CAMBRIDGE SYSTEMATICS

West Texas Rail Feasibility Study

summary

report

prepared for

Texas Department of Transportation

prepared by

Cambridge Systematics, Inc.

with

HNTB

August 2011

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1.0 Introduction

Today there is no north-south rail linkage serving agricultural and industrial shippers in West Texas, or support facilities available to accommodate trans-loading of the bulk goods the region produces. While the region hosts two Class I carriers—Burlington Northern Santa Fe Railway (BNSF) and Union Pacific Railroad (UPRR)—their operations and networks focus on east-west traffic and fail to connect many of the region's population and distribution centers. As a result, it is believed that trucks carry many commodities in the north-south direction that could otherwise flow by rail; "rail-divertible" commodities that are high-weight, low unit cost, and not time-sensitive such as agricultural and industrial commodities. The region produces and consumes these commodities in abundance, but the long-term reliability on highway transport may not be sustainable if the demand of these goods increases. A north-south rail option could provide lower shipping costs, decrease highway wear, and accommodate growth of domestic and international trade.

Findings

The objective of this study was to help the Texas Department of Transportation (TxDOT) the Ports-to-Plains (P2P) Alliance, and other partners determine the feasibility of developing a north-south rail linkage between Seagraves, Texas and the U.S.-Mexican border at Del Rio or Eagle Pass, Texas.

The results of the benefit-cost and rail revenue analyses calculated a maximum benefit-cost ratio is 0.42, for diverting 175,000 truck tons per year. A benefit-cost of 1.0, or better is desired to advance projects. This study investigated the tonnage required in order to "break-even" from a self-supported financial perspective and found that 4.75 M tons would need to be transported on the rail corridor, annually.

However, as a point of comparison, this study only calculated the benefit-cost ratio on truck-to-rail diversions. If rail-to-rail diversions are considered as input into the analysis, an additional 3.9M tons are input, and a maximum benefit-cost ratio of 1.34 is achieved. While this shows additional transportation system benefits can be realized through rail diversions, the 3.9M tons are still short of the required 4.5M tons to make this rail line self-sufficient.

1.2 About Phase 1 and Phase 2 Reports

The *West Texas Rail Feasibility Study* was conducted in two phases. The *Phase 1 Report* sets baseline conditions through review of previous research, stakeholder interviews and freight data analysis. This report also presents potential rail

corridor alignment options and calculates order of magnitude costs as a jumping off point for Phase 2 analysis. The *Phase 1 Report* is organized as follows:

- **Section 1 – Introduction**
- **Section 2 – Review of Previous Studies** provides a background information on several earlier studies conducted that are related to this project;
- **Section 3 – Stakeholder Interviews** contains a synthesis of West Texas stakeholder, and potential user, perspectives regarding a new north-south rail corridor;
- **Section 4 – Freight Movement Analysis** contains a high-level analysis of West Texas' freight flows including tonnage and value of goods, key commodities, and trading partners;
- **Section 5 – Conceptual Alignments** presents four alternatives that connect Seagraves, Texas to the border towns of Del Rio and Eagle Pass, Texas;
- **Section 6 – Cost Estimates** outlines the capital, operations and maintenance costs for the three alternatives.

The *Phase 2 Report* completes this projects analysis, and determines the feasibility of the West Texas Rail Corridor. The *Phase 2 Report* is organized as follows:

- **Section 1 – Introduction**
- **Section 2 – Diversion Analysis** outlines the methodology and results of truck-to-rail and rail-to rail diversion analysis by commodity that could potentially use the new north-south corridor;
- **Section 3 – Benefit-Cost Analysis** explains the evaluation measures used to evaluate the benefits and costs of a variety of aspects of the new north-south corridor;
- **Section 4 – Revenue Analysis** describes the basis for calculating revenue that could be generated by the line;
- **Section 5 – Findings and Opportunities** provides a summary of the rail corridor analyses and outlines several options that could be considered as means to attract new rail traffic to the line.

This *West Texas Rail Feasibility Study Summary Report* presents a compilation of the findings found in detail in the Phase 1 and Phase 2 reports.

2.0 Conceptual Alignments

Many rail corridors exist in West Texas and are owned by the UPRR, the BNSF, the TxDOT, and other shortline, or Class III, railroad operators. Most of these rail lines generally travel in an east-west direction, and those rail lines that travel in a north-south direction do not connect directly from west Texas commodity centers to railroads in Mexico. The project team reviewed the engineering feasibility of possible rail corridor alignments and improvement options for a north-south rail route to move commodities by rail between West Texas to the U.S.-Mexico border.

The possible rail alignments begin at a connection with the West Texas & Lubbock Railway (WTLC) in Seagraves, Texas and terminate at one of two potential U.S.-Mexico border locations at Del Rio or Eagle Pass. Access to Presidio could be provided via the South Orient Rail Line. At Presidio and Eagle Pass there are existing border crossings on the South Orient Railroad and the UPRR Eagle Pass Subdivision, respectively; the Presidio bridge is out of service due to fire and currently has a timetable for replacement by 2014. Del Rio does not have an existing rail crossing at the U.S. - Mexico border. The development of these alignment options were based on interviews with stakeholders regarding potential commodities and economic opportunities within the region as well as other engineering criteria and assumptions as discussed in the following section.

2.1 Range of Rail Infrastructure Options

Initial selection criteria used to identify potential corridors included:

- Verification that fatal flaws do not exist within the corridor segment (e.g. profile issues, etc);
- Minimization of segment distance;
- Connections with areas of greatest benefit for railroad operations, such as potential commodity centers; and
- Control of costs by minimizing or eliminating grade separations and utility conflicts.

Potential corridor segments were analyzed from Midland-Odessa to Del Rio and Eagle Pass to connect with the segments identified in the previous *Permian Basin Rail Connection Economic & Financial Feasibility Study* (2008). The study identified an alignment from Seagraves to McCamey, by way of Midland-Odessa, that would connect to Lubbock via the WTLC. The Seagraves-to-Midland-Odessa segment of the alignment was included in the alignments developed in this study.

Segment boundaries were placed in the Big Lake and Ozona/Sonora areas as well as Del Rio and Eagle Pass to allow for comparisons between alignment options where applicable.

The previous Permian Basin Rail Study also included a connection to McCamey, which provided access to the SORR corridor and a border crossing at Presidio. Since this alignment has been evaluated as part of the previous study, a connection to Presidio was not evaluated as part of this study but remains an option as a crossing into Mexico as stated in the Permian Basin Rail Study.

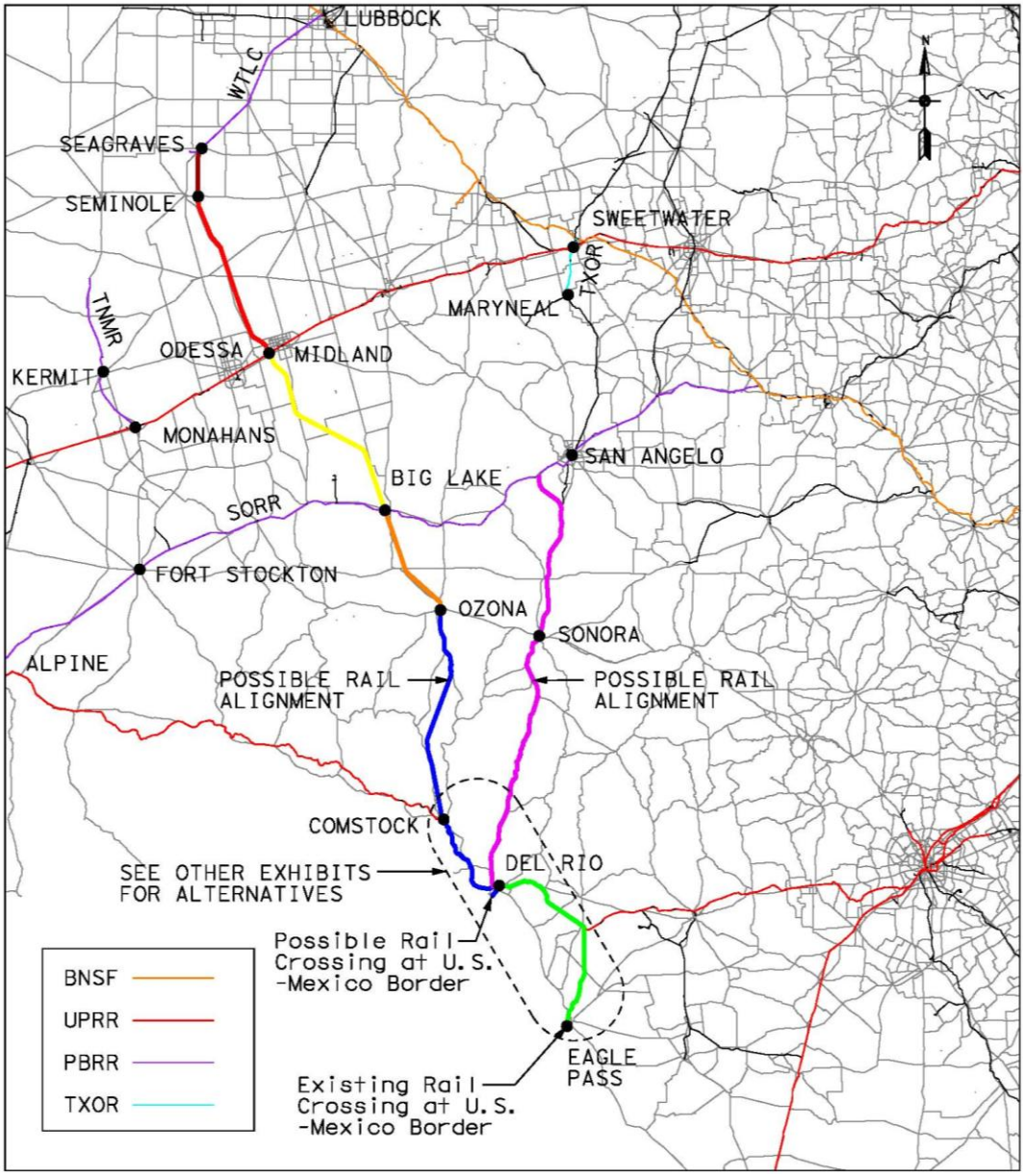
Abandoned railroad corridors were identified as potential locations for new rail infrastructure but did not coincide with the potential alignment segments and were not utilized as part of this study.

As part of the profile fatal-flaw analysis, each segment corridor was evaluated based on the terrain's general slope to verify that a Class 3 track would be able to traverse that terrain. The analysis noted that many routes between Ozona and Del Rio would be difficult due to the elevation changes in this stretch; however, an alignment segment using an area of smaller elevation changes was identified through this terrain. This alignment segment was assumed for all but one of the alignments south of Ozona to north and west of Del Rio. The other alignment segment travels from Sonora south to Del Rio adjacent to U.S. 377.

There is connectivity to major highways along each route for potential intermodal facilities. Access points in or near Lubbock include U.S. 62/U.S. 82 and U.S. 84; these roadways interchange with other major roadways within Lubbock such as I-27 and U.S. 87. Route segments would also cross I-20 near Midland-Odessa, U.S. 67 at Big Lake and San Angelo, and I-10 near Ozona and Sonora. Also, highway access points would also exist around Del Rio and Eagle Pass.

The analysis of potential corridors based on the previously-mentioned criteria as well as the previous Permian Basin Rail Study resulted in the development of four alternative alignments as shown in Figure 2.1. Detailed maps of each alignment can be found in *Phase 1 Report*.

Figure 2.1 Conceptual Alignments



Alternative 1: Seagraves to Del Rio (all new track)

The route for Alternative 1 connects Lubbock to Seagraves by way of the existing WTLC track. New rail infrastructure would be required from Seagraves to Del Rio, including new track through or near the areas of Midland-Odessa, Big Lake, and Ozona. Connections off of the possible new rail alignment to and from Alpine and San Angelo would be provided through switching with the SORR.

As shown in Figure 2.1 and Table 2.1, the route would then travel on new rail infrastructure from Ozona to Del Rio and would require a new border crossing at

Del Rio. Note that a new border crossing would require reconstruction of abandoned Ferromex track from Zaragosa to Acuna in Mexico as well as a Presidential permit to cross the U.S.-Mexico border and coordination and approvals with, at a minimum, Mexico, the Department of Homeland Security, and the International Boundary and Water Commission. It could take significant time to acquire the Presidential permit and other approvals for a new crossing at the U.S.-Mexico border, and the crossing will not be feasible without the cooperation of Mexico. Ferromex has also stated that they do not intend to reconstruct the previous corridor to the border.

Table 2.1 Alternative 1 – Characteristics by Segment

Alignment Segment	Total Miles	Urban Miles	Rural Miles	Oil/Gas Field Miles	Rail Structures	Highway Structures
Seagraves to Seminole	16.4	1.7	14.7	-	-	-
Seminole to Midland/Odessa	63.2	3.0	60.2	47.8	-	3
Midland/Odessa to Big Lake	69.8	4.7	65.1	28.0	1	5
Big Lake to Ozona	39.7	1.7	38.0	27.6	1	4
Ozona to Del Rio	78.5	7.3	71.2	9.1	2	3
Total	**267.6**	**18.4**	**249.2**	**112.5**	**4**	**15**

Alternative 2: Seagraves to Eagle Pass (existing track from Comstock to Eagle Pass)

The route for Alternative 2 is the same as Alternative 1 between Lubbock and Ozona. Between Ozona and Comstock the route requires new rail infrastructure. At Comstock the route can switch with UPRR and use the Del Rio and Eagle Pass Subdivisions to utilize the crossing at the U.S.-Mexico border at Eagle Pass, as shown in Figure 2.1 and Table 2.2.

Table 2.2 Alternative 2 – Characteristics by Segment

Alignment Segment	Total Miles	Urban Miles	Rural Miles	Oil/Gas Field Miles	Rail Structures	Highway Structures
Seagraves to Seminole	16.4	1.7	14.7	-	-	-
Seminole to Midland/Odessa	63.2	3	60.2	47.8	-	3
Midland/Odessa to Big Lake	69.8	4.7	65.1	28.0	1	5
Big Lake to Ozona	39.7	1.7	38.0	27.6	1	4
Ozona to Del Rio	73.0	2.6	70.4	9.1	1	2
Del Rio to Eagle Pass	-	-	-	-	-	-
Total	**262.1**	**13.7**	**248.4**	**112.5**	**3**	**14**

Alternative 3: Seagraves to Eagle Pass (all new track to border crossing)

The route for Alternative 3 is the same as Alternatives 1 and 2 between Lubbock and Ozona. From Ozona new rail infrastructure would be required to Del Rio, where a new-location track would be constructed near the existing UPRR Del Rio Subdivision alignment and through Del Rio and Eagle Pass. As shown in Figure 2.1 and Table 2.3, the alignment would use the existing UPRR border crossing at Eagle Pass.

Table 2.3 Alternative 3 – Characteristics by Segment

Alignment Segment	Total Miles	Urban Miles	Rural Miles	Oil/Gas Field Miles	Rail Structures	Highway Structures
Seagraves to Seminole	16.4	1.7	14.7	-	-	-
Seminole to Midland/Odessa	63.2	3	60.2	47.8	-	3
Midland/Odessa to Big Lake	69.8	4.7	65.1	28.0	1	5
Big Lake to Ozona	39.7	1.7	38.0	27.6	1	4
Ozona to Del Rio	113.4	5.2	108.2	9.1	2	9
Del Rio to Eagle Pass	71.8	3.7	68.1	0.0	1	7
Total	**374.3**	**20.0**	**354.3**	**112.5**	**5**	**28**

Alternative 4: Seagraves to Del Rio via San Angelo (SORR between Big Lake/San Angelo)

The route for Alternative 4 is the same as Alternatives 1, 2, and 3 between Lubbock and Big Lake. Between Big Lake and San Angelo the freight would be switch on and off of the existing SORR track. As shown in Figure 2.1 and Table 2.4, from San Angelo to Del Rio new rail infrastructure would be required and also would require a new border crossing at Del Rio. Note that a new border crossing would require reconstruction of abandoned Ferromex track from Zaragosa to Acuna in Mexico as well as a Presidential permit to cross the U.S.-Mexico border and coordination and approvals with, at a minimum, Mexico, the Department of Homeland Security, and the International Boundary and Water Commission. It could take significant time to acquire the Presidential permit and other approvals for a new crossing at the U.S.-Mexico border, and the crossing will not be feasible without the cooperation of Mexico. Ferromex has also stated that they do not intend to reconstruct the previous corridor to the border.

Table 2.4 Alternative 4 – Characteristics by Segment

Alignment Segment	Total Miles	Urban Miles	Rural Miles	Oil/Gas Field Miles	Rail Structures	Highway Structures
Seagraves to Seminole	16.4	1.7	14.7	-	-	-
Seminole to Midland/Odessa	63.2	3.0	60.2	47.8	-	3
Midland/Odessa to Big Lake	69.8	4.7	65.1	28.0	1	5
Big Lake to San Angelo	61.9	-	-	-	-	-
San Angelo to Sonora	59.2	0.5	58.7	14.5	-	2
Sonora to Del Rio	97.8	5.7	92.1	12.2	2	3
Total	**368.3**	**15.6**	**290.8**	**102.5**	**3**	**13**

3.0 Cost Estimates

The costs used for this report were gathered and verified from previous data sources provided in the *Permian Basin Rail Connection Economic & Financial Feasibility Study* and converted from 2007 to 2010 dollars (1st quarter) using the Consumer Price Index (CPI)[1]. The CPI provides an adjustment for inflation rates through the 1st quarter of 2010. For this study an increase in costs of 5.98% from the previous study was assumed based on CPI.

3.1 CAPITAL COSTS

Each alignment was broken down into segments and order-of-magnitude costs were estimated for each segment. Some segments were similar between alternatives; in other cases the alignments differ between alternatives, such as between Del Rio and Eagle Pass.

The assumptions used to derive key capital unit costs are described in *Phase 1 Report*. The order-of-estimates include:

- **Track.** The total miles of track includes rail, ties, ballast, and other track materials for a Class 3 single-track railroad. The cost also includes environmental permitting, engineering design, and construction. A cost of $2.40 million per mile was used for most of the corridors within this study; the exception is the Sonora-to-Del Rio corridor, which has more challenging terrain and was estimated at $4.00 million per mile due to the potential of additional structures along the route.
- **Right of way (urban/rural).** The right-of-way cost is based on a 50-foot width of rail right of way and is determined by the density of land use (rural is not as dense, while urban is more dense). A cost of $4,200 per mile for rural land and $550,000 per mile for urban land was used for this study.
- **Oil/gas field miles.** The oil and gas fields were determined using USGS quadrangle maps and aerial photography where available. These include active and abandoned oil and gas fields. A cost of $1.06 million per mile was used for estimation purposes for the utility relocations in these areas.
- **Structures (rail/highway).** Rail grade separation structures were identified along the alignments at crossings with other active railroads (UPRR, SORR, etc.) so that train operations would not need to be coordinated with other railroads. Highway structures were deemed necessary at roadway crossings

[1] http://www.bls.gov/cpi/

with higher volumes of traffic, which generally are interstate and U.S. highways. Costs of $37.0 million per railroad grade separation and $8.5 million per highway grade separation were used for this study.

Items that were not included in the estimation of the order-of-magnitude probable construction costs are rolling stock, equipment, vehicles, buildings, nor the costs for operations and maintenance as well as any upgrades that may be required to the WTLC.

Table 3.1 provides a summary of the four alignment alternatives' capital costs.

Table 3.1 Alternative Summary - Estimated Construction Costs (2010 Dollars)

Alternative	Total Miles	Total Cost ($M)	Per Mile Average
Alternative 1	267.6	$1,048.3	$3.9
Alternative 2	262.1	$987.0	$3.8
Alternative 3	374.3	$1,416.1	$3.8
Alternative 4	306.4	$1,232.0	$4.0

3.2 OPERATIONS AND MAINTENANCE COSTS

Another important component of railroad infrastructure is the operations and maintenance of the infrastructure once it is in place. The estimates for the operations and maintenance costs are on a per-mile per-year basis and exclude costs related to rolling stock, equipment, vehicles, and buildings.

- **Annual operations costs.** The operations costs mainly include estimates for labor and fuel. The cost used in this study was $16,000 per mile per year.
- **Annual maintenance costs.** The maintenance costs generally include estimates for maintenance of track infrastructure. The cost used in this study was $10,600 per mile per year.

The segment from Big Lake to San Angelo is planned to utilize the existing South Orient Railroad track. Since the SORR would likely pass any operations and maintenance costs of this segment of track through other means (shipper costs), the report assumes that this segment would not require operations and maintenance costs from this shortline provider.

Table 3.2 provides a summary of the four alignment alternatives' annual operation and maintenance costs.

Table 3.2 Alternative Summary - Estimated Annual Operations and Maintenance Costs per Year (2010 Dollars)

Alternative	Total Miles	Operations Cost	Maintenance Cost
Alternative 1	267.6	$4,255,000	$2,837,000
Alternative 2	262.1	$4,167,000	$2,779,000
Alternative 3	374.3	$4,810,000	$3,207,000
Alternative 4	306.4	$4,872,000	$3,247,000

3.3 TOTAL PROJECT COSTS

Combining the construction, operations, and maintenance costs, the total project cost was calculated over an assumed 30-year period. Table 3.3 summarizes the total cost over a 30-year period using a discount rate of 2.8% for operations and maintenance costs for each of the four alternatives. Note, that Alternative 2 assumes trackage rights on UPRR track. The cost of trackage rights has not been included in the total project cost.

Table 3.3 Alternative Summary - Total Project Cost
2015 to 2045 (2010 Dollars)

Alternative	Construction Cost ($M)	Operations Cost ($M)	Maintenance Cost ($M)	Total Cost ($M)
Alternative 1	$1,048.3	$85.6	$57.1	$1,191.0
Alternative 2	$987.0	$83.8	$55.9	$1,126.7
Alternative 3	$1,416.1	$119.8	$79.9	$1,615.8
Alternative 4	$1,232.0	$98.0	$65.3	$1,395.3

In summary, Alternative 2 (Seagraves to Eagle Pass using existing UPRR track from Comstock to the border) has the lowest cost for construction, operations, and maintenance. However, this would require coordination with UPRR for switching operations for rail cars to use the U.S.-Mexico rail crossing at Eagle Pass. Alternative 1 (Seagraves to Del Rio with a new border crossing) is the second least-expensive option, but this alternative requires coordination with Mexico since existing track has been removed on the Mexican side of the border and there is not an existing crossing at Del Rio. Alternative 4 is the second most-expensive option, but similar to Alternative 1 it will require coordination with Mexico since there is not a crossing in Del Rio. Alternative 3 (Seagraves to Eagle Pass on new track) is the most expensive and would require new track throughout the alignment limits and a new border crossing at Eagle Pass.

4.0 Diversion Analysis

Demand for the West Texas rail corridor will be primarily driven by diversion of freight flows that currently use other road and rail networks to get goods-to-market, and will secondarily be driven by the introduction of "mega-shippers" that may be attracted to locate within the corridor because of the presence of the new rail line.

A diversion analysis was conducted to quantify the primary source of traffic on the West Texas rail line; specifically truck-to-rail and rail-to-rail freight flow diversions that could[2] use a new north-south rail corridor. The analysis assumed two cases:

- **Base Case**. Represents all freight flows by mode as they occur today.
- **Planning Case.** Represents potential freight flows by mode, as they could occur, after construction of a rail line in West Texas.

Select link analyses on railway links were performed to determine the origin-destination (OD) pairs that could switch to the potential rail corridor. For each of the identified OD pairs and the existing total freight demand, the modal shares by commodity group in the Base Case and Planning Case were estimated. In this analysis, it was assumed that the total freight demand remains static during the analysis year, i.e. no induced demand is anticipated.

Subsections 4.1 and 4.2 present the results of full corridor development for two distinct alignments between Eagle Pass and Lubbock, TX:

- Subsection 4.1 - Results of Full Rail Corridor Development (Eagle Pass, Big Lake, Midland-Odessa, Lubbock). Represents Alignments 1, 2 and 3.
- Subsection 4.2 - Results of Full Rail Corridor Development (Eagle Pass, San Angelo, Big Lake, Midland-Odessa, Lubbock). Represents Alignment 4.

[2] Note that this analysis reflects the consultants' diversion estimates, only, and does not intend to imply actual use of the corridor. Use of this shortline operated rail corridor by diverting Class I railroads is unlikely due to the nature of existing Class I operations and the railcar classification process at existing rail yards.

4.1 RESULTS OF FULL RAIL CORRIDOR DEVELOPMENT (EAGLE PASS, BIG LAKE, MIDLAND-ODESSA, LUBBOCK)

For the full development of a West Texas rail corridor from Eagle Pass to Lubbock via Alignments 1, 2 or 3, the OD pairs that could potentially use the full rail corridor were identified and divertible flows calculated. The total freight demand of divertible flows is approximately 19.4 million tons, annually. This resulted in an estimated 3.75 million annual tons of rail carload flows and an estimated 0.12 million annual tons of rail intermodal flows, together making about 19.6% of the total demand related to the identified OD pairs.

Analysis shows that with full development of the West Texas rail corridor, the demand for rail carload is expected to go up by about 147,000 tons annually and the demand for rail intermodal is expected to go up by about 26,500 tons annually. This would mean increases of about 1,800 carload trips annually and about 1,400 TEUs annually, while saving about 7,600 truck trips annually; trips which will no longer use the Texas roadways.

Modal Diversions

Modal diversions were summarized by trade type, shown in Table 4.1. The U.S.-Mexico North American Free Trade Agreement (NAFTA) flows include about 31,000 tons of rail carload and about 8,400 tons of rail intermodal annually, which make up about 21% and about 32% of all diversions of the corresponding modes.

Table 4.1 Modal Diversions for a West Texas Rail Connection by Trade Type (Eagle Pass to Lubbock, TX)

Trade Type	Scenario	Rail Carload*	%Change of Rail Total	Rail Intermodal *	%Change of Rail Total	Truck*
All Flows	Base Case (tons)	3,749,216		118,886		15,572,195
	Planning Case (tons)	3,896,551		145,402		15,398,345
	Diversion (tons)	147,334	85%	26,516	15%	-173,851
Domestic Flows	Base Case (tons)	1,157,472		61,574		13,602,555
	Planning Case (tons)	1,273,831		79,652		13,468,118
	Diversion (tons)	116,359	87%	18,078	13%	-134,437
	% Diversion of All Flows	79%		68%		77%
International	Base Case (tons)	2,591,745		57,311		1,969,640

Trade Type	Scenario	Rail Carload*	%Change of Rail Total	Rail Intermodal *	%Change of Rail Total	Truck*
Flows	Planning Case (tons)	2,622,720		65,750		1,930,227
	Diversion (tons)	30,975	79%	8,438	21%	-39,414
	% Diversion of All Flows	21%		32%		23%

Source: TxDOT SAM V2 Freight Mode Choice Modeling, Cambridge Systematics, Inc.

*The values correspond to the annual total for OD pairs with flows divertible to the West Texas Rail Connection only. These are not statewide totals.

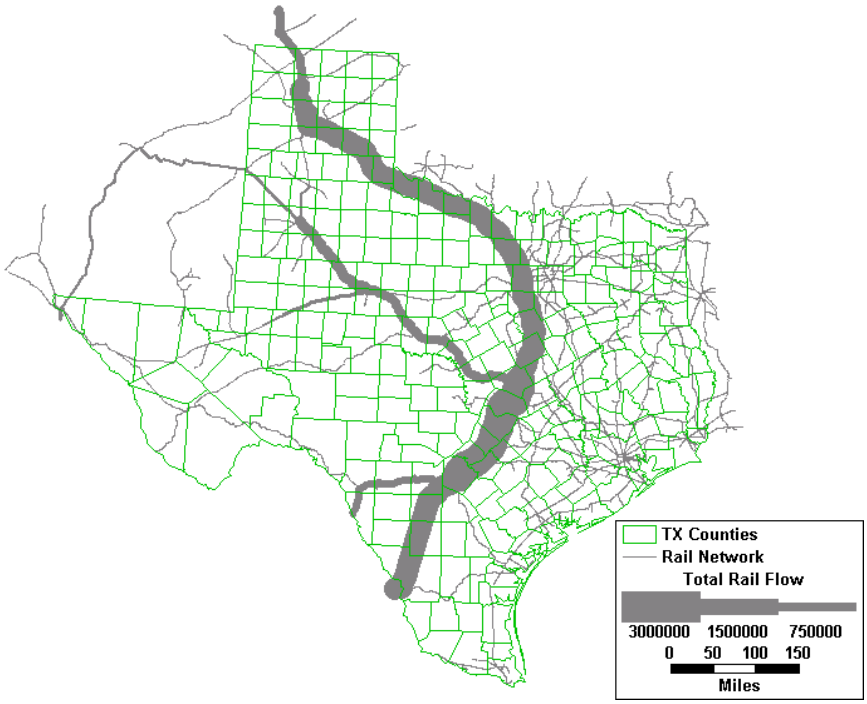
Route Diversions

The Base Case rail freight flows are about 3.86 million annual tons (approx. 20% of total existing demand), and were routed on the existing rail network. These rail flows as shown in Figure 4.1 appear to be going through San Antonio, Austin and Dallas (along the I-35 corridor), and then into the Texas panhandle. This clearly depicts the roundabout route most of these rail flows have to go through, which increases their travel times significantly. However, this routing is necessary due to the rail classification process at Class I yards along these corridors; breaking and re-classifying trains to direct them to their final destinations.

The change in flows over the rail network as a result of the full development of West Texas rail connection are shown in Figure 4.2. There are increases in flow on the new rail line, while there are reductions in flow in rest of Texas indicating diversions within the rail mode. The new rail line tries to eliminate some of the winding flows identified above. However, comparing the relative magnitudes of the change to the existing flow bandwidths, the flows diverted from other rail lines are quite small.

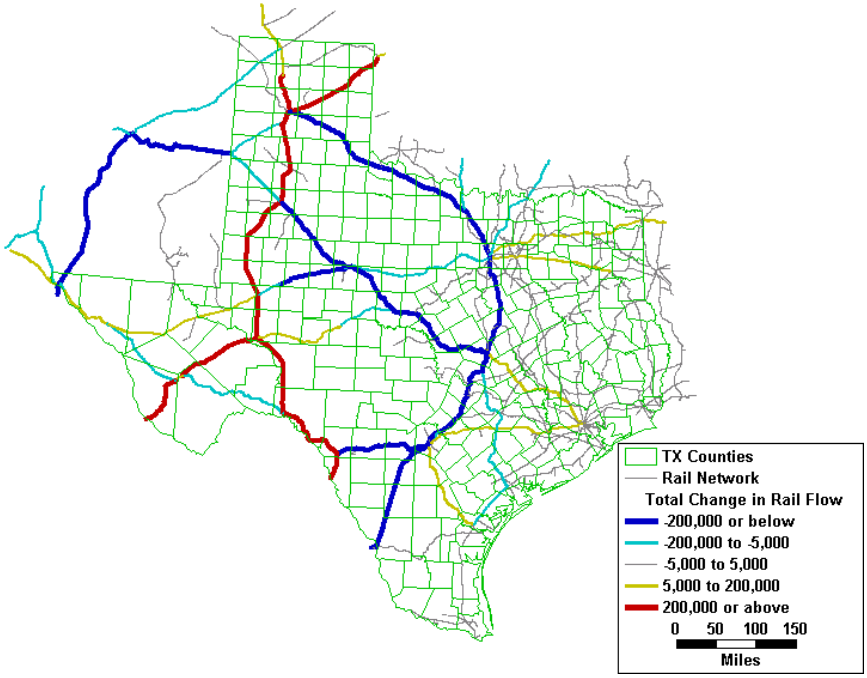
The routed highway freight flows of 15.57 million annual tons in the Base Case were found to have a flow pattern as shown in Figure 4.3. According to Figure 4.4, the change in truck flows as a result of the West Texas Rail Connection is minimal within the corridor, as only 7,600 trucks are expected to divert, annually.

Figure 4.1 Base Case Rail Flows on the Rail Network (Eagle Pass to Lubbock, TX)



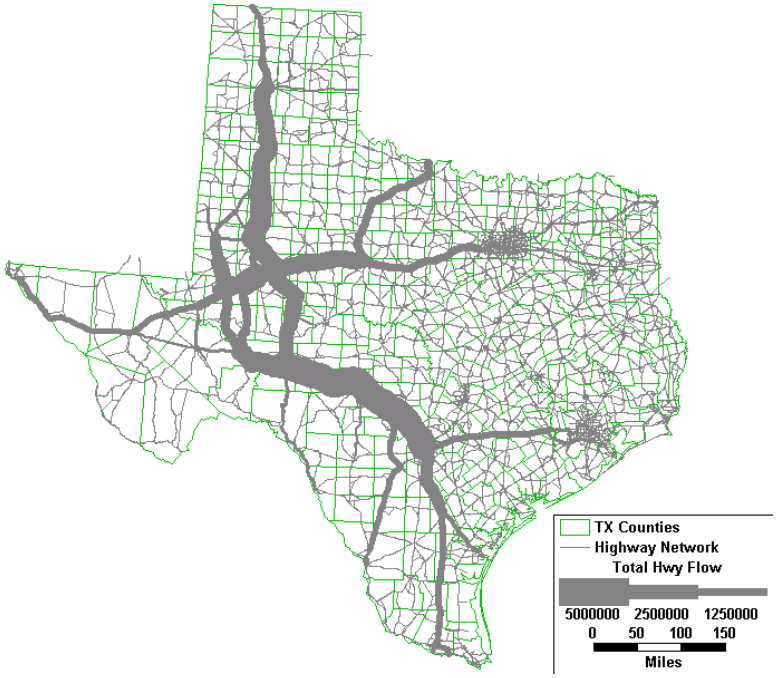
Source: ORNL Rail Network Routing

Figure 4.2 Route Diversions on Rail Network for the West Texas Rail Connection (Eagle Pass to Lubbock, TX)



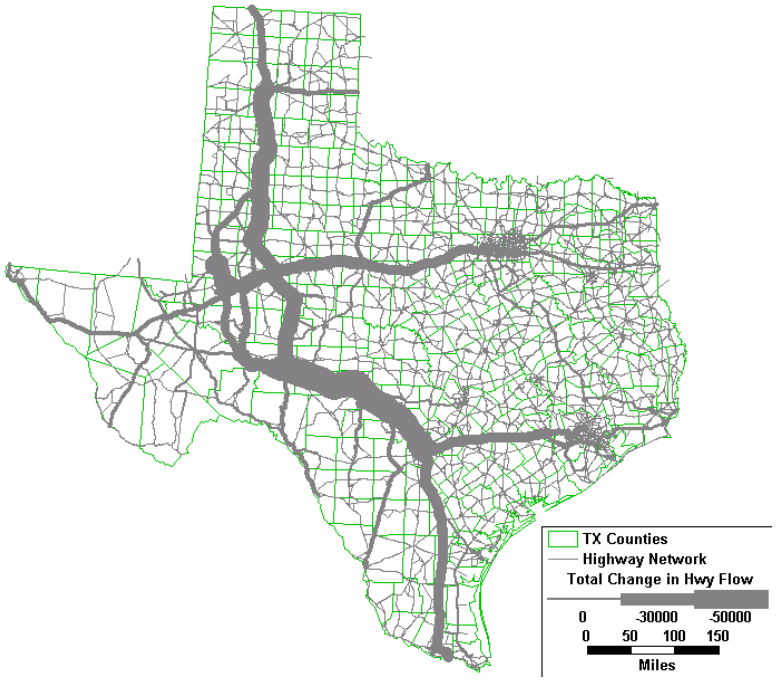
Source: ORNL Rail Network Routing

Figure 4.3 Base Case Truck Flows on the Highway Network (Eagle Pass to Lubbock, TX)



Source: FAF Highway Network Routing

Figure 4.4 Route Diversions on Highway Network for the West Texas Rail Connection (Eagle Pass to Lubbock, TX)



Source: FAF Highway Network Routing, Cambridge Systematics, Inc.

Regional Ton-Mile Diversions

To estimate the total travel impact of full development of West Texas rail corridor on the transportation system, rail ton-mile diversions were estimated for the divertible flows. Three regions where impacts may be felt are shown in Table 4.2.

The state of Texas as a whole has a significant reduction in rail ton-miles in spite of the increase in rail tons, which indicates there is travel distance savings for the selected OD pairs. This was previously confirmed by the rail route diversion maps. Due to a longer existing travel distance over the Texas roadways, the statewide ton-mile reductions for international flows is higher.

The study area zones, on the other hand, have an increase in flows due to addition of the new rail line. The increase in ton-miles on the potential West Texas rail line itself is about 1.42 billion ton-miles annually.

Table 4.2 Regional Rail Ton-Mile Diversions for the West Texas Rail Connection by Trade Type (Eagle Pass to Lubbock, TX)

Trade Type	Scenario	Texas*	Study Area Zones*	Study Area Network*
All Flows	Base Case (tons)	2,575,786,819	131,772,346	34,998,551
	Planning Case (tons)	2,176,653,648	1,644,058,875	1,453,694,808
	Diversion (ton-miles)	-399,133,171	1,512,286,529	1,418,696,257
Domestic Flows	Base Case (tons)	783,415,893	88,620,406	27,267,636
	Planning Case (tons)	708,614,971	429,021,032	366,352,870
	Diversion (ton-miles)	-74,800,922	340,400,626	339,085,235
	% Diversion of All Flows	19%	23%	24%
International Flows	Base Case (tons)	1,792,370,926	43,151,940	7,730,915
	Planning Case (tons)	1,468,038,677	1,215,037,843	1,087,341,938
	Diversion (ton-miles)	-324,332,249	1,171,885,903	1,079,611,023
	% Diversion of All Flows	81%	77%	76%

Source: Regional Ton-miles Estimation, Cambridge Systematics, Inc.

* The values correspond to the annual total for OD pairs with flows divertible to the West Texas Rail Corridor, only. These are not statewide totals. Study Area Zones are study area identified counties in the Phase 1 Report and all the links lying within or touching the boundary of the study area are included. Study Area Network consists of West Texas rail connection and its parallel highway network as identified in the Phase 1 Report.

Similar results were generated for the truck ton-mile flows in the region and are summarized in Table 4.3 below. As expected, at all region levels, a decrease in ton-miles is observed.

Table 4.3 Regional Truck Ton-Mile Diversions for the West Texas Rail Connection by Trade Type (Eagle Pass to Lubbock, TX)

Trade Type	Scenario	Texas*	Study Area Zones*	Study Area Network*
All Flows	Base Case (tons)	8,215,584,723	1,489,743,118	1,113,731,086
	Planning Case (tons)	8,051,728,724	1,471,697,751	1,094,215,678
	Diversion (ton-miles)	-163,856,000	-18,045,368	-19,515,409
Domestic Flows	Base Case (tons)	6,584,411,065	1,420,894,049	1,067,222,191
	Planning Case (tons)	6,459,470,520	1,406,865,086	1,047,728,397
	Diversion (ton-miles)	-124,940,545	-14,028,963	-19,493,794
	% Diversion of All Flows	76%	78%	100%
International Flows	Base Case (tons)	1,631,173,659	68,849,069	46,508,895
	Planning Case (tons)	1,592,258,204	64,832,664	46,487,281
	Diversion (ton-miles)	-38,915,455	-4,016,405	-21,615
	% Diversion of All Flows	24%	22%	0%

Source: Regional Ton-miles Estimation, Cambridge Systematics, Inc.

* The values correspond to the annual total for OD pairs with flows divertible to the West Texas Rail Connection only. These are not statewide totals. Study Area Zones are study area identified counties in the Phase 1 Report and all the links lying within or touching the boundary of the study area are included. Study Area Network consists of West Texas rail connection and its parallel highway network as identified in the Phase 1 Report.

Rail Ton-Miles and Average Rail Flow Attracted by New Rail Segments

Focusing on the potential rail corridor, segment-by-segment, the expected ton-miles and average rail flow captured are indicated in Table 4.4. The estimated rail flow appears to be uniform for all segments.

Table 4.4 Rail Ton-Miles and Average Rail Flow for the West Texas Rail Connection by New Rail Segment (Eagle Pass to Lubbock, TX)

Segment Start	Segment End	Rail Ton-Miles Added	Segment Length (miles)	Average Rail Flow (Tons)
Eagle Pass	Del Rio	201,632,498	73.4	2,746,288
Del Rio	Ozona	380,456,885	120.3	3,163,093
Ozona	Big Lake	153,386,591	48.0	3,197,552
Big Lake	Midland/Odessa	187,496,356	53.9	3,481,180
Midland/Odessa	Seminole	215,836,196	55.5	3,888,240
Seminole	Seagraves	80,411,381	21.2	3,791,201
Seagraves	Lubbock	199,476,350	54.4	3,664,824
Total		**1,418,696,257**	**426.7**	**3,324,810**

Source: ORNL Rail Network Routing, Cambridge Systematics, Inc.

4.2 RESULTS OF FULL RAIL CORRIDOR DEVELOPMENT (EAGLE PASS, SAN ANGELO, BIG LAKE, MIDLAND-ODESSA, LUBBOCK)

For the full development of a West Texas rail corridor from Eagle Pass to Lubbock via Alignment 4, the OD pairs that could potentially use the full rail corridor were identified and divertible flows calculated. The total freight demand of divertible flows is about 23.0 million tons annually, of which 4.1 million tons use the existing rail network. Of the remaining 19.0 million tons of divertible flows using the highway mode, the truck-to-rail diversions were a mere 0.11 million tons annually. Overall, the West Texas rail connection can generate about 4.0 million annual tons of rail carload flows (or about 41,800 carloads) and about 0.18 million annual tons of rail intermodal flows (or about 7,000 TEUs), while eliminating about 4,800 truck trips annually. This is less than the 7,500 truck trips identified with the alignment that bypasses San Angelo.

Modal Diversions

Modal diversions by trade type are summarized in Table 4.5. The U.S.-Mexico North American Free Trade Agreement (NAFTA) flows included about 2.7 million tons of rail carload and about 83,000 tons of rail intermodal annually, which make up about 67% and about 46% of all diversions of the corresponding modes.

Table 4.5 Modal Diversions for a West Texas Rail Connection by Trade Type (Eagle Pass, San Angelo, Lubbock, TX)

Trade Type	Scenario	Rail Carload*	%Change of Rail Total	Rail Intermodal *	%Change of Rail Total	Truck*
All Flows	Potential Rail-to-Rail Diversion (Tons)	3,919,383	96.0%	162,004	4.0%	
	Potential Truck-to-Rail Diversion (Tons)	93,112	84.9%	16,549	15.1%	109,661
	Potential Total Diverted (Tons)	4,012,495	95.7%	178,553	4.3%	
Domestic Flows	Potential Rail-to-Rail Diversion (Tons)	1,240,563	93.8%	82,702	0.6%	
	Potential Truck-to-Rail Diversion (Tons)	80,441	85.9%	13,167	14.1%	93,608
	Potential Total Diverted (Tons)	1,321,003	93.2%	95,869	0.7%	
	% Change of All Flows	33%		54%		85%
International Flows	Potential Rail-to-Rail Diversion (Tons)	2,678,821	97.1%	79,302	1.8%	
	Potential Truck-to-Rail Diversion (Tons)	12,671	78.9%	3,382	21.1%	16,053
	Potential Total Diverted (Tons)	2,691,492	97.0%	82,684	1.9%	
	% Change of All Flows	67%		46%		15%

Source: TxDOT SAM V2 Freight Mode Choice Modeling, Cambridge Systematics, Inc.

*The values correspond to the annual total for OD pairs with flows divertible to the West Texas Rail Connection only. These are not statewide totals.

Route Diversions

The rail freight flows of divertible OD pairs (about 4.1 million annual tons, or about 18% of total existing demand) were routed on the existing rail network. These rail flows as shown in Figure 4.5 seem to be going through San Antonio, Austin and Dallas (along the I-35 corridor), and then into the Texas panhandle.

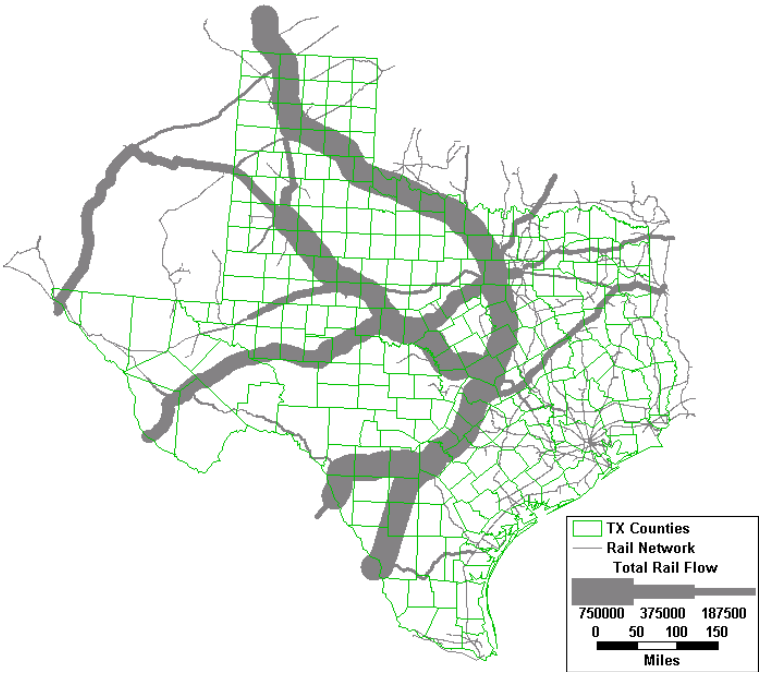
This clearly depicts the roundabout route most of these rail flows have to go through, which increases their travel times significantly.

The change in flows over the rail network as a result of the modified alignment alternative of West Texas rail connection are shown in Figure 4.6. There are increases in flow on the new rail line, while there are reductions in flow in rest of Texas indicating diversions within the rail mode. The new rail line tries to eliminate some of the winding flows identified above. Comparing to the original alternative, the modified alternative has a much wider system flow impacts.

The highway flows of divertible OD pairs (about 19.0 million annual tons, or about 82% of total existing demand) were routed on the highway network. The flows were found to have a pattern as shown in Figure 4.7. The key divertible highways flows are: (a) between El Paso area and Dallas metropolitan area, and (b) less prominent yet conceivably between Midland/Odessa and San Antonio. However, in terms of annual tonnages these are very small values compared to the divertible rail flows.

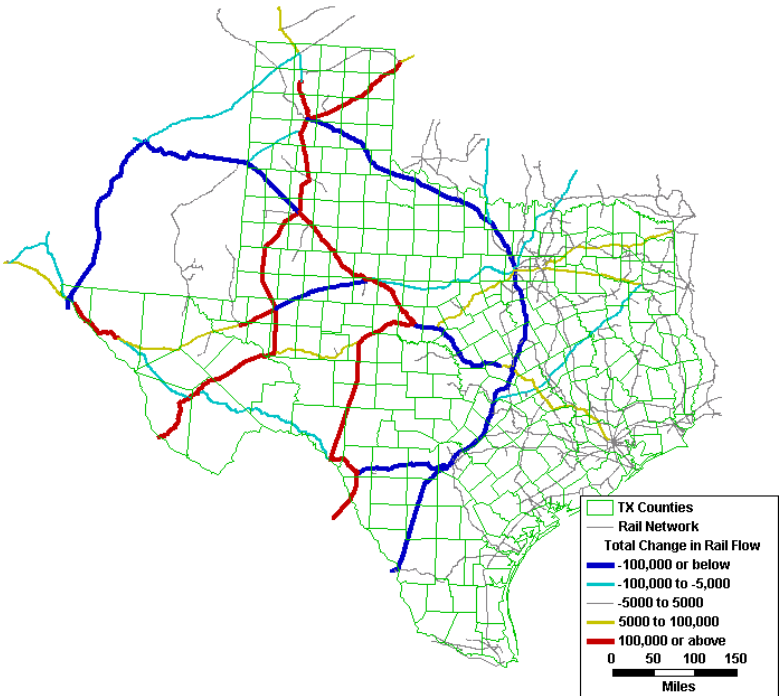
Figure 4.8 shows the change in truck flows as a result of the West Texas Rail Connection. The values have small effect in the central parts of Texas and the study area. Not many OD pairs that currently depend on trucking stand to gain by the new rail connection. The impact seems quite similar for both Dallas and San Antonio markets.

Figure 4.5 Base Case Rail Flows on the Rail Network (Eagle Pass to San Angelo to Lubbock, TX)



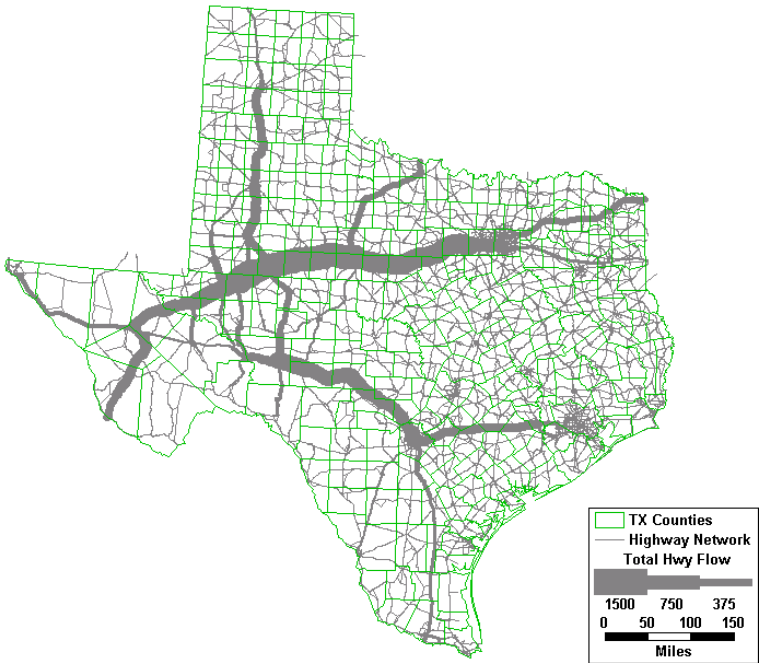
Source: ORNL Rail Network Routing, Cambridge Systematics, Inc.

Figure 4.6 Route Diversions on Rail Network for the West Texas Rail Connection (Eagle Pass to San Angelo to Lubbock, TX)



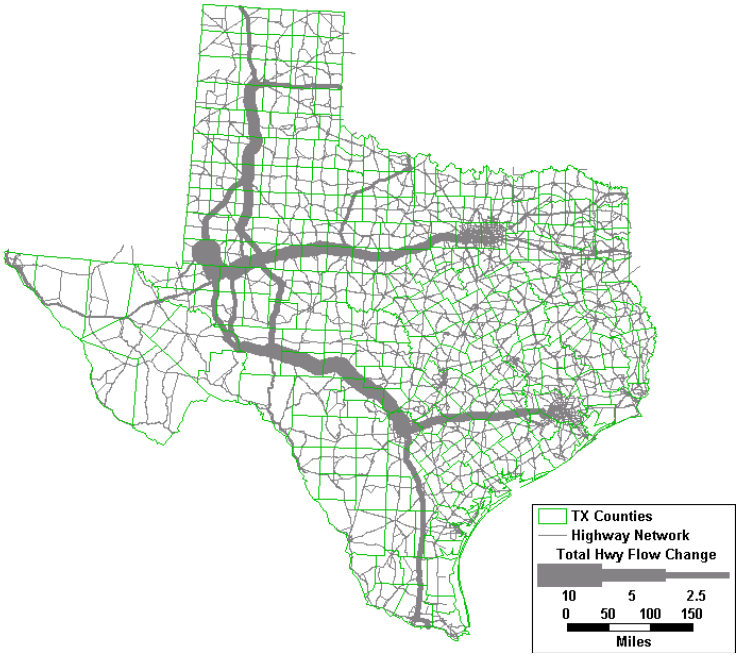
Source: ORNL Rail Network Routing, Cambridge Systematics, Inc.

Figure 4.7 Base Case Truck Flows on the Highway Network (Eagle Pass to San Angelo to Lubbock, TX)



Source: FAF Highway Network Routing

Figure 4.8 Route Diversions on Highway Network for the West Texas Rail Connection (Eagle Pass to San Angelo to Lubbock, TX)



Source: FAF Highway Network Routing, Cambridge Systematics, Inc.

Regional Ton-Mile Diversions

To estimate the total travel impact of the full development of West Texas rail connection on the transportation system, rail ton-mile diversions were estimated for the divertible flows. The summaries were made using the previously described regions as shown in Table 4.6.

The state of Texas as a whole has a significant reduction in rail ton-miles in spite of the increase in rail tons, which indicates there is travel distance savings for the selected OD pairs, which was also confirmed earlier by the rail route diversion maps. Due to a longer existing travel distance over the Texas roadways, the statewide ton-mile reductions for international flows is higher.

The study area zones, on the other hand, have an increase in flows due to addition of the new rail line. The increase in ton-miles on West Texas rail connection itself is about 0.62 billion ton-miles annually.

Table 4.6 Regional Rail Ton-Mile Diversions for the West Texas Rail Connection by Trade Type (Eagle Pass to San Angelo to Lubbock, TX)

Trade Type	Scenario	Texas*	Study Area Zones*	Study Area Network*
All Flows	Before (ton-miles)	2,563,233,599	176,342,277	89,085,086
	After (ton-miles)	2,091,523,008	975,590,785	710,084,024
	Change (ton-miles)	-471,710,592	799,248,508	620,998,938
Domestic Flows	Before (ton-miles)	817,616,496	87,893,016	42,693,393
	After (ton-miles)	690,068,322	295,094,213	218,912,541
	Change (ton-miles)	-127,548,173	207,201,198	176,219,149
	% Change of All Flows	27%	26%	28%
International Flows	Before (ton-miles)	1,745,617,103	176,342,277	89,085,086
	After (ton-miles)	1,401,454,685	975,590,785	710,084,024
	Change (ton-miles)	-344,162,418	799,248,508	620,998,938
	% Change of All Flows	73%	74%	72%

Source: Regional Ton-miles Estimation, Cambridge Systematics, Inc.

* The values correspond to the annual total for OD pairs with flows divertible to the West Texas Rail Corridor, only. These are not statewide totals. Study Area Zones are study area identified counties in the Phase 1 Report and all the links lying within or touching the boundary of the study area are included. Study Area Network consists of West Texas rail connection and its parallel highway network as identified in the Phase 1 Report.

Similar results were generated for the truck ton-mile flows in the region and are summarized in Table 4.7 below. As expected, at all regional levels, decrease in ton-miles is observed.

Table 4.7 Regional Truck Ton-Mile Diversions for the West Texas Rail Connection by Trade Type (Eagle Pass to San Angelo to Lubbock, TX)

Trade Type	Scenario	Texas*	Study Area Zones*	Study Area Network*
All Flows	Before (ton-miles)	1,655,847	438,053	439,676
	After (ton-miles)	1,646,683	435,032	436,636
	Change (ton-miles)	-9,163	-3,022	-3,039
Domestic Flows	Before (ton-miles)	1,115,875	321,507	327,016
	After (ton-miles)	1,108,848	319,152	324,664
	Change (ton-miles)	-7,027	-2,356	-2,352
	% Change of All Flows	77%	78%	77%
International Flows	Before (ton-miles)	539,972	116,546	112,659
	After (ton-miles)	537,835	115,880	111,972
	Change (ton-miles)	-2,136	-666	-687
	% Change of All Flows	23%	22%	23%

Source: Regional Ton-miles Estimation, Cambridge Systematics, Inc.

* The values correspond to the annual total for OD pairs with flows divertible to the West Texas Rail Connection only. These are not statewide totals. Study Area Zones are study area identified counties in the Phase 1 Report and all the links lying within or touching the boundary of the study area are included. Study Area Network consists of West Texas rail connection and its parallel highway network as identified in the Phase 1 Report.

Rail Ton-Miles and Average Rail Flow Attracted by New Rail Segments

Focusing on the new rail segments, the expected ton-miles and average flow tons captured by the full deployment of the West Texas rail connection are indicated in Table 4.8. The estimated rail flow is highest between Eagle Pass and San Angelo and beyond that it falls down, indicating that there is a benefit in providing a direct connectivity from San Angelo to the international border crossing with Mexico in the south.

The average rail flow by segment in the alignment through San Angelo is just over 950,000 tons. The average rail flow of the more direct route is over 3.3 M. ***For this reason, the route through San Angelo will not be evaluated as part of the economic and financial feasibility analysis.***

Table 4.8 Rail Ton-Miles and Average Rail Flow for the West Texas Rail Connection by New Rail Segment (Eagle Pass to San Angelo to Lubbock, TX)

Segment Start	Segment End	Rail Ton-Miles Added	Segment Length (miles)	Average Rail Flow (Tons)
Eagle Pass	Del Rio	136,105,333	73.4	1,847,500
Del Rio	San Angelo	267,272,305	144.9	1,845,039
San Angelo	Midland/Odessa	64,925,082	170.0	381,867
Midland/Odessa	Seminole	11,940,393	55.5	215,103
Seminole	Seagraves	4,555,897	21.2	214,799
Seagraves	Lubbock	12,330,494	57.4	214,742
Total		**497,129,502**	**522.7**	**951,080**

Source: ORNL Rail Network Routing, Cambridge Systematics, Inc.

5.0 Benefit-Cost Analysis

A key objective of this study is to determine the feasibility of developing the north-south rail linkage between Del Rio/Eagle Pass and Lubbock, Texas. To that end, key benefit factors have been evaluated to help assess a variety of aspects of the rail line, for example if the line will yield transportation benefits on Texas roadways (e.g. pavement or safety improvements), if there will be environmental benefits, and if the line will serve as a catalyst of economic growth in West Texas.

The methodology used is largely based on benefit-cost analysis processes developed by Cambridge Systematics for TIGER II Discretionary Grant applications and truck size and weight studies, such as the Wisconsin Truck Size and Weight Study (2009) which includes rail diversion impact assessment.

In general, benefits are shaped by the following inputs:

- **Changing shipping patterns.** Development of new rail facilities provide shippers with additional goods movement options. Some will find shorter rail trips. Others will move goods from truck to rail to realize cost savings. Changing shipping patterns will have impacts on infrastructure maintenance, safety, emissions, and fuel consumption.
- **Construction spending.** New spending on rail infrastructure can inject the region with new permanent operations jobs and wages as well as temporary jobs and wages during the construction period.
- **Business attraction.** New infrastructure and access to better transportation resources can serve as a catalyst for new economic development and business attraction.

There are two areas of benefits that are traditionally considered in this type of benefit-costs analysis that are not included in this evaluation:

- **Congestion Relief.** While congestion relief can be a secondary benefit of shifting truck traffic to railways, it is not considered a significant factor in this analysis because 1) the region does not face significant roadway congestion at present, 2) the region is not anticipated to face significant roadway congestion in the future, and 3) the amount of truck traffic anticipated to shift onto railways would likely have minimal impact, given the high available roadway capacity of the region.
- **Reliability Savings.** Some shippers may see changes in freight reliability as they shift from truck to rail freight movements. However, these factors are assumed to be accounted for in the estimation of truck diversion. It is assumed that shippers will generally pursue the lowest cost transportation option available for bulky, non-time sensitive commodities.

Note that this analysis reflects the consultants' diversion estimates, only, and does not intend to imply actual use of the corridor. Use of this shortline operated rail corridor by diverting Class I railroads is very unlikely due to the nature of existing Class I operations and the desire to minimize interchanges.

5.1 ASSUMPTIONS

The following categories of benefits and major assumptions used to estimate benefits of the West Texas rail project are shown in Table 5.1.

Table 5.1 Benefit Analysis Assumptions (Real 2010 Dollars)

Input Category	Input	Value
Present Value and Benefit Cost Ratio	Analysis timeframe	2010 to 2045
	Discount rate	2.8%
Timeline	Construction period	2012-2015
	Operating period	2015-2045
Residual Value of Capital	Lifespan for rail	50 years
Shipping Costs	Rail – carload (per ton-mile)	$0.036
	Rail – intermodal (per ton-mile)	$0.10
	Truck (per ton-mile)	$0.15
Safety	Savings for eliminating truck VMT	$0.13
State of Good Repair	Pavement impacts per truck VMT	$0.20
Environmental	"Monopsony" Savings (reduced pressure on world fuel prices) per gallon	$0.28
	"Price Shock" Savings (reduced exposure to economic loss risks) per gallon	$0.12
	Combined emissions cost (CO2, NOx and PM) per gallon by truck	$0.86
	Combined emissions cost (CO2, NOx and PM) per gallon by rail	$1.56
	Ton-miles per gallon (truck)	97.2
	Ton-miles per gallon (rail)	413
Regional Economy/Economic Analysis	Permanent jobs per $1M operations cost	11.9463
	Construction job per $1M capital cost	21.6992
	Operations-related wages per operations $	$0.5617
	Construction-related wages per construction $	$0.8266

Note, in addition to the assumptions outlined in the table, the results presented calculate the benefit-cost for ***truck-to-rail diversions, only***. While significant rail-to-rail demand has been identified as part of the diversion analysis, that demand is primarily a result of diverting Class I rail traffic to this potential shortline operated rail corridor. It is unrealistic to assume that this corridor will be an attractive option for those rail operators, given the presence of existing rail classification yards along Class I corridors and the additional switching and operational complexities that would be introduced if those movements were diverted.

5.2 BENEFIT-COST SUMMARY – TRUCK-TO-RAIL DIVERSIONS

It is anticipated that about 175,000 truck tons would divert to the new rail line under Alignments 1, 2 or 3. This equates to close to 20 M truck ton-miles that are removed from area Texas highways and transported instead as rail carload and rail intermodal units. Considering only truck-to-rail diversion, we see limited benefits. Costs remain the same, as do the employment and wage creation due to spending. Benefits are smaller as rail-to-rail diversions are not considered.

Benefits are driven largely by the estimated $63 M in transportation cost savings for local, domestic, and international shippers diverting from truck to rail movements. The benefit-cost ratio for all three alternatives is close to 0.41, indicating that significant additional truck diversion or increased rail traffic for economic benefit would be needed for the benefits to exceed the costs for this project. Tables 5.2 and 5.3 provide a summary of each benefit as applied to the three alternatives under evaluation.

Table 5.2 Total Costs and Benefits (Millions of Real 2010 Dollars)

	Item	Alt 1	Alt 2	Alt 3
Costs	Construction	1,048	987	1,416
	Operations and Maintenance	143	140	200
	Total Costs	**1,191**	**1,127**	**1,616**
Benefits	Shipper Cost Savings	63	63	63
	State of Good Repair	4.4	4.4	4.4
	Safety	2.8	2.8	2.8
	Environmental	4.3	4.3	4.3
	Residual Value	419	395	566
	Total Benefits	**493.5**	**469.5**	**640.5**
	Benefit-Cost Ratio	**0.41**	**0.42**	**0.40**

Table 5.3 provides benefits as a result of construction. These are the same benefits regardless of what diversion alternative is considered, as the construction and operating costs of the line are constant values.

Table 5.3 Employment and Wage Benefits

Item	Alt 1	Alt 2	Alt 3
FTE Jobs Created by Construction *(2012-2015)**	22,700	21,400	30,700
Wages Created by Construction *(2012-2015)*	$866.5 M	$815.9 M	$1,170.5 M
FTE Jobs Created by Railroad Operations *(2015-2045)**	1,700	1,700	2,400
Wages Created by Railroad Operations *(2015-2045)*	$80.2 M	$78.5 M	$112.2 M

*Rounded to the nearest hundredth.

6.0 Rail Line Revenue Analysis

A rail line revenue analysis was conducted to understand the potential revenue that could be generated through operating a potential West Texas rail line. The objective of this analysis is to compare rail line revenue to operating expenses to determine whether or not operations can be self-sufficient. The overarching assumption for this financial analysis is that public funding will either not be available for this project, or, will form a small part of the total financing package. This assumption is based on the reality of the current transportation funding shortfall at both the state and national level and the number of projects already in the funding queue.

6.1 SHORTLINE RAILROAD PRO FORMA ANALYSIS

Shortline railroads are often contracted by the owner of a rail line to provide rail services required under the infrastructure owner's common carrier obligation. In most instances, these shortline operators are one of many operators owned by a parent or holding company that specialize in providing transportation services (e.g., railroad switching, mechanical, and leasing services).

The pro forma analysis used to forecast the shipping rate that a shortline railroad operator would need to charge shippers in West Texas assumes a typical scenario where the new rail line is owned by a separate entity and the shortline railroad company is contracted to provide freight rail service on the owner's behalf. The determination of a shipping rate for this scenario assumes that:

1. Shippers in West Texas that divert freight from truck to rail service pay the shortline railroad a tariff on a per railcar basis, and also pay to lease railcars from a Class I railroad or a railcar leasing company.
2. The shortline railroad bases the railcar tariff on the costs expected to be incurred in order to meet the demand for rail service (i.e., the tonnage expected to be diverted to rail) plus an acceptable rate of return on the expenditures made to meet this demand.
3. The shortline railroad is a newly established company rather than an expansion of service provided by other shortline or regional railroads that might exist within the region, even though existing railroads might in fact become interested in performing this service.
4. Railcars transported by the shortline interchange with a Class I railroad for delivery to their final destination.

Demand for Shortline Railroad Service

Earlier in the study, truck-to-rail diversions have been forecasted to be almost 175,000 tons per year, with an average payload of approximately 70 tons per railcar (boxcar, gondola, hopper, etc.) and 17.5 tons per intermodal twenty-foot equivalent unit (TEU) container. Since intermodal flatbed railcars have a four-TEU capacity, these intermodal railcars are also assumed to have a total payload of 70 tons.[3]

Trains operated by the shortline railroad are assumed to consist of 25 railcars each with a maximum in-haul delivery time of four days, which leads to the need for approximately 100 trains per year (one train every 3 to 4 days). Since one train move is expected to occur about once every four days, and since the maximum in-haul delivery time is assumed to be four days, this analysis also assumes that only 25 railcars will be under lease by shippers at a cost of $15.00 per day en-route.[4]

Costs of Shortline Railroad Operations

Shortline railroad operations will incur costs associated with rolling stock, track maintenance, and labor expenses. After these expenses have been totaled, the cost is then inflated by an expected rate of return on investment to establish a tariff that the shortline railroad will charge per railcar to shippers in West Texas.

- **Rolling Stock:** This analysis assumes an average haul length of 150 miles, requiring two locomotives with an efficiency of 400 ton-miles per gallon to each be leased at a rate of $250 per day and consuming No. 2 Diesel at a cost of $3.00[5] per gallon. Since the cost of railcars will be incurred by shippers, the total cost of rolling stock to the shortline railroad is expected to be $698,125 per year.
- **Track Maintenance:** A maintenance-of-way cost of $2,000 per mile is assumed to maintain the condition of the new 286,000-pound capacity track in use by 100 trains per year comprised of 25 railcars each.[6] Leases for support vehicles, such as hi-rail or standard trucks, are assumed to cost $1,500 per month, and additional equipment expenses are assumed to cost

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[3] The AAR reports that average line haul freight payloads are actually about 61 tons per railcar in Class I Railroad Statistics, AAR – Policy & Economics Department, April 21, 2008.

[4] The inclusion of railcar lease costs actually has a negligible effect on shipping rates paid by shippers.

[5] As of August 10, 2011, diesel was priced at $2.90.

[6] Maintenance-of-way costs necessary to support through-movement of Class I rail freight (rail-to-rail diversions) must be collected from the Class I railroads in exchange for trackage rights granted by the rail line owner.

$10,000 per year. The total cost of track maintenance is expected to be $548,000 per year.

- **Labor:** Labor costs are assumed to include one manager at a salary of $80,000 per year, four train crew members each at a salary of $50,000 per year, three track and signalmen each at a salary of $45,000 per year, and one support staff member at a salary of $35,000 per year. A multiplier of 2.5 times salary is applied to each employee to account for all overhead associated with the support of these personnel, giving a total expected labor cost of $1,125,000 per year.
- **Return on Investment:** The most recent Surface Transportation Board release on the cost of capital (cost of debt and shareholder equity) for Class I railroads indicates that the average (all Class I railroads) cost of capital is 10.75 percent. This analysis bases the necessary return on investment to equal the cost of capital, a minimum acceptable condition for sustainable business operations, and assumes that the shortline railroad's cost of capital (and consequently, the required return on investment) is 10.0 percent.

6.2 ANALYSIS OF RAIL PROVIDER-ONLY BUSINESS MODEL

This analysis assumes that the owner and financier of the new rail line is an entity separate from that of the rail service provider. As shown in Table 6.1 the shortline railroad tariff must cover the following expenses on an annual basis.

Table 6.1 Annual Shortline Railroad Expenses

Item	Cost
Rolling Stock	$698,125
Track Maintenance	$548,000
Labor	$1,125,000
Total	**$2,371,125**
ROI at 10%	237,113
Total Required Revenue	**$2,608,238**

The Table 6.1 indicates that a new shortline railroad will need to earn revenues equal to $2,608,238 per year in order to cover the cost of operations and earn a return on investment of 10 percent when moving 175,000 tons per year by moving approximately one train, each comprised of 25 railcars, every four days. The need for $2,608,238 in annual revenue translates to a tariff of $1,043 per railcar. On a ton-mile basis, this tariff equates to a shipping rate of 10.5 cents per ton-mile for shippers that chose to divert freight from truck to rail.

As a comparison, the tariff for moving rock approximately 41 miles by the Austin & Western Railroad on the Cap Metro line between Austin and Elgin is $650 per railcar. These railcars are likely to carry a payload closer to 100 tons per railcar rather than 70 tons (as assumed in the West Texas case), resulting in a shipping rate of approximately 16 cents per ton-mile. These findings indicate that shipping rates charged by shortline railroads can potentially exceed the trends in shipping rates presented in Table 6.1.

6.3 ANALYSIS OF AN OWNER-OPERATOR BUSINESS MODEL

The previous tariff analysis assumes that the owner and financier of the new rail line is an entity separate from that of the rail service provider, with the rail service provider consisting of a shortline railroad company contracted by the owner to move freight between shippers in the West Texas region and a Class I railroad. Therefore, a second analysis was prepared using an owner-operator business model, in which a single entity finances the new rail line through the obligation of revenues generated by rail service that it provides to shippers in West Texas.

The owner-operator business model assumes that the $1.0 billion capital cost of the new line is able to be financed at an interest rate of 3.0 percent over 30 years, resulting in an annual debt payment of approximately $51 million included in the list of cost items that need to be covered by operations. This scenario also assumes an increase in track maintenance and rolling stock costs (e.g., locomotive maintenance and fuel) required to accommodate the significant additions in tonnage needintg to be handled by the shortline railroad in order to remain profitable.

Table 6.2 lists the operating expenses necessary to support shortline railroad operations under the owner-operator business model, attributable to the need to handle volumes of freight great enough to offset the added expense of debt financing (i.e. the additional $51.02 million per year).

Table 6.2 Annual Shortline Railroad Expenses (Owner-Operator Model)

Item	Cost
Rolling Stock	$11,124,464
Track Maintenance	$1,060,000
Labor	$1,125,000
Debt Financing	$51,020,000
Total	**$64,329,464**
ROI at 10%	$6,432,946
Total Required Revenue	**$70,762,410**

Analysis of this owner-operator business model show that the tariff and shipping rate required for a 10 percent return on investment equate to a $1,040 tariff and 10.5 cent shipping rate (from the original analysis) when traffic volumes reach 4.75 million tons per year. That is, the owner-operator business model does not become feasible unless the volume of freight can be increased from the original case by 4.575 million tons per year.

7.0 Conclusion

The results of the benefit-cost and rail revenue analyses for a potential West Texas Rail Corridor are sobering. As noted, the maximum benefit-cost ratio is 0.42. A benefit-cost of 1.0, or better is desired to advance projects. Additionally, in order to "break-even" from a self-supported financial perspective, 4.75 M tons need to be transported on the rail corridor, annually. These are daunting numbers and represent a significant shortfall in benefits to justify a $1B investment.

However, as a point of comparison, this study only calculated the benefit-cost ratio on truck-to-rail diversions. If rail-to-rail diversions are considered as input into the analysis, an additional 3.9M tons are input, and a maximum benefit-cost ratio of 1.34 is achieved. While this shows additional transportation system benefits can be realized through rail diversions, the 3.9M tons are still short of the required 4.5M tons to make this rail line self-sufficient, and, as previously noted may be unrealistic to expect to divert.

Absent the guarantee of rail-to-rail diversions for this analysis, other local conditions should be considered as holding the potential to generate additional demand for the West Texas rail line. The following text provides ideas and opportunities that could generate additional traffic on the West Texas rail line. The amount of traffic that could be generated by each development has not been quantified.

Business Attraction

The potential for induced demand (the possibility that shipping volumes may increase due to the presence of better rail options) was not considered as part of this analysis. However, it is valid to assume that this rail project could attract business and stimulate economic development and place additional demand on the rail line. Access to rail service is recognized as one of many critical conditions for business attraction potential. Investment in this rail linkage can spur development along the corridor. As part of stakeholder interviews, one interviewee was eager to see the development of a new rail line because they felt captive to a single Class I railroad. They believe that increased competition would result in more favorable rail rates and service to shippers – which would also result in new business locating to the area.

Expansion Demand

Expansion demand is traffic generated from expansion of existing shippers located on the line or from new shippers that located or relocated to the area for its improved rail service. This is new demand resulting from expansion accruing in addition to the diversion. Few public studies describe the expansion demand

potential of new rail facilities, especially in rural areas. Through the interviews conducted for this study, we identified several opportunities where the new alignment could provide service to "mega-shippers" - companies that have the potential to bring significant traffic to this corridor. These businesses include:

- **Wind turbine manufacturing.** Located in San Angelo, this facility is currently operational but does not have rail access. A spur is planned to connect to the South Orient Rail Line. The West Texas rail corridor could provide north-south connectivity for transporting wind turbine components.
- **Gasification facility.** A gasification plant is being constructed by Summit Energy in Penwell. As part of this development, the Union Pacific Railroad will provide service to the plant via a rail spur. Given the proximity of the West Texas rail corridor, there is potential for raw materials (sand, water) and processed gases to be transported to/from the facility on a north-south rail line.
- **Industrial park**. On the outskirts of Odessa, Flint Hill is an abandoned industrial park (1,100 acres) with an existing rail spur; the only rail spur still in existence in the area that presents the community some potential for generating new business/attracting companies. Flint Hill Petrochemical closed several years ago, but has capacity for 450 rail cars. There is also additional land for expansion and the Odessa Economic Development Corporation is working with local companies to re-establish the activity in park. The West Texas rail line could potentially serve this development.
- **Nuclear waste disposal.** This industry is very dependent on rail, with the vast majority of incoming waste from East Coast markets. It is expected that the facility will grow substantially in the next few years (over 3 million square yards of near-surface disposal has been planned for expansion by 2014 resulting in up to 700 rail carloads by that time). Currently the site is served by the Texas-New Mexico shortline railroad via a connection with Union Pacific Railroad (and to a certain extent by CSXT for east coast service). If the supply chain shifts for this business in the future, (i.e. waste is transported to the facility from areas other than the east coast) there could potentially be a role for a north-south rail corridor.

In addition to these site-specific industries, it was mentioned that a new rail line could support existing thriving businesses in the region, especially the cotton and grain sorghum hybrid business along the corridor. Recognizing that the interview process for this study was limited, there are likely other shippers that could be attracted to the region by the new rail service, but an estimate would be nothing more than an educated guess.

Build on Existing, On-going Investments in the Region

Several interviewees mentioned that by constructing this rail line, they believe that shippers in the region would be able to eventually make use of Mexican ports instead of relying on Class I railroads to ship to congested U.S. West Coast

ports of L.A. and Long Beach. This includes a connection to Mexican rail (which leads to Mexican Pacific Coast Ports) near Del Rio, as well as through the South Orient Rail Line to the Mexican port of Topolobampo through the border town of Presidio. While these proposals are ambitious, they may not be unrealistic considering several developments underway.

- **Presidio Bridge reopening.** There are plans underway for this bridge that had suffered fire damage to reopen, again in the next two years. While traffic on this line had been in decline (or absent) at the time of the closure (as a result of track class and slow speed limitations), a north-south rail line connecting to the South Orient Rail Line could provide the link needed to drive demand at that border crossing.
- **Border initiatives.** The TxDOT has contracted with the Center for Transportation Research to undertake the Border Master Planning study. As part of this effort current and planned future capacity of ports of entry, and the bi-national transportation infrastructure serving those points will be reviewed and improvement investments, prioritized. Of the concerns of this project, border crossings and their condition are critical to success. The Eagle Pass alternative is attractive because it is an existing crossing, however, the crossing would require significant coordination with Union Pacific to serve it.

  The Del Rio crossing is also a concern. No rail bridge currently crosses the Rio Grande and the potential bridge location has been compromised on the Mexican-side through the removal of previously-existing infrastructure and development on the old railroad line. This bi-national effort could prioritize the Del Rio rail crossing and provide this study a lower cost option to connect to Mexico. It is our understanding that there is a significant rail market on the border region that could be served by this rail line, as the trend of Mexican businesses is to open in the U.S. so they are able to sell their product as "Made in the U.S.A."
- **Intermodal expansions.** There are several rail expansions on-going in the region. In November the city of Levelland, Texas opened an $8.6 million industrial rail park. The park encompasses 240-acres and is located along a West Texas & Lubbock Railway line. City officials expect the park to create 1,000 jobs and generate $100 million in new capital investment during the next 10 years[7]. A north-south rail line connecting to the West Texas & Lubbock could not only increase the economic activity at the industrial park, but could also benefit from directly serving industry. Continued investment in establishing intermodal and transload facilities along the West Texas rail shed will enable system interconnectivity and increase the likelihood of traffic to choose use of the new rail corridor.

[7] Progressive Railroading

- **Track Improvements.** During stakeholder interviews, track improvements to the rail line east of San Angelo were mentioned several times as an example of how improved rail infrastructure can benefit businesses and the region. For one, these track improvements contributed to the region landing a new green energy production plant (i.e. wind turbines). In addition, several agricultural businesses are happy with how goods are moved more efficiently and effectively from the region to eastern destinations because of the track improvements. Continued investment in upgrading and maintaining existing infrastructure holds the potential to make using a West Texas rail line that connects to upgraded track more attractive.