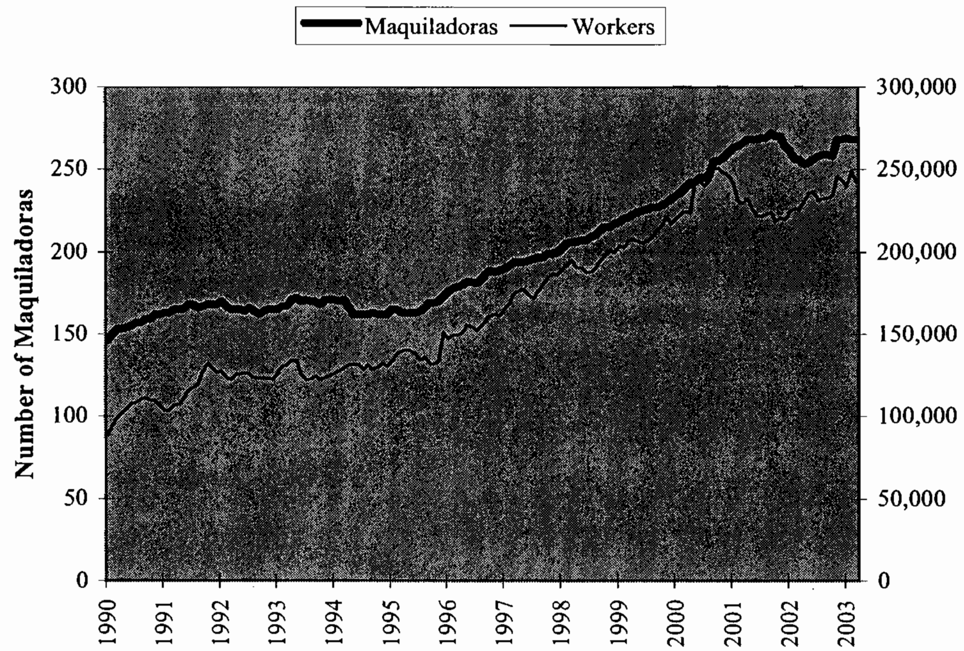
The next few pages show, for various industries, the trends in the number of maquiladora manufacturing facilities and workers between January 1990 and March 2003 (See Graph 4 through Graph 11). The data in these charts show which maquiladora industries appear to be experiencing continued growth, which are affected by cyclical economic conditions, which are volatile, and which appear to be declining. For economic development purposes, Fort Stockton will want to concentrate on growing industries and perhaps even growing industries that have been negatively affected by U.S. economic conditions but have shown overall positive growth. Obviously, Fort Stockton will want to be cautious about developing linkages with industries that are volatile or that appear to be or could be declining. Table 8 summarizes our initial assessment of various industries in the maquiladora sector.

Table 8: Initial Assessment of Growth Prospects for Select Maquiladora Industries

Industry	Assessment	Comments
Automotive	Growing/Cyclical	Susceptible to U.S. and world economic conditions but just-in-time manufacturing will require a proximity to low-cost labor that is only found in Mexico at present.†
Chemical Products	Growing/Cyclical/Somewhat Volatile	The prices of chemical commodities can fluctuate as other commodities do. Mexico's petroleum resources and West Texas' equipment and experience with petrochemicals could be mutually advantageous.
Electrical and Electronics Materials and Accessories	Declining/Cyclical	Significant offshore movement to China and other Asian countries for lower cost consumer products. Remaining firms will produce more sophisticated products.
Food Preparation	Volatile/Cyclical/Seasonal	Demand varies by food commodity prices and harvests.
Furniture	Potentially Declining/Cyclical	Susceptible to lower labor costs in Asia.
Textile, Leather, and Shoes	Declining/Cyclical	Significant offshore movement to China and other Asian countries, as well as Central America.
Tools and Equipment	Growing	Small but growing industry. Mexico has skilled labor for further growth.
Toys and Sporting Goods	Potentially Declining/Cyclical	Susceptible to lower labor costs in Asia.

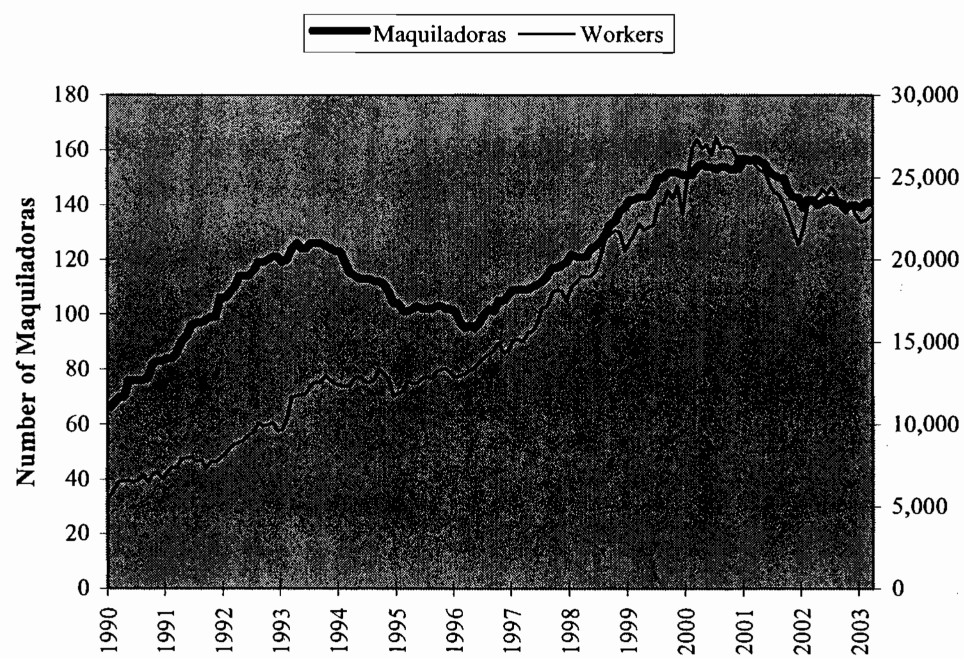
† The FSEDC should continuously monitor each of these industries for changing conditions and competitiveness, particularly the U.S. automotive industry. The above assessment assumes that industry conditions will remain relatively stable and will not significantly deteriorate over the short to medium-term. It should be noted that Ford Motor Company is currently experiencing financial difficulties and there are some industry analysts with serious concerns about the company's viability over the near-term. Major changes at any of the three major U.S. automakers could have significant impacts on U.S.-Mexico trade levels and patterns.

Graph 4: Number of Maquiladoras and Workers in the Automotive Industry, January 1990 through March 2003



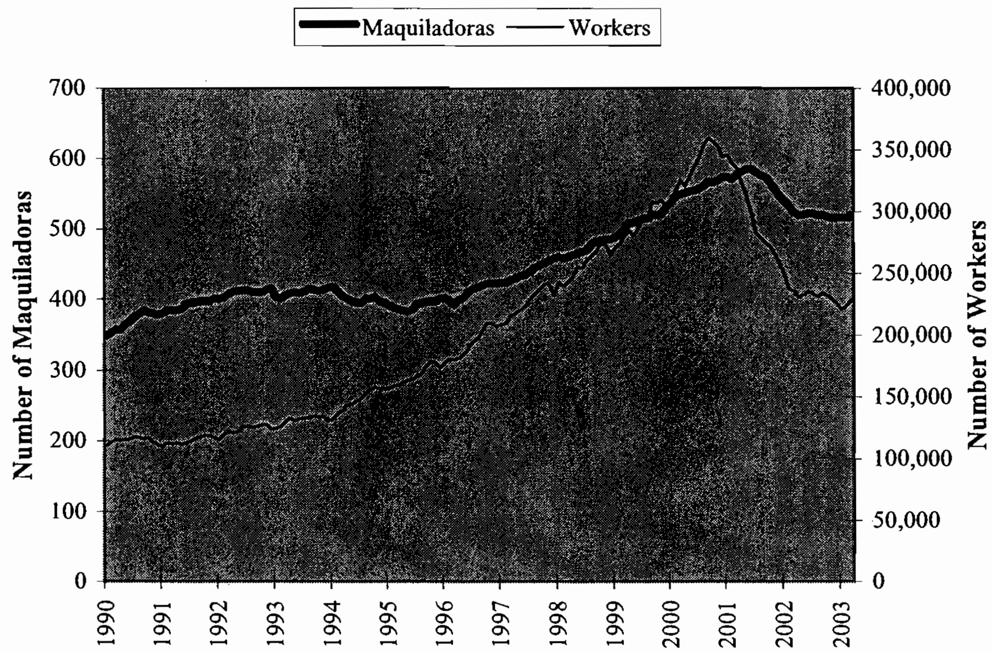
Source: Instituto Nacional de Estadística Geographía Informática, 2003.

Graph 5: Number of Maquiladoras and Workers in the Chemical Products Industry, January 1990 through March 2003



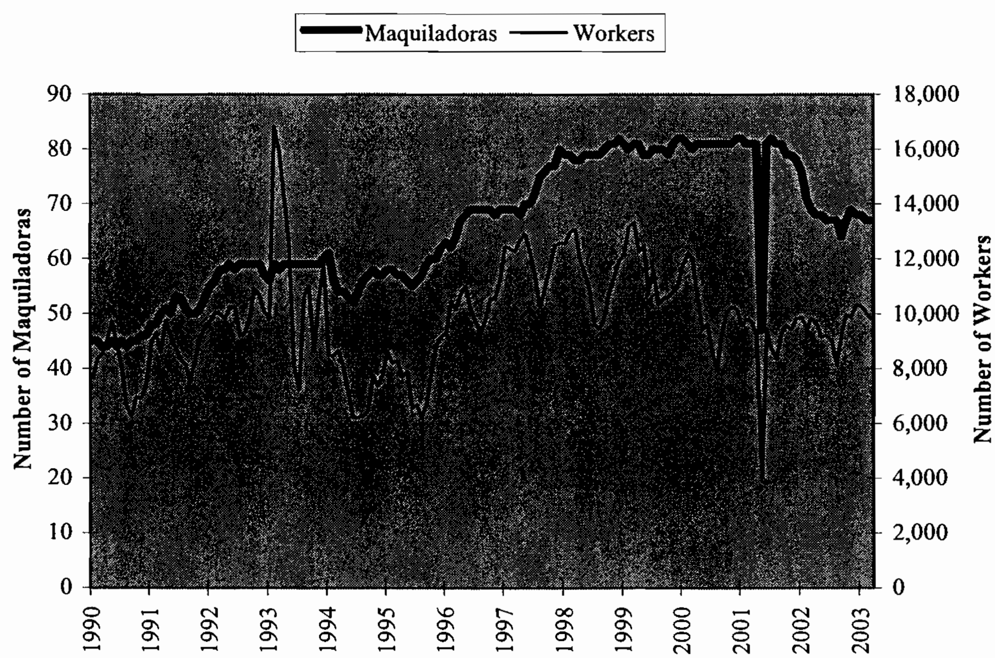
Source: Instituto Nacional de Estadística Geographía Informática, 2003.

Graph 6: Number of Maquiladoras and Workers in the Electrical and Electronics Materials and Accessories Industries, January 1990 through March 2003



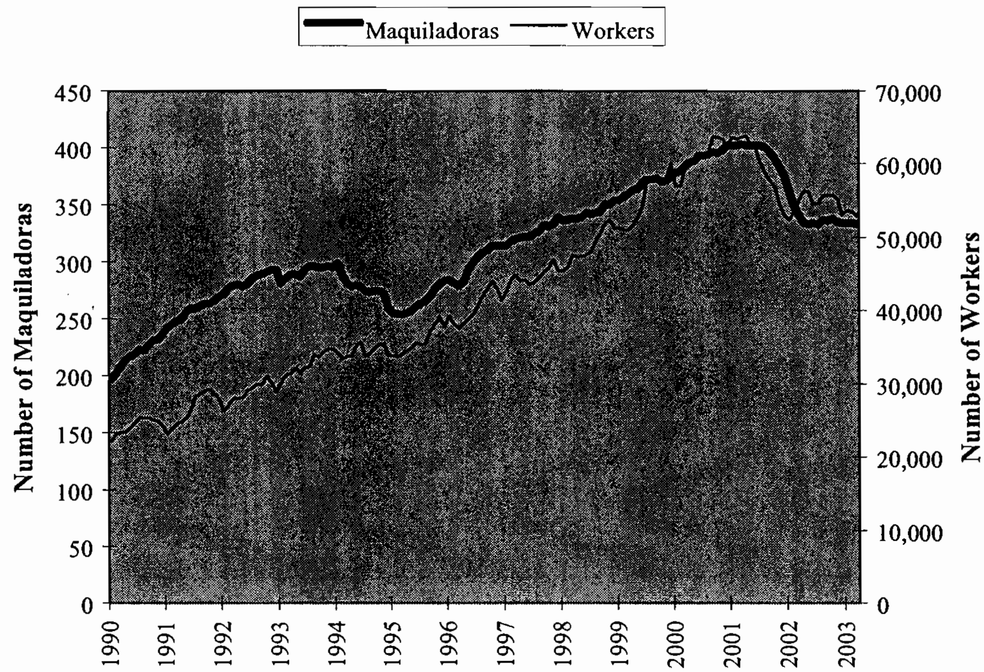
Source: Instituto Nacional de Estadística Geographía Informática, 2003.

Graph 7: Number of Maquiladoras and Workers in the Food Preparation Industry, January 1990 through March 2003



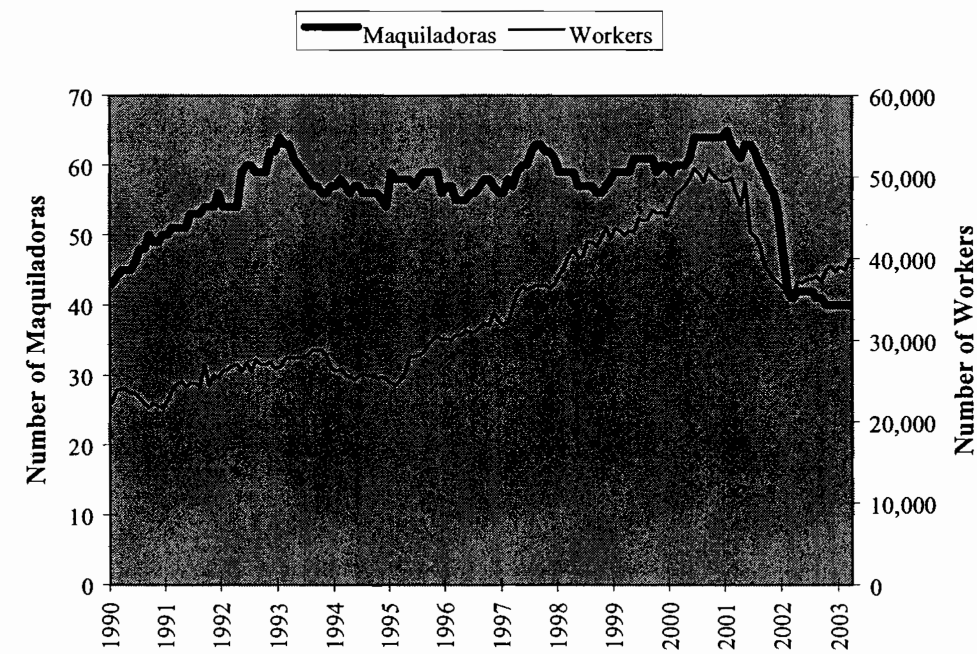
Source: Instituto Nacional de Estadística Geographía Informática, 2003.

Graph 8: Number of Maquiladoras and Workers in the Furniture Industry, January 1990 through March 2003



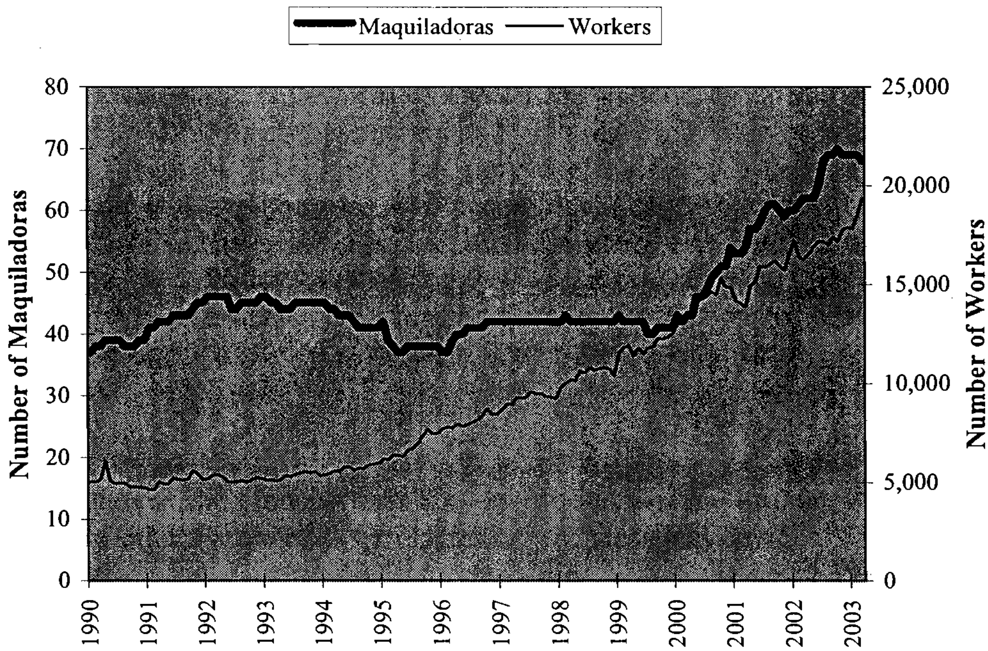
Source: Instituto Nacional de Estadística Geographía Informática, 2003.

Graph 9: Number of Maquiladoras and Workers in the Textile, Leather, and Shoe Industries, January 1990 through March 2003



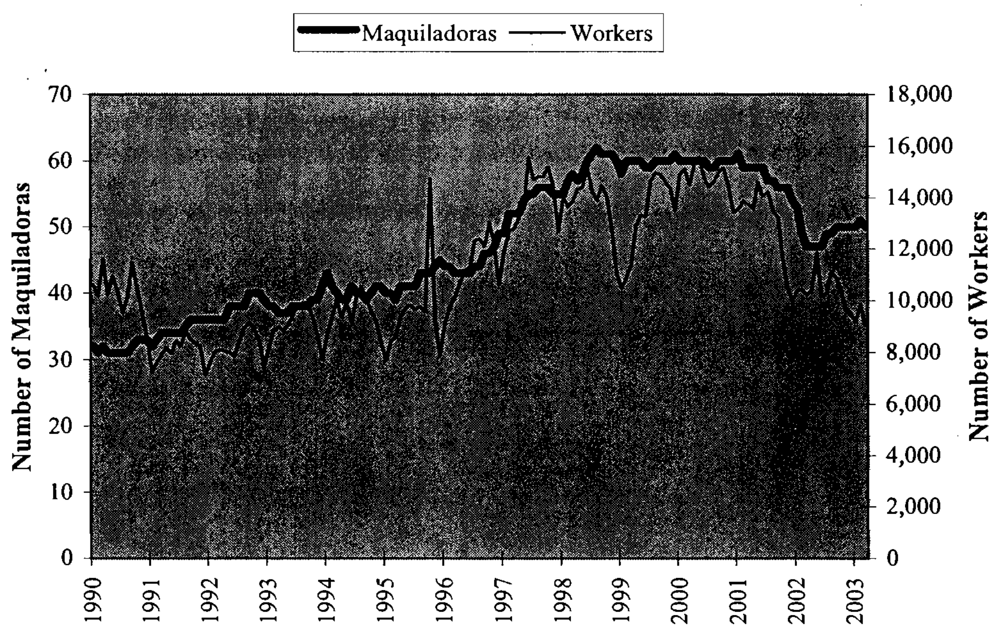
Source: Instituto Nacional de Estadística Geographía Informática, 2003.

Graph 10: Number of Maquiladoras and Workers in the Tools and Equipment Industries, January 1990 through March 2003



Source: Instituto Nacional de Estadística Geographía Informática, 2003.

Graph 11: Number of Maquiladoras and Workers in the Toy and Sporting Goods Industries, January 1990 through March 2003



Source: Instituto Nacional de Estadística Geographía Informática, 2003.

COMMODITIES TRADED THROUGH WEST TEXAS

Table 9 through Table 11 shows the top ten commodities crossing through Presidio and El Paso at the 5-digit Standard International Trade Code (SITC) between January and June of 2003. The SITC codes shown in these tables are a standardized method to categorize trade for reporting purposes and are used by most governments and international trade organizations in the world. The most general level of SITC codes has only one digit and represents a broad category of goods such as food and live animals. The second level of SITC codes, within the category of food and live animals, has two-digits and includes categories for live animals, meats, dairy products and eggs, etc. Within each of these two-digit descriptions, there would be even more categories with three-digit SITC codes that would give descriptions of products with even more detail. At the five-digit SITC code, which is shown in the table below, goods are explained in very specific detail.

Table 9 and Table 10 show the products that are exported and imported through Presidio, respectively. Many of the products that are exported to Mexico through Presidio are related to agriculture, while others are metals or machinery for electrical devices, vehicles, or processing ores. Most of the products that are imported from Mexico through Presidio are related to agricultural products and equipment, vehicles, and metals.

Table 9: Top 10 Export Commodities Crossing Through Presidio, Texas
January through June 2003

Rank	SITC	Product Description
1	77255	Switches for electrical apparatus, n.e.s., for voltages not exceeding 1,000 volts
2	74810	Transmission shafts (including cam and crank shafts) and cranks
3	78689	Parts of trailers and semi-trailers, for housing or camping, transport of goods, trailers, n.e.s. and vehicles not mechanically propelled, n.e.s.
4	72123	Harvesting and threshing machinery, n.e.s.; mowers, n.e.s. (other than mowers for lawns, parks or sports grounds)
5	29252	Seeds of forage plants, other than beet seed
6	99200	Export shipments valued not over $10,000 (thru march 1998) and not over $20,000 (effective april 1998), not identified by kind
7	74564	Agricultural or horticultural appliances for projecting, dispersing or spraying liquids or powders
8	69969	Articles of iron or steel, n.e.s.
9	72249	Wheeled tractors, n.e.s.
10	72839	Parts of machinery for sorting, washing, crushing or mixing earth, stone, ores etc., And for shaping solid mineral fuels, ceramic pastes etc.

Source: Texas A&M International University, Texas Center for Border Economic and Enterprise Development, September 2003a.

Table 10: Top 10 Import Commodities Crossing Through Presidio, Texas
January through June 2003

Rank	SITC	Product Description
1	00119	Bovine animals, other than purebred breeding animals, live
2	69979	Articles of aluminum, n.e.s.
3	05779	Edible nuts (excluding mixtures), fresh or dried, n.e.s., whether or not shelled or peeled
4	78439	Parts and accessories n.e.s. for tractors, motor cars and other motor vehicles, trucks, public-transport vehicles and road motor vehicles, n.e.s.
5	78683	Trailers and semi-trailers, n.e.s.
6	07513	Fruits of the genus capsicum or of the genus pimenta, dried or crushed or ground
7	78689	Parts of trailers and semi-trailers, for housing or camping, transport of goods, trailers, n.e.s. and vehicles not mechanically propelled, n.e.s.
8	67959	Iron and steel tube and pipe fittings, n.e.s.
9	93100	Special transactions and commodities not classified according to kind
10	78685	Vehicles, not mechanically propelled, n.e.s.

Source: Texas A&M International University, Texas Center for Border Economic and Enterprise Development, September 2003a.

Table 11 and Table 12 show the top ten export and import products that cross through El Paso. Most of the products that are exported to Mexico through El Paso are electronics or electrical equipment. The most important products imported into the United States from Mexico through El Paso include motor vehicles and their parts, televisions, and radio equipment.

Table 11: Top 10 Export Commodities Crossing Through El Paso, Texas
January through June 2003

Same as above

Rank	SITC	Product Description
1	75997	Parts of automatic data processing machines and units thereof, magnetic or optical readers, and machines for transcribing and processing data n.e.s.
2	76493	Parts of television receivers, radiobroadcast receivers, transmission apparatus for radio telephony, telegraphy, broadcasting or television etc.
3	89399	Articles of plastics, n.e.s.
4	77282	Parts of electrical apparatus for switching or protecting electrical circuits for making connections to or in electrical circuits, n.e.s.
5	77641	Digital monolithic integrated units
6	77259	Electrical apparatus for switching or protecting electrical circuits or making connections to or in electrical circuits, n.e.s., not exceeding 1,000 v
7	77314	Electric conductors, for a voltage not exceeding 80 volts, n.e.s.
8	75260	Input or output units whether or not presented with the rest of a system and whether or not containing storage units in one housing in data processing
9	89319	Articles for the conveyance or packing of goods, n.e.s., of plastics; stoppers, lids, caps and other closures, of plastics
10	77643	Non-digital monolithic integrated units

Source: Texas A&M International University, Texas Center for Border Economic and Enterprise Development, September 2003a.

Table 12: Top 10 Import Commodities Crossing Through El Paso, Texas January through June 2003

Same as above

Rank	SITC	Product Description
1	77313	Ignition wiring sets and other wiring sets of a kind used in vehicles, aircraft or ships
2	75230	Digital processing units whether or not presented with the rest of the system which may contain storage units, input units or output units
3	82119	Parts of seats, n.e.s.
4	78120	Motor vehicles for the transport of persons (other than public transport), n.e.s.
5	76110	Television receivers, color, including video monitors & projectors), whet or not incorporated radio broadcast receivers or sound or video recording or reproducing apparatus
6	93100	Special transactions and commodities not classified according to kind
7	76431	Transmission apparatus for radiotelephony, radiotelegraphy, radio broadcasting or television, not incorporating reception apparatus
8	75997	Parts of automatic data processing machines and units thereof, magnetic or optical readers, and machines for transcribing and processing data n.e.s.
9	78219	Motor vehicles for the transport of goods, n.e.s.
10	76211	Radiobroadcast receivers, combined with sound recording or reproducing apparatus, operating with an external power source as in motor vehicles

Source: Texas A&M International University, Texas Center for Border Economic and Enterprise Development, September 2003a.

ISSUES TO CONSIDER

The Agricultural and Mineral Ore Orientation of the Presidio Crossing – Although Presidio is presently one of the smaller crossing points along the Texas-Mexico border, in terms of the volume and value of trade, it has developed a strong orientation toward crossing products in the agricultural and mineral ore mining sectors. This is not surprising, since these are the primary rural economic activities in northern Mexico. Fort Stockton may wish to consider developing stronger linkages with Mexican firms in these industries.

The Mexican Maquiladora Sector is Declining- The Mexican maquiladora sector is no longer growing as it once had and so there are greater risks in any attempt to develop linkages with it. The best long-term prospects will be in industries that are intertwined with production processes in the United States (such as automobile manufacturers who get parts from Mexico) and goods that require skilled labor. Although, Mexico does not have a particularly educated population, its workers are highly skilled and relatively productive, which still makes them attractive for more sophisticated manufacturing. However, in the case of low-price items that do not require a great deal of skilled labor to produce, the hemorrhaging of jobs to Asia and Central America is likely to intensify.

Lagged Increase in Truck Traffic at Presidio - The completion of the improvements to Mexican Highway 16 may not necessarily result in an immediate, substantial increase in the number of trucks crossing at Presidio. This delayed response may be the result of several factors. First, Mexican law requires the involvement of custom brokers in the transfer of goods across the border. Custom broker licenses in Mexico are issued by the government and are both a prized possession for their owners and a method of control and reward for the government. Unlike the United States, the process of becoming a custom broker is not open to all persons who qualify. As a result of the Mexican custom broker system, there may not be a sufficient number of customs brokers to immediately handle a large increase in demand at the Presidio crossing. Remember, right now, there are about 100 times more trucks crossing every day in El Paso than there are in Presidio. Additionally, over time, shippers have developed relationships with brokers and transport companies in Ciudad Juarez and they may be reluctant to shift to Ojinaga unless there are significant cost savings. Similarly, corporate logistic managers are extremely risk-averse and they prefer reliability to speed in uncertain situations. This is because they can face significant penalties if they fail to deliver a shipment on time, even once, while the benefits they may gain from the risk could be modest. Therefore, many logistic managers are willing to tolerate a certain level of inefficiency to insure reliability. Second, trucks crossing the U.S.-Mexico border must rely on the drayage system to cross the border. Therefore, there must be a sufficient number drayage firms with adequate equipment capacity to handle the increase demand at the Presidio-Ojinaga crossing. Third, the velocity of the flow of goods into the U.S. is very much determined by the capacity of the roadway and bridge infrastructure and the availability of staff at federal inspection stations. These changes occur slowly. Therefore, Fort Stockton would be prudent to expect increasing truck flows to and from Mexico through Presidio, but the growth will likely be gradual rather than a dramatic jump.

Diverting Trade Traffic and Establishing a Trade Corridor - Not all maquiladora traffic can be diverted because firms may have producers or warehouses of inputs in El Paso that could not be easily moved. Only some firms will find it more advantageous to move their goods through Presidio rather than El Paso. The committee should ask the question "Is it necessarily in the interest of Fort Stockton to attract maquiladora or off-shore manufacturing trade traffic, if that truck traffic is simply passing through." If trucks are only passing through, the benefits will be limited (more business for fuel, food, lodging, and truck repair), while creating far more traffic for local residents. On the other hand, by establishing itself along a trade route, there is potential for firms to locate facilities in Fort Stockton as a staging point for northern Mexico or as a distribution point for West Texas or the southwestern part of the United States. The committee should consider making Fort Stockton into distribution point as a primary strategy for development.

Crossing the U.S.-Mexico border at Presidio instead of El Paso can offer substantial savings in terms of miles traveled and (with adequate broker, drayage, and infrastructure facilities) in terms of time for traffic to and from Chihuahua City (See Table 13). Crossing at the Ojinaga-Presidio port-of-entry instead of the Ciudad Juaréz-El Paso port-of-entry from Chihuahua City reduces the trip distance by approximately 175 miles (about two and one-half hours of travel time) when the final destination is San Antonio, Austin, or Houston.[2] If the destination is Fort Worth or Dallas, crossing at Presidio reduces the trip distance by approximately 102 miles, roughly one and one-half hour of travel time.[3]

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[2] For the Presidio Crossing, this distance assumes taking Mexican Highway 16 from Chihuahua City to Ojinaga, U.S. 67 and I.H. 10 from Presidio to Fort Stockton, and I.H. 10 to San Antonio and Houston. Austin is reached via I.H. 35 from San Antonio, although U.S. 290 at Junction offers an alternate route. The El Paso crossing assumes Mexican Highway 45 from Chihuahua City to El Paso, I.H. 10 to San Antonio and Houston, and I.H. 35 from San Antonio to Austin.

[3] For the Presidio crossing, this distance assumes taking Mexican Highway 16 from Chihuahua City to Ojinaga, U.S. 67 and I.H. 10 from Presidio to Fort Stockton, U.S. 385 to Midland-Odessa, and I.H. 20 to Fort Worth and Dallas. The El Paso crossing assumes Mexican Highway 45 from Chihuahua City to El Paso, I.H. 10 from El Paso to its intersection with I.H. 20, and I.H. 20 to Fort Worth and Dallas.

Table 13: Approximate Distances between Chihuahua City and Major Texas Cities via El Paso and Presidio

Origin	Crossing Point	Destination	Approx. Miles
Chihuahua City	El Paso	San Antonio	787
Chihuahua City	Presidio	San Antonio	612
Chihuahua City	El Paso	Austin	868
Chihuahua City	Presidio	Austin	693
Chihuahua City	El Paso	Houston	985
Chihuahua City	Presidio	Houston	810
Chihuahua City	El Paso	Fort Worth	809
Chihuahua City	Presidio	Fort Worth	707
Chihuahua City	El Paso	Dallas	841
Chihuahua City	Presidio	Dallas	739

It was initially hoped that the Ojinaga-Presidio crossing would reduce the distance between Torreón and major Texas cities, but this was not true (See Table 14). In reality, the distance of crossing the U.S.-Mexico border at either Ciudad Juaréz-El Paso or Ojinaga-Presidio from Torreón was substantially greater than crossing at the Nuevo Laredo-Laredo crossing. In general, it makes the most sense for Fort Stockton to concentrate its efforts on diverting trade from Chihuahua City and not to concentrate its efforts on diverting trade from other Mexican cities.

Table 14: Approximate Distances between Torreón and Major Texas Cities via El Paso, Presidio, and Laredo

Origin	Crossing	Destination	Approx. Miles
Torreón	El Paso	San Antonio	1,068
Torreón	Presidio	San Antonio	893
Torreón	Laredo	San Antonio	519
Torreón	El Paso	Austin	1,149
Torreón	Presidio	Austin	974
Torreón	Laredo	Austin	600
Torreón	El Paso	Houston	1,266
Torreón	Presidio	Houston	1,091
Torreón	Laredo	Houston	678
Torreón	El Paso	Fort Worth	1,090
Torreón	Presidio	Fort Worth	988
Torreón	Laredo	Fort Worth	792
Torreón	El Paso	Dallas	1,122
Torreón	Presidio	Dallas	1,020
Torreón	Laredo	Dallas	802

SUMMARY

This report evaluates the most recent, publicly available trade data along the Eagle Pass to El Paso segment of the U.S.-Mexico border. The information provided in this report takes into account the economic conditions that have occurred since the September 11, 2001 terrorist attacks. Appendix A gives the top 25 export and import commodities crossing at El Paso and Presidio for use in further trade analysis.

The next step is to develop a demand analysis for commodities likely to be impacted by improvements in transportation services along the South Orient Network and by the provision of logistical centers at Fort Stockton, like an inland port. It is therefore recommended that the following elements be addressed as part of this analysis.

1. Quantify the available workforce and housing stock in Fort Stockton for potential employers. This will help to target the size and subsequently the types of industry to attract.
2. Characterize roadway conditions in northern Mexico to determine the likelihood of redirecting trade from El Paso through Presidio.
3. Identify the capacity and availability of custom broker and drayage services in Ojinaga and Presidio. Identify any constraints to adding capacity at this crossing.
4. Identify firms and manufacturing facilities in Chihuahua City and northern Mexico, which could be targeted for economic linkages with Fort Stockton or the West Texas area. Those industries that appear to be the better prospects for long-term success are automotive (assuming no major changes), tools, and, perhaps, chemicals. Industries to exercise caution with are electronics, textiles and apparel, and toys.
5. Research the needs and prospects for warehousing, distribution, and exporting to northern Mexico and the southwest United States from Fort Stockton.

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DEMAND FOR SOUTH ORIENT RAILWAY SERVICES

Robert Harrison, CTR

INTRODUCTION

Demand analysis for transportation modes like rail is always challenging but particularly so when new services are being introduced. Not only are price and delivery time key determinants of demand but any new services must establish credibility on the part of shippers in the areas of time reliability, damage, and other attributes.

Fort Stockton Economic Development staff, led by Doug May, have been working diligently to stimulate railroad demand. The commodities targeted include traditional West Texas agriculture and mineral products (hay and minerals) and NAFTA commodities like hot house tomatoes. Looking to the future, there are commodities such as scrap metal, metropolitan waste, and grain (the latter passing *en route* to Asia) that might use the system if the line offers reasonable service.

Demand Analysis

A basic sequence of demand can be regarded as multi-stage, comprising:

1. Identification of commodity
2. Marketing SOR to shipper
3. Shipper asking for SOR rate request
4. SOR issued rates
5. Service contract
6. Experience with service
7. New demand for SOR based on satisfactory service performance

Currently, Texas Pacifico Railroad (TXPF) is moving car loads on the northern section of its network from San Angelo. This traffic is estimated by TXPF at 1600 revenue car loads (100 tons) per year and, although this (a) seems conservative based on the reported 2003 data and (b) is held constant over the ten year time period used in this analysis, the figure is adopted in this study for consistency purposes.

Table 1 provides car load based on the commodity rate requests sent to TXPF. It covers the period years 1 through 5, and year 10. These data are then summed and moved to Table 2 where they provide one estimate of potential demand.

Speed over the network is a critical service performance factor and TXPF provided TxDOT with three operating scenarios and demand estimates for consideration. These are given in Box 1.

Box 1. TXPF Future Traffic Scenarios

Scenario 1 – Operating trains at current speeds and infrastructure, TXPF projects 1,600 carloads of local traffic and 4,680 carloads of international traffic per year.

Scenario 2 – Operating trains at 25mph along the route with the exception of 75 miles of 70# rail, between east of Ft. Stockton & Alpine (10mph); with the construction of 4 sidings; TXPF projects 1,600 carloads of local traffic and 7,400 carloads of international traffic per year.

Scenario 3 – Operating the entire route at 25mph with the construction of 5 sidings; TXPF projects 1,600 carloads of local traffic and 10,400 carloads of international traffic per year.

Accordingly, they were used to produce a key statistic – namely how does capacity of the system at the three speeds match up to the estimated demand?

Randy Resor of ZETA-TECH produced a further set of capacity data based on (a) locomotive sets along the three network segments and (b) the line constraints within the networks. These data are give in Appendix B. After discussions with CTR and TxDOT, it was decided to adopt the 3-3-3 Case 1, for the 10mph and 25mph capacities (Scenarios 1 and 2) and the 2-5-2 Case 2, for the 40mph capacity (Scenario 3) for the purpose of matching demand with capacity.

TABLE 1. Forecast New Demand Based on Rate Requests to SOR (car loads)

			FORECAST, CARLOADS PER YEAR					
PRODUCT	**CAR TYPE**	**ROUTE**	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**	**YEAR 10**
AGGREGATE (MINERALS)	BULK	NORTH	600	900	1200	1200	1200	1800
ALFALFA HAY	BOX	SOUTH	120	240	480	960	960	1200
PHOSPHOROUS	BULK	NORTH	3	6	6	6	12	24
PROCESSED LIVESTOCK FEED	BOX	SOUTH	12	24	36	36	36	48
FUEL	TANKER	SOUTH	48	72	72	48	24	24
BENTONITE/HUMITE	BULK	NORTH	72	120	240	480	480	720
WHOLE CORN & MILO	BULK	SOUTH	48	48	72	72	96	144
COTTONSEED	BOX	SOUTH	300	360	540	660	780	1200
HOT HOUSE TOMATOES	REFRIG BOX	NORTH	0	100	500	1500	1500	1500
RUBBER	REFRIG BOX	SOUTH	0	0	20	100	200	400
CERAMIC TILE	BOX	NORTH	0	0	100	200	300	500
MASA (FLOUR)	BOX	NORTH	0	50	100	100	200	400
FEED GRAINS (LIVESTOCK COOPERATIVES)	HOPPER	SOUTH	50	200	400	600	800	1000
SCRAP METAL		SOUTH	100	300	500	500	500	500

TABLE 2. Total Demand, Current and New Demand for SOR

	FORECAST, TOTAL ANNUAL REVENUE TONS (00)					
DIRECTION	**YEAR 1**	**YEAR 2**	**YEAR 3**	**YEAR 4**	**YEAR 5**	**YEAR 10**
NORTH	676	1176	2146	3486	3692	4944
SOUTH	676	1244	2120	2976	3396	4516
CURRENT TRAFFIC	1600	1600	1600	1600	1600	1600
TOTAL	2953	4020	5866	8062	8688	11060

FINDINGS

Table 3 gives the findings for the three TXPF scenarios.

TABLE 3. Consolidated Forecasted Traffic (revenue tons, 00) VS. Capacity

Scenario 1 (10 mph) Nine locomotives 3-3-3		
	TxPF Forecasted	Zeta-Tech Capacity
LOCAL[1]	1600	
INTERNATIONAL[1]	4680	
NEW US[2]	1350	
TOTAL	7630	4056

Scenario 2 (25 mph) Nine locomotives 3-3-3		
	TxPF Forecasted	Zeta-Tech Capacity
LOCAL	1600	
INTERNATIONAL	7400	
NEW US	3770	
TOTAL	12770	6084

Scenario 3 (40 mph) Nine locomotives 2-5-2		
	TxPF Forecasted	Zeta-Tech Capacity
LOCAL	1600	
INTERNATIONAL	10400	
NEW US	5590	
TOTAL	17590	13260

NOTE: 1. TXPF Forecasts
2. US Regional rate requests (Source May, 2004)

It can be seen that forecasted demand exceeds capacity by 1.9 times at 10mph, 2.1 times at 25mph, and 1.4 times at 40mph. And this data is conservative because capacity was calculated at 100 ton per car load, if the net load was 75 tons for example, the figure for 10mph rises to 2.5 times. The conclusion, at this admittedly early stage in the analysis, is that demand is unlikely to be the key problem on whether the SOR can be successful. Rather it will be the capacity of the track and the ability of TXPF to offer reliable and dependable service over its network.

Specifically,

1. With modest investment, the SOR can offer regular services of shippers.
2. The pattern of commodities that could be shipped over the railroad is both real and of sufficient magnitude to warrant investment <u>if SOR can offer reliable service</u>.

3. It may be possible to stage the process so that investment milestones match demand. For example, only if demand reaches X1 when Y1 investments have been made will TxDOT recommend moving to a Y2 investment milestone.
4. A substantial growth in traffic, particularly through traffic, will only take place if the network is capable of supporting the power equipment and the heavy axle carloads now utilized in class one unit train operations. This must be the long term goal of the SOR if it is to grow and offer compatible service with Class 1 and other railroad companies.

APPENDIX A
TOP 25 EXPORT AND IMPORT COMMODITIES CROSSING-
EL PASO AND PRESIDIO

Table A.1: Top 25 Export Commodities Crossing Through Presidio, Texas January through June 2003

Rank	SITC	Product Description
1	77255	Switches for electrical apparatus, n.e.s., for voltages not exceeding 1,000 volts
2	74810	Transmission shafts (including cam and crank shafts) and cranks
3	78689	Parts of trailers and semi-trailers, for housing or camping, transport of goods, trailers, n.e.s. and vehicles not mechanically propelled, n.e.s.
4	72123	Harvesting and threshing machinery, n.e.s.; mowers, n.e.s. (other than mowers for lawns, parks or sports grounds)
5	29252	Seeds of forage plants, other than beet seed
6	99200	Export shipments valued not over $10,000 (thru march 1998) and not over $20,000 (effective April 1998), not identified by kind
7	74564	Agricultural or horticultural appliances for projecting, dispersing or spraying liquids or powders
8	69969	Articles of iron or steel, n.e.s.
9	72249	Wheeled tractors, n.e.s.
10	72839	Parts of machinery for sorting, washing, crushing or mixing earth, stone, ores etc., and for shaping solid mineral fuels, ceramic pastes etc.
11	89879	Recorded media, n.e.s., sound or similarly recorded phenomena
12	68423	Aluminum and aluminum alloy plates, sheets and strip, over .2 mm thick
13	22211	Groundnuts (peanuts), not roasted or otherwise cooked, in the shell
14	08199	Preparations of a kind used for animal food, n.e.s.
15	67390	Flat-rolled products of iron or non-alloy steel, not clad, plated or coated and not further worked than hot-rolled or cold-rolled (cold-reduced)
16	67686	Iron and steel sheet piling, welded angles, shapes and sections
17	57529	Acrylic polymers, other than polymethyl methacrylate, in primary forms
18	72849	Machinery having individual functions, n.e.s.
19	72121	Mowers for lawns, parks or sports grounds
20	04410	Maize (corn) seed
21	64212	Folding cartons, boxes and cases of non-corrugated paper or paperboard
22	72855	Parts, n.e.s., of machinery for public works etc., preparing animal or fixed vegetable fats and oils, and specialized for particular industries n.e.s.
23	72832	Machinery for crushing or grinding earth, stone, ores or other mineral substances in solid (including powder or paste) form
24	67269	Iron or non-alloy steel semi-finished shapes, under .25% (wt.) Carbon, n.e.s
25	72122	Combine harvester-threshers

Source: Texas A&M International University, Texas Center for Border Economic and Enterprise Development, September 2003a.

Table A.2: Top 25 Import Commodities Crossing Through Presidio, Texas
January through June 2003

Rank	SITC	Product Description
1	00119	Bovine animals, other than purebred breeding animals, live
2	69979	Articles of aluminum, n.e.s.
3	05779	Edible nuts (excluding mixtures), fresh or dried, n.e.s., whether or not shelled or peeled
4	78439	Parts and accessories n.e.s. for tractors, motor cars and other motor vehicles, trucks, public-transport vehicles and road motor vehicles, n.e.s.
5	78683	Trailers and semi-trailers, n.e.s.
6	07513	Fruits of the genus capsicum or of the genus pimenta, dried or crushed or ground
7	78689	Parts of trailers and semi-trailers, for housing or camping, transport of goods, trailers, n.e.s. and vehicles not mechanically propelled, n.e.s.
8	67959	Iron and steel tube and pipe fittings, n.e.s.
9	93100	Special transactions and commodities not classified according to kind
10	78685	Vehicles, not mechanically propelled, n.e.s.
11	69969	Articles of iron or steel, n.e.s.
12	56214	Fertilizers, double salts and mixtures of calcium nitrate and ammonium nitrate, (imports only)
13	65759	Articles of artificial and synthetic textile monofilaments, strip, etc., and twine, cordage or rope, n.e.s.
14	89449	Entertainment articles, n.e.s., including festive, carnival or other entertainment articles, except Christmas tree lights and other Christmas articles
15	74291	Parts of pumps for liquids
16	05470	Vegetables provisionally preserved (e.g., by sulphur dioxide gas, in brine, in sulphur water or other preservative solutions), inedible in that state
17	82159	Furniture, n.e.s., of wood, n.e.s. (other than of a kind used in offices, kitchens, or bedrooms)
18	66139	Monumental or building stone (except slate), n.e.s. and articles thereof, molded, turned, polished, decorated, carved or otherwise worked
19	00151	Horses, live
20	72249	Wheeled tractors, n.e.s.
21	56219	Mineral or chemical fertilizers, nitrogenous, n.e.s. (include nitrogenous mixtures, n.e.s.), (imports only)
22	81315	Electric lamps and lighting fittings, n.e.s.
23	56294	Ammonium dihydrogenorthophosphate (monoammonium phosphate) fertilz & mix with diammonium hydrogenorthophosphate (diammonium phosphate), (imports only)
24	72722	Machinery, n.e.s., for the industrial preparation or manufacture of food or drink
25	78431	Bumpers and parts thereof, for tractors, motor cars and other motor vehicles, etc.

Source: Texas A&M International University, Texas Center for Border Economic and Enterprise Development, September 2003a.

Table A.3: Top 25 Export Commodities Crossing Through El Paso, Texas
January through June 2003

Rank	SITC	Product Description
1	75997	Parts of automatic data processing machines and units thereof, magnetic or optical readers, and machines for transcribing and processing data n.e.s.
2	76493	Parts of television receivers, radiobroadcast receivers, transmission apparatus for radio telephony, telegraphy, broadcasting or television etc.
3	89399	Articles of plastics, n.e.s.
4	77282	Parts of electrical apparatus for switching or protecting electrical circuits for making connections to or in electrical circuits, n.e.s.
5	77641	Digital monolithic integrated units
6	77259	Electrical apparatus for switching or protecting electrical circuits or making connections to or in electrical circuits, n.e.s., not exceeding 1,000 v
7	77314	Electric conductors, for a voltage not exceeding 80 volts, n.e.s.
8	75260	Input or output units whether or not presented with the rest of a system and whether or not containing storage units in one housing in data processing
9	89319	Articles for the conveyance or packing of goods, n.e.s., of plastics; stoppers, lids, caps and other closures, of plastics
10	77643	Non-digital monolithic integrated units
11	77611	Television picture tubes, color
12	65732	Textile fabrics impregnated, coated, covered or laminated with plastics, other than tire cord fabric
13	69969	Articles of iron or steel, n.e.s.
14	87229	Instruments and appliances used in medical, surgical or veterinary sciences, n.e.s.
15	74159	Parts for the air conditioning machines (having a motor-driven fan and elements for changing the temperature and humidity) of heading 741.5
16	77220	Printed circuits
17	78439	Parts and accessories n.e.s. for tractors, motor cars and other motor vehicles, trucks, public-transport vehicles and road motor vehicles, n.e.s.
18	71690	Parts n.e.s. for use solely or principally with electric motors, electric generators, electric generating sets and rotary converters
19	78432	Other parts and accessories of motor vehicle bodies of headings 8701 to 8705 (including cabs)
20	76431	Transmission apparatus for radiotelephony, radiotelegraphy, radio broadcasting or television, not incorporating reception apparatus
21	87329	Parts and accessories of revolution and production counters, odometers, pedometers, speedometers, tachometers, strobescopes, etc.
22	82119	Parts of seats, n.e.s.
23	77315	Electric conductors, for a voltage exceeding 80 volts, but not exceeding 1,000 volts, n.e.s.
24	77579	Parts Of Electromechanical Domestic Appliances With Self Contained Electric motor
25	65720	Non wovens, whether or not impregnated, coated, covered or laminated, n.e.s.

Source: Texas A&M International University, Texas Center for Border Economic and Enterprise Development, September 2003a.

Table A.4: Top 25 Import Commodities Crossing Through El Paso, Texas
January through June 2003

Rank	SITC	Product Description
1	77313	Ignition wiring sets and other wiring sets of a kind used in vehicles, aircraft or ships
2	75230	Digital processing units whether or not presented with the rest of the system which may contain storage units, input units or output units
3	82119	Parts of seats, n.e.s.
4	78120	Motor vehicles for the transport of persons (other than public transport), n.e.s.
5	76110	Television receivers, color, incl video monitors & projectors), whet or not incorporated radiobroadcast receivers or sound or video recording or reproducing apparatus
6	93100	Special transactions and commodities not classified according to kind
7	76431	Transmission apparatus for radiotelephony, radiotelegraphy, radio broadcasting or television, not incorporating reception apparatus
8	75997	Parts of automatic data processing machines and units thereof, magnetic or optical readers, and machines for transcribing and processing data n.e.s.
9	78219	Motor vehicles for the transport of goods, n.e.s.
10	76211	Radiobroadcast receivers, combined with sound recording or reproducing apparatus, operating with an external power source as in motor vehicles
11	87325	Speedometers and tachometers; stroboscopes
12	76432	Transmission apparatus for radiotelephony, radiotelegraphy, radio broadcasting or television, incorporating reception apparatus
13	78439	Parts and accessories n.e.s. for tractors, motor cars and other motor vehicles, trucks, public-transport vehicles and road motor vehicles, n.e.s.
14	87229	Instruments and appliances used in medical, surgical or veterinary sciences, n.e.s.
15	84140	Trousers, bib and brace overalls, breeches and shorts of woven textile materials, men's or boys'
16	77261	Boards, panels, consoles and other bases, for electric control or distribution of electricity, for a voltage not exceeding 1,000 volts
17	71631	Electric motors of an output exceeding 37.5 w (including universal ac/dc motors), ac
18	87465	Automatic regulating or controlling instruments and apparatus, n.e.s.
19	71322	Reciprocating piston engines of a cylinder capacity exceeding 1,000 cc
20	74159	Parts for the air conditioning machines (having a motor-driven fan and elements for changing the temperature and humidity) of heading 741.5
21	78432	Other parts and accessories of motor vehicle bodies of headings 8701 to 8705 (including cabs)
22	77315	Electric conductors, for a voltage exceeding 80 volts, but not exceeding 1,000 volts, n.e.s.
23	74780	Taps, cocks, valves and similar appliances, n.e.s.
24	84260	Trousers, bib and brace overalls, breeches and shorts, of woven textile fabrics, women's or girls'
25	77571	Vacuum cleaners and floor polishers, electromechanical, domestic, with self-contained electric motor

Source: Texas A&M International University, Texas Center for Border Economic and Enterprise Development, September 2003a.

APPENDIX B
ADDITIONAL SOUTH ORIENT CAPACITY ANALYSIS

INTRODUCTION

For comparison purposes, a set of nine matrices is prepared, shown below. The first three assume Texas Pacifico employs a total of nine locomotives. Three operate between San Angelo Junction and San Angelo, three between San Angelo and Alpine, and three between Alpine and Presidio. Grades limit train size to 39 100-ton loaded cars, or a total of 3,900 net tons per train. All capacity is in net (revenue) tons.

Case One: Nine Locomotives, Assigned 3 -- 3 – 3

The first three matrices show the base case. With a 10-MPH speed limit except on the 131 miles of CWR, only three round trips per week are possible at each end of the line. On the middle section, each one-way trip takes two days. Working a six-day week, then, a crew can make only two round trips per week between San Angelo and Alpine. This is the limit on capacity.

Increasing speeds to 25 MPH allows a single crew to make one round-trip per day on each end of the line, and to make a one-way trip on the middle segment of the line in one day. Thus, five round trips per week are made on the end segments, and three round-trips per week (crew works six days) on the middle portion.

Increasing speed further, to 40 MPH, enables the crews on each end of the line to make two round trips per shift, but only reduces running time on the middle section of the line from nine to six hours. This is not sufficient to allow the crew to complete a round trip in 12 hours reliably, since local switching, train make-up at the terminals, and other operational factors will add running time.

1. 10 MPH (with 131 miles of 25), Base Case

MP 1	MP 2	DIST	Speed	Running time	One-way Trips/Crew	Trips/Wk With one crew	Train Size Locos	cars	Net cap	Trips/Yr	Tons/Yr
0	69.5	69.5	10	7	1	3	3	39	3900	156	608400
714	738.1	24.1	10	2	0.5	2	3	39	3900	104	405600
738.1	869.1	131	25	5	0.5	2	3	39	3900	104	405600
869.1	945	75.9	10	8	0.5	2	3	39	3900	104	405600
967	1029.1	62.1	10	6	1	3	3	39	3900	156	608400

2. 25 MPH

MP 1	MP 2	DIST	Speed	Running time	One-way Trips/Crew	Trips/Wk With one crew	Train Size Locos	cars	Net cap	Trips/Yr	Tons/Yr
0	69.5	69.5	25	3	2	5	3	39	3900	260	1014000
714	738.1	24.1	25	1	1	3	3	39	3900	156	608400
738.1	869.1	131	25	5	1	3	3	39	3900	156	608400
869.1	945	75.9	25	3	1	3	3	39	3900	156	608400
967	1029.1	62.1	25	2.50	2	5	3	39	3900	260	1014000

3. 40 MPH

MP 1	MP 2	DIST	Speed	Running time	One-way Trips/Crew	Trips/Wk With one crew	Train Size Locos	Cars	Net cap	Trips/Yr	Tons/Yr
0	69.5	69.5	40	2	4	10	3	39	3900	520	2028000
714	738.1	24.1	40	1	1	3	3	39	3900	156	608400
738.1	869.1	131	40	3	1	3	3	39	3900	156	608400
869.1	945	75.9	40	2	1	3	3	39	3900	156	608400
967	1029.1	62.1	40	2	4	10	3	39	3900	520	2028000

Case 2: Locomotives Assigned 2 – 5 – 2

Since in Case 1, the middle section of the line is the constraint, in Case 2 two locomotives are assigned to each end segment and five to the middle segment. This allows for operation of an 85-car train between San Angelo and Alpine (8,500 net tons), but limits the end segments to 26 cars (2,600 tons). As can be seen, capacity remains the same in the base (10 MPH) case, since the gain on the middle segment is offset by a loss of capacity on the ends of the line.

With an increase in speed to 25 MPH, we reach about 1.3 million tons annually, a single crew can now complete a round-trip on each end segment in one day. However, the use of only two locomotives means that capacity is limited by the end sections of the line.

A further increase to 40 MPH doubles the capacity of the end segments – since trains can now make two round-trips per shift – but does nothing for capacity on the middle segment. However, capacity is now about 1.3 million tons annually.

1. 10 MPH

MP 1	MP 2	DIST	Speed	Running time	One-way Trips/Crew	Trips/Wk With one crew	Train Size Locos	Cars	Net cap	Trips/Yr	Tons/Yr
0	69.5	69.5	10	7	1	3	2	26	2600	156	405600
714	738.1	24.1	10	2	0.5	2	5	85	8500	104	884000
738.1	869.1	131	25	5	0.5	2	5	85	8500	104	884000
869.1	945	75.9	10	8	0.5	2	5	85	8500	104	884000
967	1029.1	62.1	10	6	1	3	2	26	2600	156	405600

2. 25 MPH

MP 1	MP 2	DIST	Speed	Running time	One-way Trips/Crew	Trips/Wk With one crew
0	69.5	69.5	25	3	2	5
714	738.1	24.1	25	1	1	3
738.1	869.1	131	25	5	1	3
869.1	945	75.9	25	3	1	3
967	1029.1	62.1	25	2.50	2	5

Train Size		Net cap	Trips/Yr	Tons/Yr
Locos	Cars			
2	26	2600	260	676000
5	85	8500	156	1326000
5	85	8500	156	1326000
5	85	8500	156	1326000
2	26	2600	260	676000

3. 40 MPH

MP 1	MP 2	DIST	Speed	Running time	One-way Trips/Crew	Trips/Wk With one crew
0	69.5	69.5	40	2	4	10
714	738.1	24.1	40	1	1	3
738.1	869.1	131	40	3	1	3
869.1	945	75.9	40	2	1	3
967	1029.1	62.1	40	2	4	10

Train Size		Net cap	Trips/Yr	Tons/Yr
Locos	Cars			
2	26	2600	1040	1352000
5	85	8500	156	1326000
5	85	8500	156	1326000
5	85	8500	156	1326000
2	26	2600	1040	1352000

Case 3: Locomotives Assigned 3 – 5 – 3

Finally, using two additional locomotives allows for operation of 39-car trains on the end segments and 85-car trains on the middle segment. This actually accomplishes little more than the 25-MPH Case 2 scenario, since the middle segment remains the limiting factor. The recommended alternative remains Case 2 at 40 MPH, which accomplishes the greatest throughput with the least resources. A further saving might be realized by raising only the 131 mile segment of the middle section that is CWR to 40 MPH, which will allow the same throughput at lower capital and maintenance cost.

1. 10 MPH

MP 1	MP 2	DIST	Speed	Running time	One-way Trips/Crew	Trips/Wk With one crew
0	69.5	69.5	10	7	1	3
714	738.1	24.1	10	2	0.5	2
738.1	869.1	131	25	5	0.5	2
869.1	945	75.9	10	8	0.5	2
967	1029.1	62.1	10	6	1	3

Train Size		Net cap	Trips/Yr	Tons/Yr
Locos	Cars			
3	39	3900	156	608400
5	85	8500	104	884000
5	85	8500	104	884000
5	85	8500	104	884000
3	39	3900	156	608400

2. 25 MPH

MP 1	MP 2	DIST	Speed	Running time	One-way Trips/Crew	Trips/Wk With one crew
0	69.5	69.5	25	3	2	5
714	738.1	24.1	25	1	1	3
738.1	869.1	131	25	5	1	3
869.1	945	75.9	25	3	1	3
967	1029.1	62.1	25	2.50	2	5

Train Size		Net cap	Trips/Yr	Tons/Yr
Locos	Cars			
3	39	3900	520	1014000
5	85	8500	156	1326000
5	85	8500	156	1326000
5	85	8500	156	1326000
3	39	3900	520	1014000

3. 40 MPH

MP 1	MP 2	DIST	Speed	Running time	One-way Trips/Crew	Trips/Wk With one crew
0	69.5	69.5	40	2	4	10
714	738.1	24.1	40	1	1	3
738.1	869.1	131	40	3	1	3
869.1	945	75.9	40	2	1	3
967	1029.1	62.1	40	2	4	10

Train Size		Net cap	Trips/Yr	Tons/Yr
Locos	Cars			
3	39	3900	1040	2028000
5	85	8500	156	1326000
5	85	8500	156	1326000
5	85	8500	156	1326000
3	39	3900	1040	2028000