SAN ANTONIO REGION FREIGHT STUDY

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Presented By
HNTB Corporation

HNTB

Texas Department of Transportation

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APPENDICES

ACKNOWLEDGMENTS

The *San Antonio Region Freight Study* could not be undertaken without the cooperative participation of public, private, and governmental representatives from the San Antonio region, the State of Texas, the Union Pacific Railroad, and the BNSF Railway Company.

Members of the Stakeholder and Technical Advisory committees who have participated and contributed to this study are listed as follows:

- Judge Nelson Wolff---County of Bexar
- David Casteel---TxDOT, San Antonio District
- Scott Moore---Union Pacific
- Rollin Bredenberg---BNSF Railway
- Bruce Flohr ---Tech Committee
- Julie Brown---TxDOT San Antonio District
- Gwen Young---UTSA-ESE Department
- Ted West---FHWA
- Joanne Walsh---SA-BC MPO
- Jim Brannan---Bexar County
- Leilah Powell---Bexar County
- Vic Boyer---SAMCO
- Nick Page---SA-BC MPO
- Harrison Grindle---Kelly USA
- Leroy Alloway---COSA-City Council District 8
- Jeanne Geiger---SA-BC MPO
- Christina DeLaCruz---COSA-Public Works
- Anthony Stuart---Senator Leticia Van de Putte
- Emil R. Monciavias---City of San Antonio
- Todd Hemingson---Via Metro Transit
- Xamara Caballero---State Representative Robert Puente
- O’Lene Stone---US Representative Lamar Smith
- Jennifer Moczygemba---TxDOT TPP Multimodal Section
- Sid Martinez---SA-BC MPO
- Seth Mitchell---Bexar County

EXECUTIVE SUMMARY

This report is intended to provide the State, local governing agencies, private partners, and the metropolitan planning organization with a description of regional freight movements and an examination of alternatives to accommodate and capitalize on present and future freight movements.

It identifies improvements that may provide relief to residents and the traveling public adversely affected by delays, interruptions, and noise attributed to the movement of freight within the region. It also identifies alternatives that may improve regional freight rail capacity by enhancing the efficiency and operations of the railroads.

This report identifies improvements for the 12-county region comprising TxDOT's San Antonio District as well as Hays, Travis, and Williamson Counties of the Austin District. The potential improvements may be categorized as follows:

- Grade Separations (bridges to separate the railroad from streets)
- Grade Crossing Closures (closing and rerouting the street at the intersection with the railroad)
- Improvements to Existing Railroad Infrastructure (improving capacity and connectivity on existing rail lines)
- New Railroad Corridors (possible bypass routes)

It is anticipated that the San Antonio region will study this report and add, subtract, modify, and use the findings to develop a regional freight plan.

Freight Movement and Operations

Over the next 20 years truck and rail freight tonnage are projected to more than double within the San Antonio region. Heavy trucks will continue to provide both local and regional service. A number of intermodal facilities located within the region use trucks to ship goods to local businesses and warehouses as well as regional locations. As a result of forecasted population and freight movement growth multiple segments of interstate, U.S., and state highways are projected to experience high congestion (exceeding their capacities) in the future. Examples of such roadways include I-35 north of I-410, I-37 north of I-410, I-410 east of US 281, and Loop 1604 northwest of San Antonio.

There are five major rail lines owned and operated by the Union Pacific Railroad (UP), with over 420 miles of single track mainline in the San Antonio area and three active rail yards in the region (Kirby Yard, East Yard, and SoSan Yard). A fourth, yet unnamed, yard will soon be constructed to the southwest of San Antonio to handle intermodal freight movement into San Antonio to and from Mexico and the West Coast ports. The rail inventory also includes approximately 895 at-grade highway-rail crossings along the railroad mainlines, and over nine miles of railroad bridge structures. The existing rail network in San Antonio is shown in Figure 1.

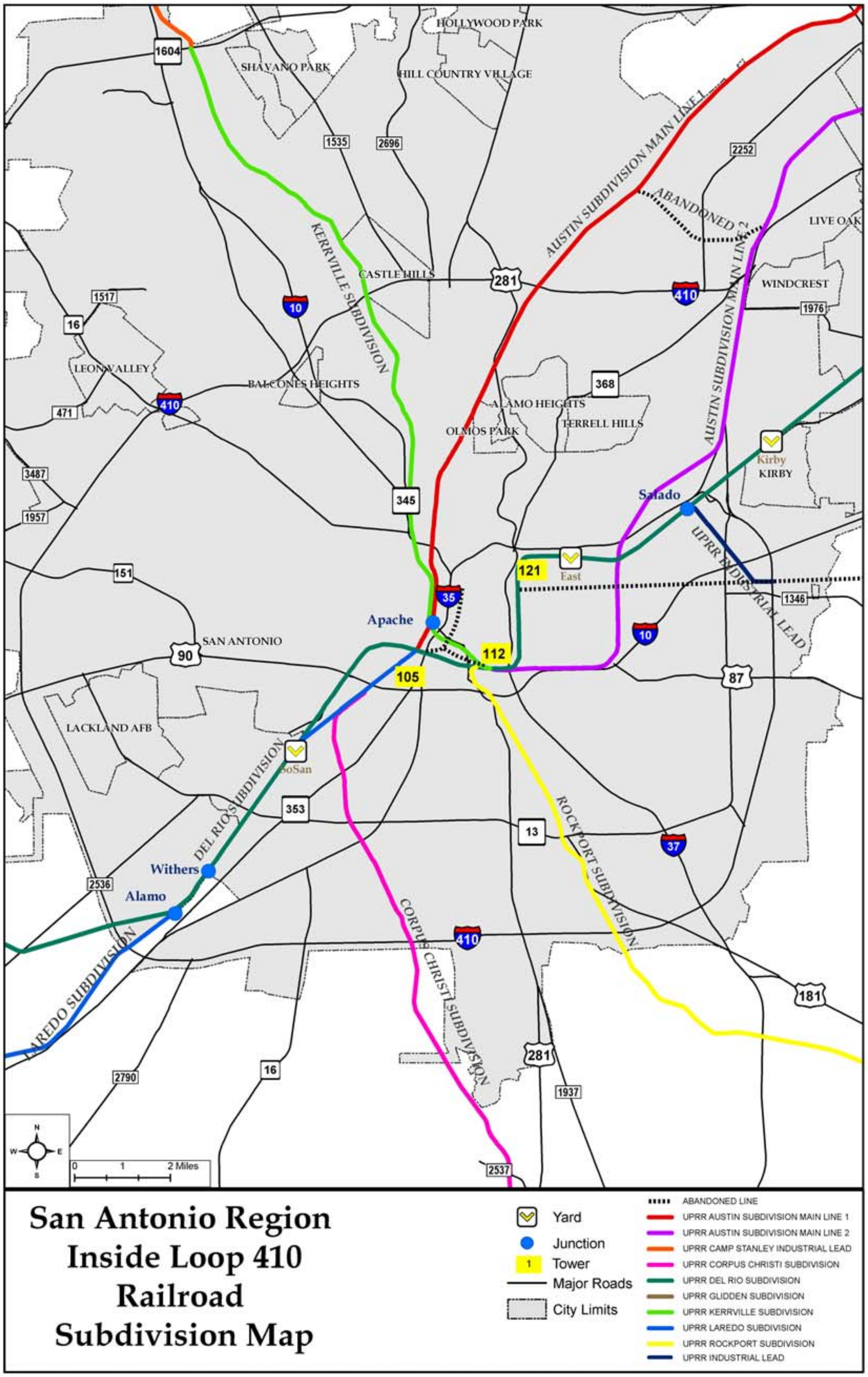


Figure 1: San Antonio Rail Network

From January 2000 through December 2005, the 12-county region experienced 128 highway-rail at-grade crossing accidents, in which there were 14 fatalities and 78 injuries.[1] As might be expected, over 80% of these incidents and nearly 80% of all fatalities occurred at public at-grade crossings. The grade separations and crossing closures identified in this report may significantly improve public safety at roadway-rail crossings in the region if they are developed.

Approximately 100 trains per day travel within the San Antonio region and areas extending north to Taylor and east to Flatonia. A significant volume of the rail freight moving into and/or out of San Antonio does not originate or terminate there; but is only in San Antonio to be switched or classified into another train destined elsewhere, or for movement onto another mainline that traverses the San Antonio area.

It is estimated that approximately 70 to 75 percent of the trains moving into/out of San Antonio perform operations such as dropping off or picking up rail cars, maintenance services, fueling, and crew changes at SoSan Yard, located near the Port Authority of San Antonio (formerly Kelly USA). East Yard is primarily used as an industrial service yard for local and regional customers. North-south trains terminating in San Antonio therefore typically do so at East Yard, located north of the Alamo Dome and the Amtrak Station. Kirby Yard, located east of San Antonio near Kirby, is a crew change point as well as in-line fueling facility. Kirby Yard is also equipped for unloading auto racks and provides some local service.

Although not a direct indication of the location of each and every customer within San Antonio's IH-410 loop, Figure 2 shows the general locations of existing industry and spur tracks that connect to the main tracks that could serve rail customers. In comparison to a Terminal network such as in the Houston region, there are relatively few customers located in the downtown area.

[1] Federal Railroad Administration, 2000 – 2005 highway-rail at-grade crossing safety statistics.

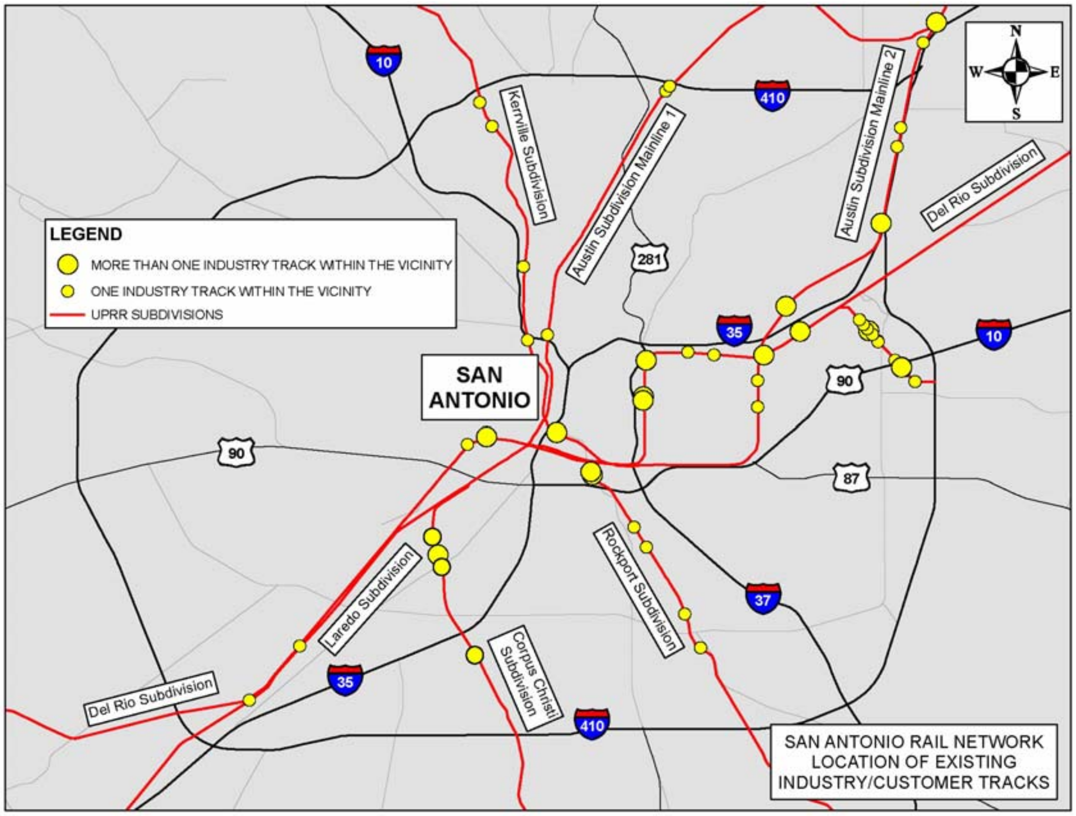


Figure 2: Approximate Industry/Customer and Spur Track Locations

Identified Improvements

At an estimated cost of $924 million, 66 identified grade separations would separate existing railroad lines from major streets in the San Antonio District, thereby reducing safety hazards and delays. Additionally, 26 existing at-grade crossings were identified as potential grade separations within the Austin District counties for a cost of $238 million. For the citizens in San Antonio's inner city neighborhoods, these projects could provide relief from blocked intersections and backed-up vehicles on the streets. The improvements could also improve safety by allowing emergency and law enforcement vehicles to respond without delay, while improving the quality of life for residents in the impacted neighborhoods. The estimated public benefit value of the identified grade separations in the San Antonio and Austin Districts totals more than $1.1 billion.

Also identified are 65 locations where existing grade crossings may be closed with an estimated cost of $3.3 million in the San Antonio District and 4 crossings in the Austin District for an estimated cost of $200 thousand. These safety improvements minimize conflict points between trains and cars by closing crossings and encouraging motorists to use grade separated roadways, or alternate streets, which have better safety systems in place. The estimated public benefit value for the crossing closures totals more than $92.2 million.

In addition to improvements addressing safety to the traveling public, the report also identifies 28 rail capacity improvements, at an estimated cost of $183 million. Three possible bypass routes at estimated costs ranging from nearly $1.37 billion to approximately $2.42 billion were also investigated.

Rail capacity enhancements augment economic growth of the region by improving the efficiency of freight rail operations as well as minimizing disturbances to residents, thus improving their quality of life. Improvements to the rail system relieve congestion along existing rail corridors, permitting the trains to pass through the region more quickly. The rail improvements analyzed can be categorized as follows:

- Adding a mainline track
- Adding track adjacent to existing mainlines at strategic locations to allow trains to pass one another or to idle without causing delays
- Constructing connections from one rail line to another to improve rail traffic mobility
- Expanding rail yard capacity
- Relocating rail yards and/or facilities that accommodate trailers and containers by ship, rail, and truck referred to as “intermodal facilities”

Certain rail improvements were determined to warrant further analysis and were grouped into separate planning cases. In general, the planning cases consisted of:

- Planning Case A (PC A) – San Antonio rail bypass between Seguin and Macdona with new rail yards at Marion and Macdona
- Planning Case B1 (PC B1) – Austin rail bypass between Taylor and Seguin with a new intermodal yard at Macdona, trains routed on the Del Rio Subdivision between East Yard and Tower 112
- Planning Case B2 (PC B2) – Austin rail bypass between Taylor and Seguin with a new intermodal yard at Macdona, trains routed on the Austin Mainline 2 Subdivision between East Yard and Tower 112
- Planning Case C (PC C) – Combined San Antonio and Austin rail bypass between Taylor and Macdona with new rail yards at Marion and Macdona
- Planning Case 1 (PC 1) – tested improvements in order to address operational efficiency with the installation of a second mainline route in and out of SoSan Yard
- Planning Case 2 (PC 2) - tested improvements in order to address operational efficiency with the installation and completion of a second mainline route between East Yard and Kirby Yard
- Planning Case 3 (PC 3) - tested improvements to address network fluidity and capacity
- Planning Case 4 (PC 4) - tested improvements to improve meet/pass efficiency and reduce train delays

Estimated costs, as well as public and private benefits for each planning case are shown in Table 1. As shown in the table, Planning Case C has the highest total public benefit to cost ratio as well as the highest total benefit to cost ratio. The estimated private benefit is largely due to savings in run time and delay time over the 20-year period.

Planning Case	Estimated Cost	Estimated Public Benefit	Ratio: Public Benefit/Cost	Estimated Private Benefit	Ratio: Private Benefit/ Cost	Estimated Total Benefit	Ratio: Total Benefit/Cost
A	$ 1,369,610,000	$ 504,790,000	0.37	$ (162,860,000)	-0.12	$ 341,930,000	0.25
B1	$ 1,595,850,000	$ 587,100,000	0.37	$ 161,990,000	0.10	$ 749,090,000	0.47
B2	$ 1,741,260,000	$ 843,460,000	0.48	$ 157,890,000	0.09	$ 1,001,350,000	0.58
C	$ 2,423,510,000	$1,424,950,000	0.59	$ 95,490,000	0.04	$ 1,520,440,000	0.63
1	$ 9,260,000	NA	NA	$ 670,000	0.07	$ 670,000	0.07
2	$ 21,060,000	NA	NA	$ 14,820,000	0.70	$ 14,820,000	0.70
3	$ 25,740,000	NA	NA	$ 16,450,000	0.64	$ 16,450,000	0.64
4	$ 35,130,000	NA	NA	$ 15,310,000	0.44	$ 15,310,000	0.44
Estimated public and private benefits are based on a 20-year study period.							

Table 1: Planning Case Estimated Cost and Benefits Summary

The planning cases are described in further detail in the following pages.

Planning Case A

Planning Case A analyzed a possible San Antonio bypass and new yards at Marion and Macdona. The San Antonio bypass alternative consists of a potential new double track rail corridor that would bypass San Antonio between Seguin (where the bypass would connect to the existing Glidden Subdivision line) and Macdona (where the bypass would connect to the existing Del Rio Subdivision). The new yard at Marion would replace most of the activities currently completed at East Yard. The new yard at Macdona would serve as a fueling facility for through-trains. The conceptual location of the possible San Antonio bypass is shown in Figure 3. The estimated cost of Planning Case A is approximately $1.37 billion, including the cost of grade separating select roadway-railroad crossings along the possible bypass route.

Trains that could be rerouted to the possible San Antonio bypass consist of through-trains primarily from the Glidden and Del Rio Subdivisions, coal trains that serve regional power plants, and intermodal trains that are currently serviced at either SoSan or East Yards. However, local service trains, rock trains to and from Hunter (north of San Antonio), passenger trains (Amtrak Texas Eagle and Sunset Limited routes), and international freight from Laredo that is destined for SoSan Yard would remain on existing rail lines.

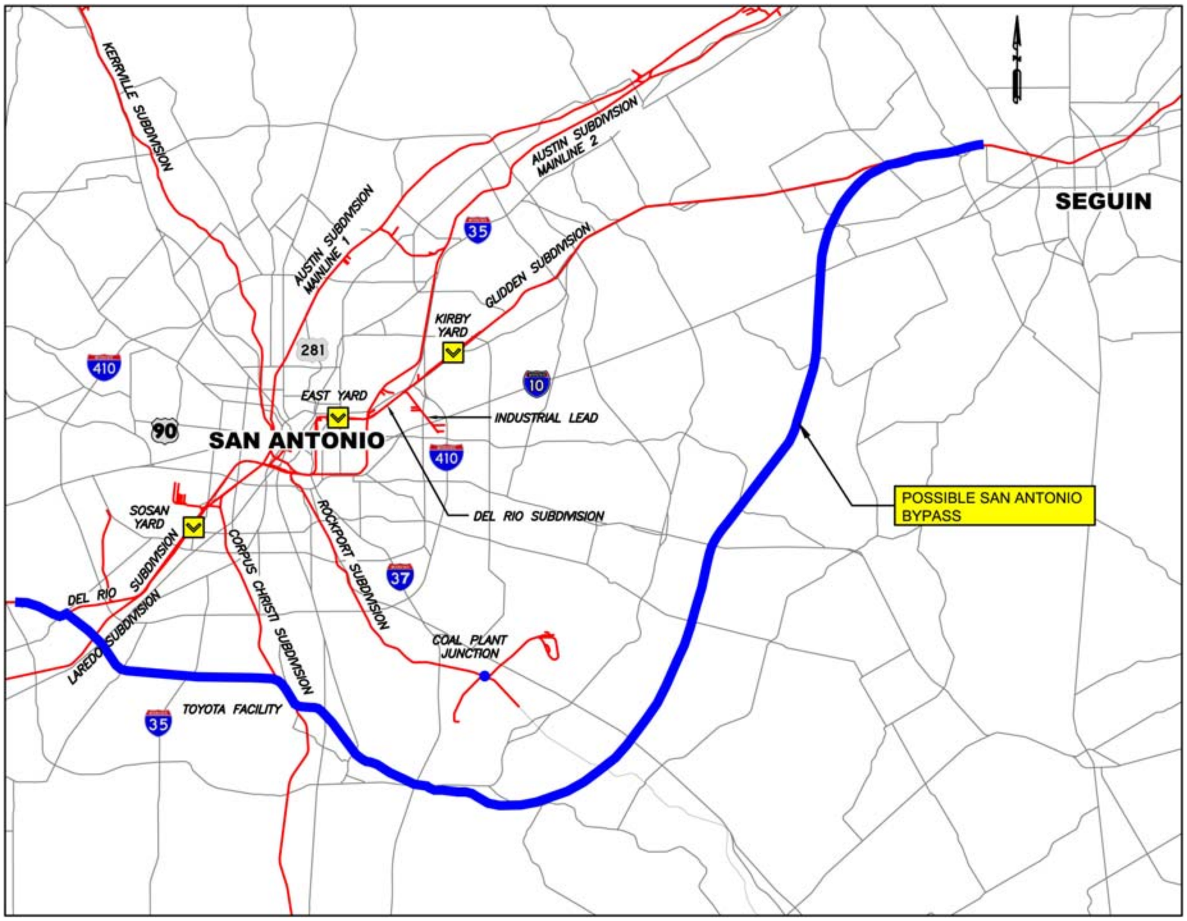


Figure 3: Possible San Antonio Bypass
(note: conceptual bypass route shown is for illustrative purposes only)

Planning Case B

Planning Cases B1 and B2 each analyzed the base case plus an Austin bypass with a new intermodal yard at Macdona. The Austin bypass is a potential new rail corridor between Taylor (where the bypass would connect to the existing Austin Subdivision line) and Seguin (where the bypass would connect to the existing Glidden Subdivision) that would bypass Austin, San Marcos, and other towns. The conceptual location of an Austin bypass is shown in Figure 4.

In Planning Case B1, trains were routed via the existing Del Rio Subdivision between the possible Austin bypass connection in Seguin and railroad Tower 112, which is how trains are currently routed under existing conditions. Planning Case B1 also includes upgrades to existing track between Seguin and East Yard as well as between Tower 112 and SoSan Yard. The estimated cost of Planning Case B1 is **$1.6 billion**, including the cost of identified grade separated roadway-railroad crossings.

In Planning Case B2, trains were routed via the existing Austin Subdivision Mainline 2 between the possible Austin bypass connection in Seguin and railroad Tower 112. Planning Case B2 would require the construction of a new wye connection between the Del Rio Subdivision and Austin Subdivision Mainline 2 as well as the grade separation or closure of the three at-grade crossings between the wye and Tower 112. Planning Case B2 also includes upgrades to existing track between Seguin and the possible new wye connection along the Del Rio Subdivision, between the wye and Tower 112 on the Austin Subdivision Mainline 2, and between Tower 112 and SoSan Yard on the Del Rio Subdivision. The estimated cost of Planning Case B2 is **$1.74 billion**, including the cost of identified grade separated roadway-railroad crossings.

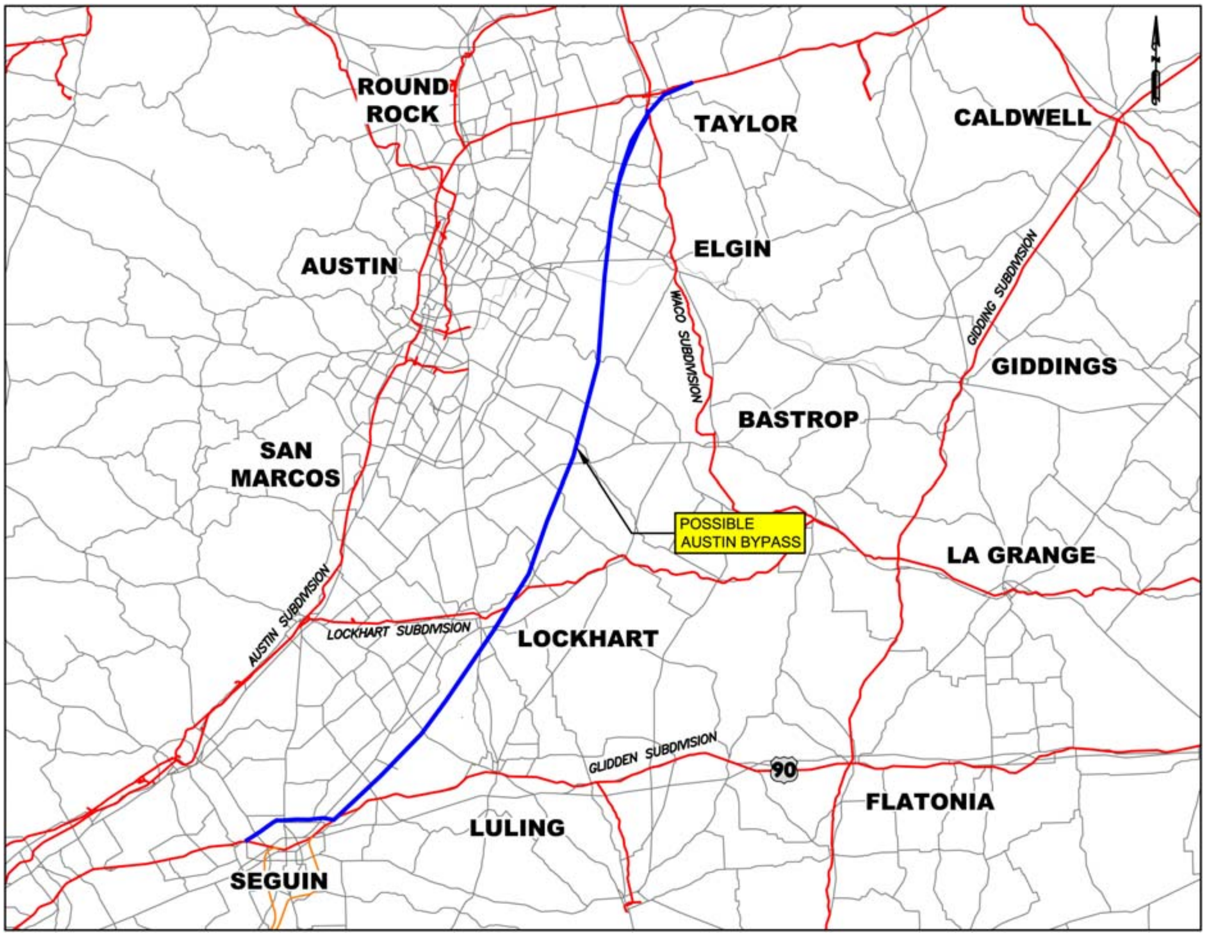


Figure 4: Possible Austin Bypass
(note: conceptual bypass route shown is for illustrative purposes only)

Planning Case C

Planning Case C analyzed the base case plus the San Antonio and Austin bypasses and new yards at Marion and Macdona. The Austin bypass in conjunction with the San Antonio bypass would allow through-trains that are typically routed on the UP Austin, Glidden, Del Rio, Laredo, Corpus Christi, Rockport, and Lockhart Subdivisions to be rerouted onto the bypass away from large metropolitan areas. The conceptual location of the possible Austin-San Antonio bypass is shown in Figure 5. The estimated cost of Planning Case C is more than **$2.42 billion**, including the cost of grade separating select roadway-railroad crossings along the possible bypass route.

Although Amtrak passenger trains, rock trains, auto trains destined for Kirby Yard in San Antonio, local service trains, and a minimal number of coal trains must remain on the existing rail lines, all other trains on the network may be able to be rerouted to the Austin-San Antonio bypass route.

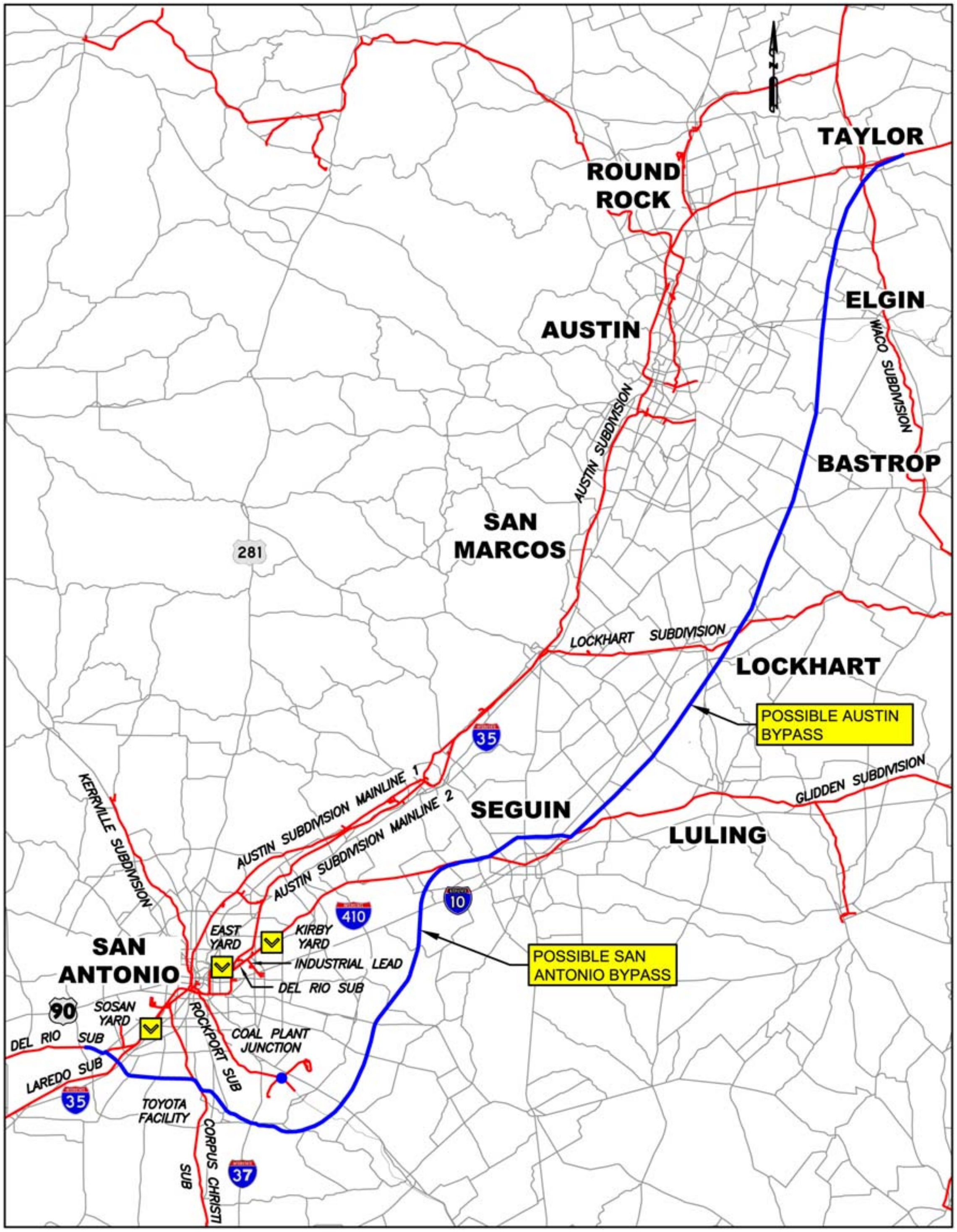


Figure 5: Possible Austin-San Antonio Bypass
(note: conceptual bypass route shown is for illustrative purposes only)

Planning Case 1

Planning Case 1, as shown in Figure 6, includes rail improvements tested in order to address operational efficiency with the installation of a second mainline route in and out of SoSan Yard. This allows traffic a straight route between SoSan, Withers, and Alamo Junction. Planning Case 1 is estimated to cost $9.3 million.

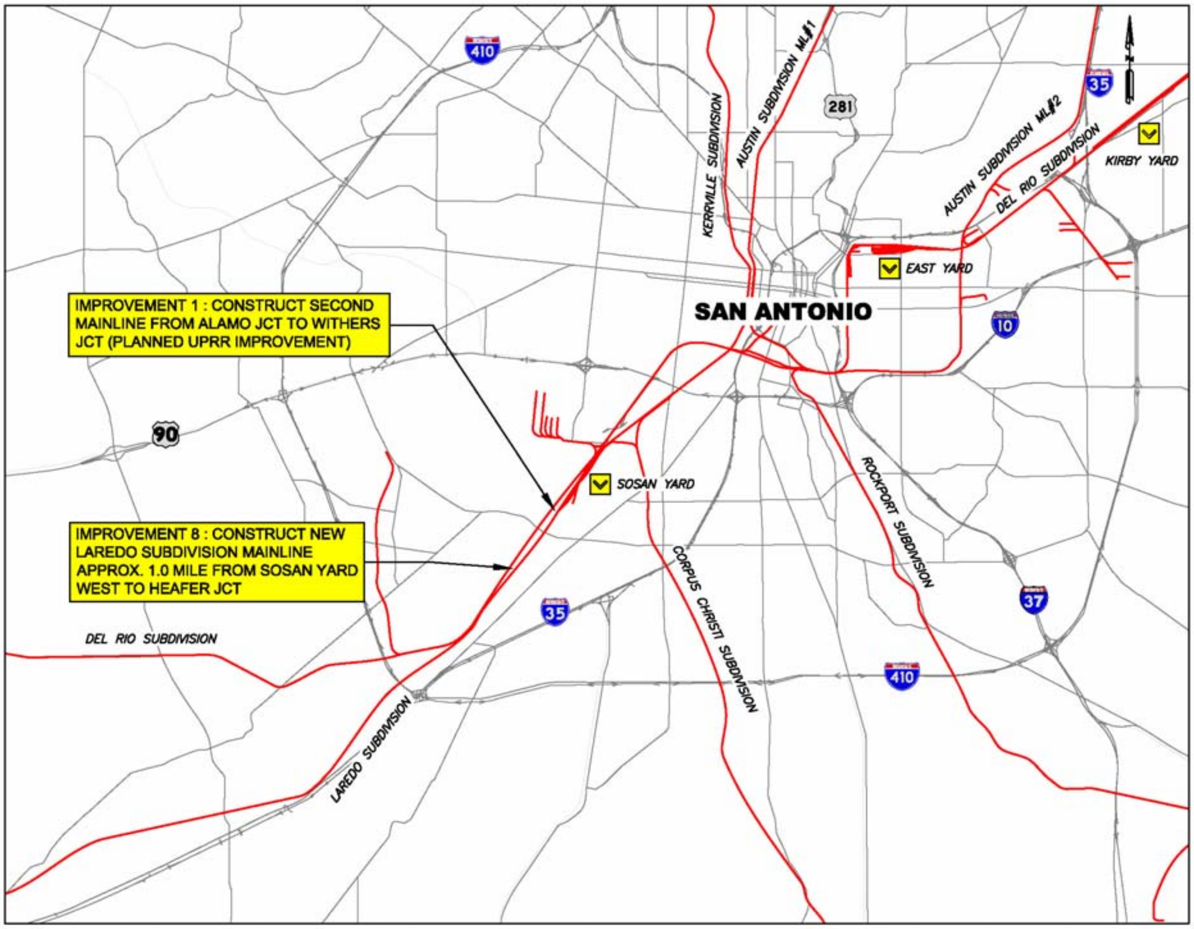


Figure 6: Planning Case 1 Improvements

Planning Case 2

Planning Case 2, as shown in Figure 7, includes the improvements of Planning Case 1 with the addition of rail improvements tested in order to address operational efficiency with the installation and completion of a second mainline route between East Yard and Kirby Yard. The new siding and switches at Toyota would allow for a passing siding for train meets, keeping the Corpus Christi Subdivision available for through-train movements. Planning Case 2 is estimated to cost $21 million.

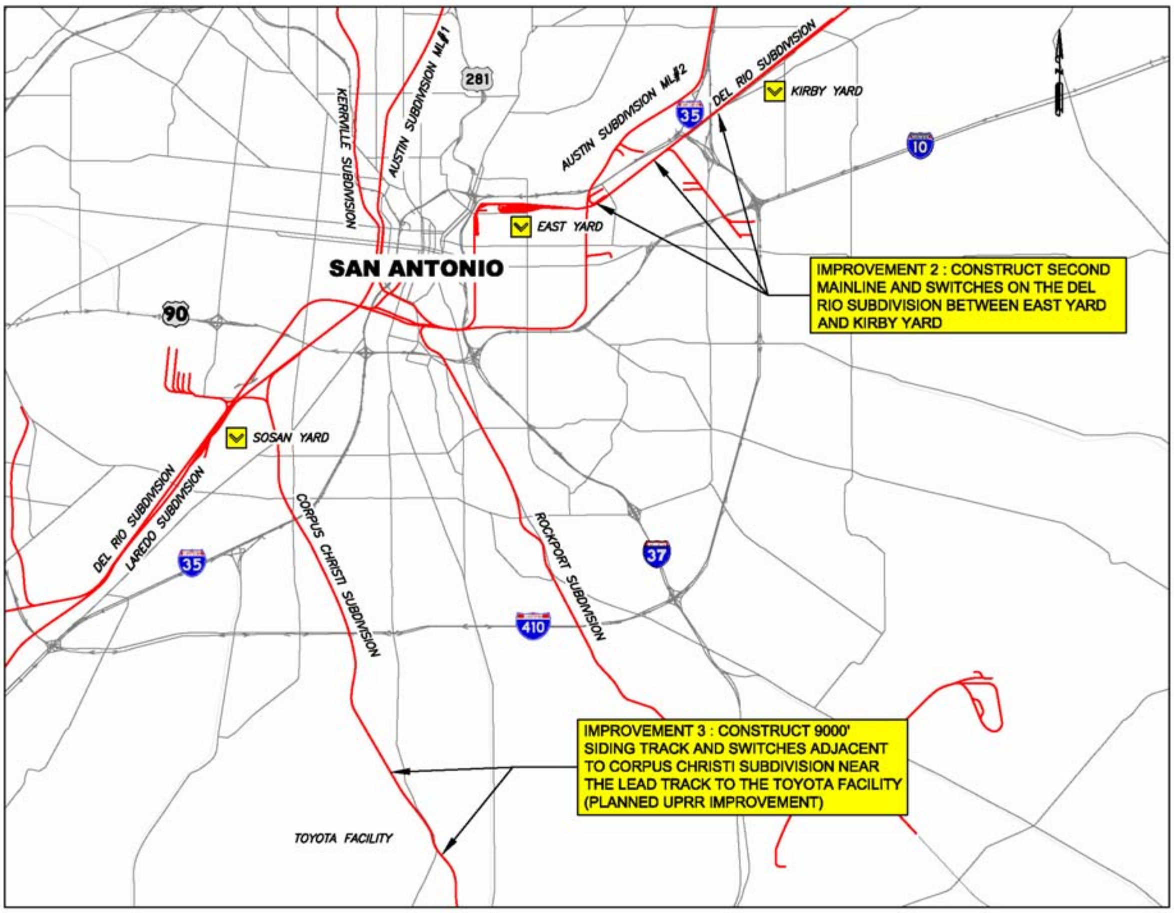


Figure 7: Planning Case 2 Improvements

Planning Case 3

Planning Case 3, as shown in Figure 8, includes the improvements of Planning Cases 1 and 2 in addition to rail improvements tested to address network fluidity and capacity. Planning Case 3 is estimated to cost nearly $26 million.

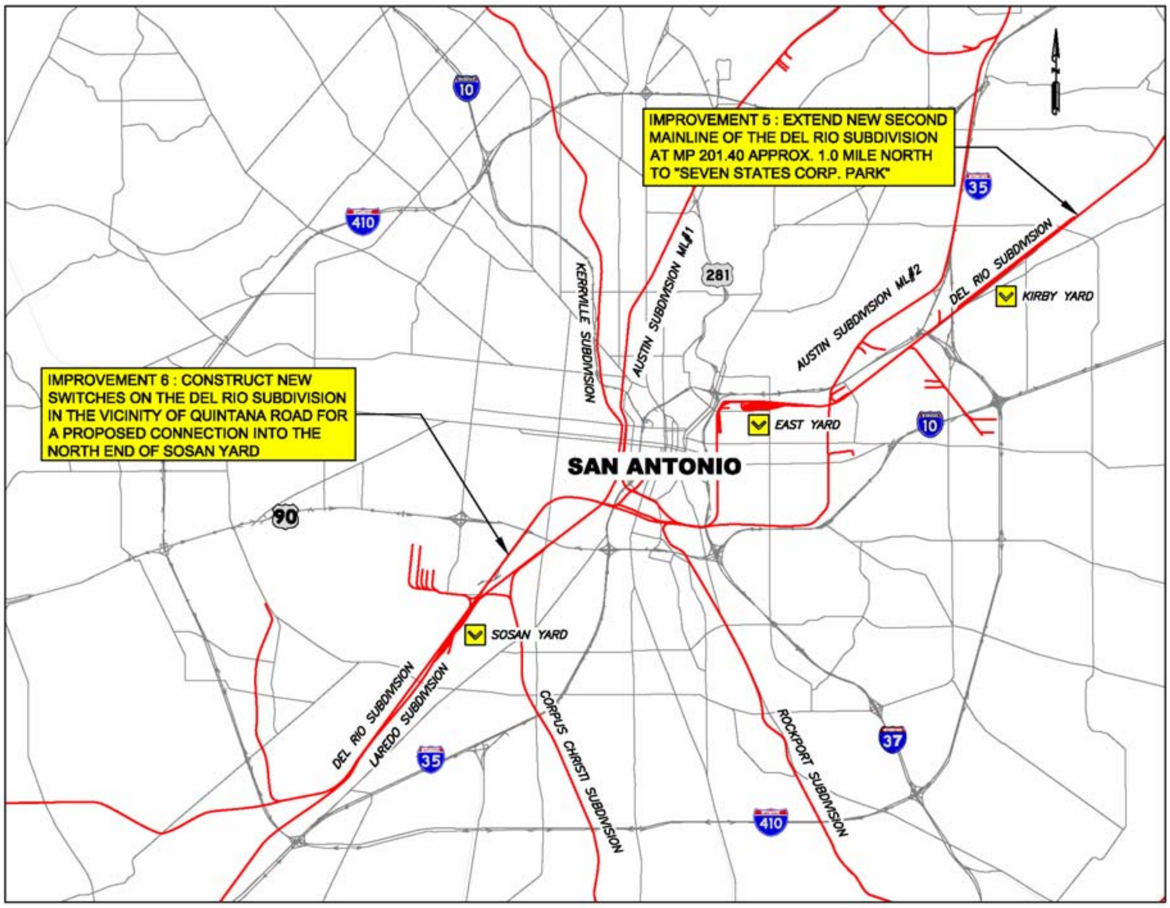


Figure 8: Planning Case 3 Improvements

Planning Case 4

Planning Case 4, as shown in Figure 9, includes the improvements of Planning Cases 1, 2, and 3 in addition to rail improvements tested to improve meet/pass efficiency and reduce train delays. Planning Case 4 is estimated to cost $35 million.

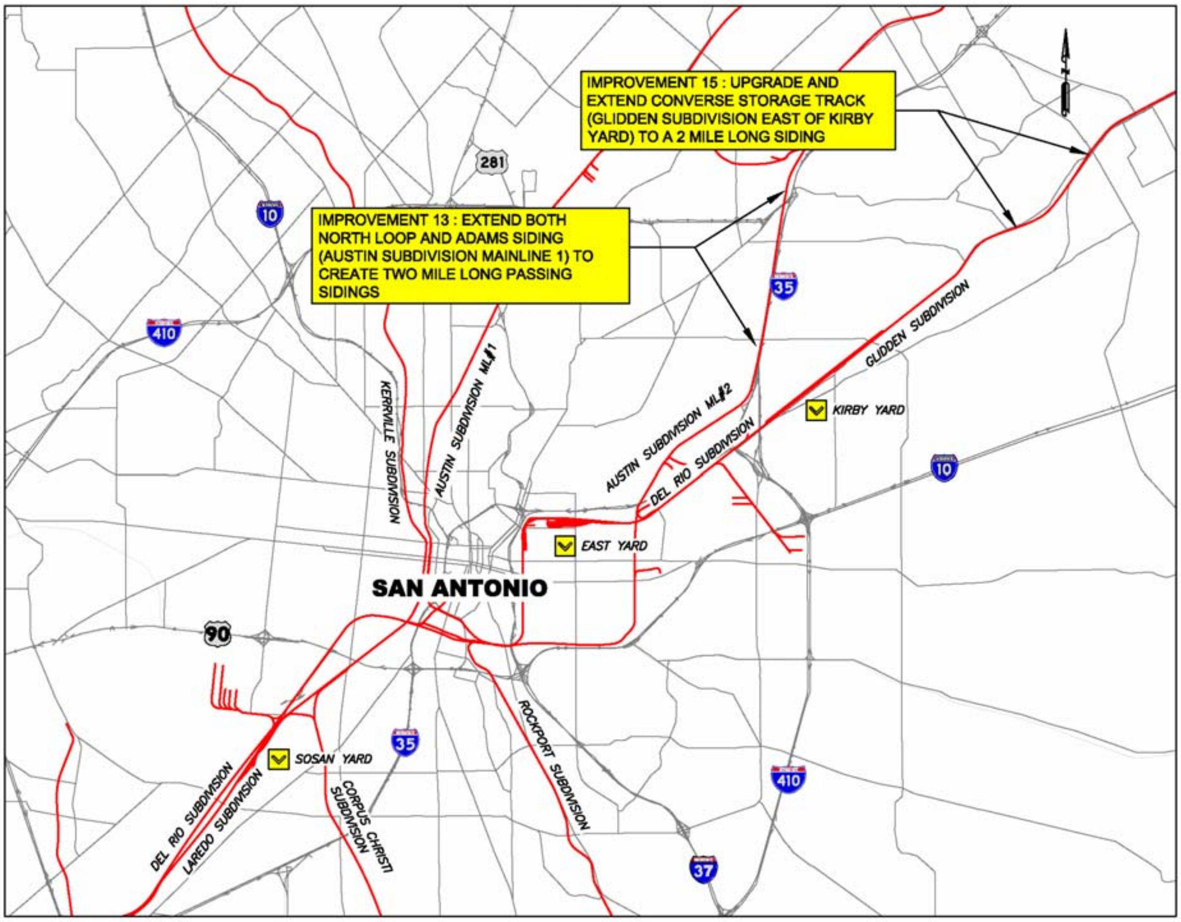


Figure 9: Planning Case 4 Improvements

Next Steps

Building upon the information contained within this report, the potential improvements, realignments, or relocations of the existing railway infrastructure have been analyzed to determine the efficiencies of through-freight rail operations and improvements associated with roadway user mobility and safety within the region. The private benefits generated for the respective modeling cases have been reviewed by UP. The railroad's concurrence to the methodology used, the proposed improvements to their infrastructure, and the overall public and private benefits associated with this study may strengthen stakeholder relationships.

Rail network improvements, reconfigurations, and possible realignments have been reviewed utilizing appropriate engineering methods to determine the operational viability of the existing and possible routes. Proposed ancillary and support facilities have also been identified.

The next step in this analysis would be to continue to review and analyze current and projected freight flow volumes to determine possible freight flows to and/or from the conceptual Trans-Texas Corridor routes and truck to rail freight shifts within the San Antonio region. Alternate uses for the existing freight rail corridor, the result of possible excess capacity windows generated by the proposed rail improvements, would also support the MPO's 2025 multimodal transportation plan.

The last step would be to proceed with an environmental impact study, with an emphasis on current and proposed land use for a recommended through-freight alignment.

The alternate uses for the existing freight rail corridor and current and proposed land use carries with it the increased potential for economic developments that could accompany new intermodal facilities, logistics parks, or mega-industrial or manufacturing facilities intended to allow the San Antonio region to flourish economically during this period of growth.

SECTION 1: PROJECT BACKGROUND

San Antonio Transportation Infrastructure

San Antonio was founded in 1718 by a Spanish military expedition as a mere stopping place along a trail through the Texas wilderness while en route to French trading posts in Louisiana. In the 19th Century the region was the starting point for the Chisholm Trail and cattle drives to Kansas. Today San Antonio is at the crossroads of a transportation network that connects the West Coast to the East Coast and Mexico to Canada.

The July 2005 US Census shows San Antonio as the second largest city in Texas, behind Houston and just ahead of Dallas, and the eighth largest in the United States. The basic framework for San Antonio's transportation network, for both vehicular and rail traffic, was laid out many years ago. Since that time, the region has experienced significant population growth. The railroad lines in the region were constructed between 1877 and 1912. The groundwork for the highway system primarily follows US and State Highways that were in existence before 1945.

Although transportation initiatives have been a continuous on-going process to upgrade the network in attempts to meet capacity demands, recent projections show unprecedented increases in population growth. Also, the corresponding movement of goods and people may require an even more aggressive approach to improving and expanding the existing transportation infrastructure so that it will have the needed capacity to support the desired economic growth of the San Antonio region for generations to come.

The Texas Department of Transportation (TxDOT) in partnership with the City of San Antonio, the 12-county region comprising TxDOT's San Antonio District, and other local transportation agencies, is undertaking a multimodal freight movement analysis. The results of this study are documented in this report, entitled *The San Antonio Region Freight Study*. The primary objective of the study is to explore opportunities and alternatives to prevent the restriction of movement of goods and people, as well as continued economic development in the region.

Today's San Antonio roadway infrastructure is experiencing a considerable number of locations where roadway congestion is common, especially during periods of peak travel. This is partly due to the tremendous growth in the movement of freight into and through the San Antonio area.

Railroad Freight Transport

In 1929 there were over 229,000 railroad route miles nationally that carried over 447,000 million revenue ton miles of freight, for an average of 2 million revenue ton miles per mile of route. There are now less than 100,000 railroad route miles nationally carrying over 1.5 billion revenue ton miles of freight for an average of over 15 million revenue ton miles per route mile.

Since Congress deregulated the railroad industry in 1980 with the Staggers Act, the railroads have had to endure increasing competitive pressures from other modes of transportation, especially the trucking industry. This competition has reduced the railroad profit margin to the point that infrastructure improvements and expansions are done very selectively; hence many rail lines/corridors are nearing (or have reached) their capacity to efficiently and cost effectively move trains. As the supply and demand equation for rail transportation has evolved, rail rates have increased in order for railroads to reinvest in their franchise (infrastructure).

In 2003, the United States House of Representatives Subcommittee on Railroads reported that over 40% of freight traffic in the U.S. is transported by rail. More importantly, approximately 70% of newly manufactured automobiles and 65% of coal shipments are transported via rail.[1] This movement of goods is being transported on an overall rail infrastructure that is less than half the size it once was.

In April 2007, John D. Boyd, Associate Editor for *Traffic World* wrote:

> This spring, when the Surface Transportation Board called in the chiefs of top U.S. railroads and their customers to review a rail network straining to keep up with near-record traffic, Vice Chairman W. Douglas Buttrey found another symbol.
>
> Holding up a rusted, cast-off spike he had taken from an active track, Buttrey told a packed hearing room April 11 that today's transport system needs "dire repair and maintenance and replacement." The country must find ways to better fund and improve its freight infrastructure, he said, with "maybe even revolutionary approaches to this issue, or we're going to end up with a whole system looking like this rail spike."
>
> U.S. Transportation Undersecretary for Policy Jeffrey Shane said "we face the challenges of success" from deregulation.
>
> To become more efficient in the wake of deregulation in 1980, railroads have shed inefficient track, shrinking networks even in times of traffic growth. Only in the last few years, rail officials say, are they making respectable profits again.
>
> "The physical rail network since 1990 has not expanded," said Shane. "Indeed, it has decreased by almost 20 percent while revenue ton miles increased by 64 percent." Average train speeds - a key efficiency measure - dropped in 2005 to the lowest in 16 years, and despite some gains last year Shane said it was clear freight demand was using up the rail system's capacity.

[1] US House of Representatives Subcommittee on Railroads, June 26, 2003 Hearing on national rail infrastructure financing proposals.

> Although most of the nation's freight is handled by trucks, rail executives say without a major highway building boom, which is not on Congress's agenda, railroads are better positioned to handle projected growth in freight traffic.
>
> "I don't think the highway system will keep up, in terms of commerce," said BNSF Railway's Matt Rose.
>
> Charles Moorman, CEO for Norfolk Southern, warned "a looming transportation crisis" could lead to gridlock in 2020 if railroads cannot find ways to take on more capacity.
>
> The rail executives said they already are investing heavily both to catch up with what Rose called a "volume surprise" in traffic in recent years and to prepare for future growth.

Within the next 15 to 20 years, tremendous demands may be placed on the rail network due to international trade growth, rising fuel costs, longer and heavier trains, without including the impact of the possible national resurgence for developed commuter and intercity passenger rail service.

The opening of the Toyota facility south of San Antonio in December 2006 will increase the volume of freight rail movements throughout the area once the facility is fully operational. Adding to the anticipated growth in rail traffic from the Toyota facility, UP announced plans to construct an intermodal facility in southwest Bexar County that may process over 100,000 trailers and containers annually.

Figure 1-1 represents the current major intermodal routes for UP. With the new San Antonio intermodal facility, the routes shown in light red may also become significant carriers of intermodal freight rail traffic.

Figure 1-1: UP Intermodal Routes

Another important element to consider is San Antonio's proximity to the nation's vehicle manufacturing and automobile parts supply network. While suppliers seem to be locating facilities for access to several US auto manufacturers, many suppliers (and some auto production plants) are already operating in Mexico within a day's drive of San Antonio. As shown in Figure 1-2, San Antonio sits near the center of a recently developed auto corridor that extends from Mexico City to Atlanta. Of the 18 assembly plants planned for or built in the US and Mexico since 1990, 12 plants (including Toyota in San Antonio) are located in this corridor, five of them in Mexico and six in the Southeastern US[2].

SOURCES: Automotive News Data Center; auto companies; TIP Strategies Inc.

Figure 1-2: Automotive Industry Corridor

Much of Mexico's auto parts manufacturing occurs in the maquiladora industry located in the four Mexican states that border Texas: Tamaulipas, Nuevo León, Coahuila, and Chihuahua. In 2002, there were 232,700 maquiladora jobs in transportation equipment manufacturing. Suppliers in Tamaulipas, Nuevo León and Coahuila are well positioned to serve the Daimler/Chrysler plant in Saltillo that makes Dodge Ram trucks, as well as the Toyota plant in San Antonio.

Toyota is building its first Mexican manufacturing plant in Baja California Sur near Tijuana, where they will make trucks and truck beds for its Tacoma pickup. Toyota purchased $600 million in auto parts from 20 Mexican suppliers in 2002. According to spokesman Dan Sieger, the company plans to expand its supplier network in Mexico to support San Antonio and Baja. Ciudad Juárez, which is between Tijuana and San Antonio, has a large auto parts industry and could be an important location

[2] "Texas Automotive Industry Profile," TIP Strategies Inc.

for suppliers seeking to produce for both plants. While Juárez is about 550 miles from San Antonio and 725 miles from Tijuana, travel to both locations is expedited by the light highway traffic between them and the good condition of I-10. Both markets are also accessible by rail.

Nationally, the transportation network relies heavily on the efficiency of freight movement via rail, not just for “to market commodities” but also to provide the necessary tools for a manufacturing base. Without reliable, affordable, and efficient rail service, the nation’s economy would be negatively affected.

San Antonio, and many other cities abutting the railroad that have turned into municipalities over time, are now faced with the dilemma of having railroad operations pass directly through their Central Business Districts. This is also true for the major truck routes. With many of the top employers of the region concentrically located, the exposure of truck and rail freight movement to the traveling public brings with it a potential increased exposure to hazardous materials transportation and an increased accident exposure rate in general.

SECTION 2: PURPOSE OF STUDY

This report is intended to provide the State, local governing agencies, private partners, and the metropolitan planning organization with a description of regional freight movements and an examination of alternatives to accommodate and capitalize on present and future freight movements. Figure 2-1 shows the counties within the San Antonio region study area. The study provides evaluations and recommendations for near term, mid-range, and long term improvements and/or activities that may facilitate freight mobility within the region. The overall concept of the study is envisioned to evaluate freight movements and operations within the region, to identify opportunities to increase freight movement efficiency, determine the physical and financial viability of potential improvements, and include an analysis of potential freight corridor connections to the Trans Texas Corridor.

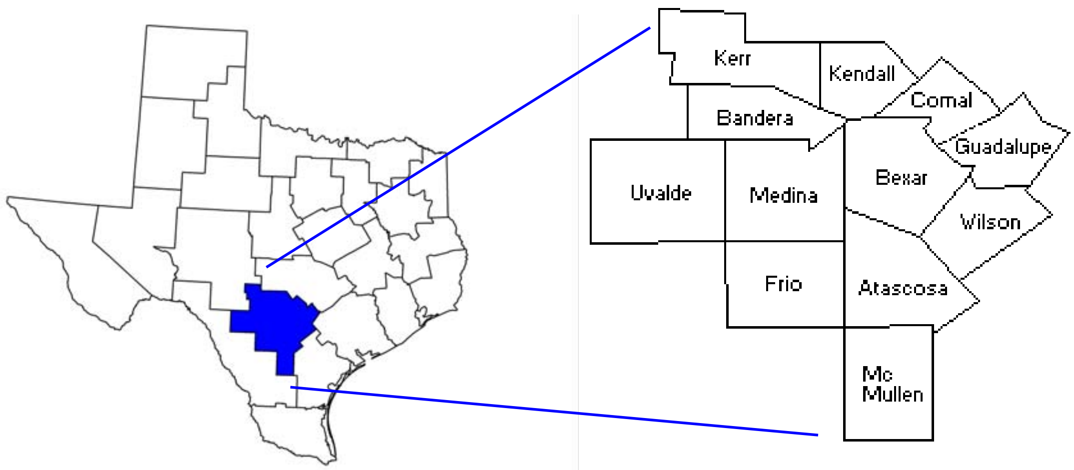


Figure 2-1: – San Antonio Region Study Area

The study was conducted in two phases. Phase I, which is covered within this report document in sections 1 through 6, encompasses establishing an inventory of the existing freight rail system, conducting a region wide freight rail operational study, identifying freight rail constraints, and identifying freight rail and rail/roadway interface safety issues. Phase II, the results of which are included in this report as sections 7 through 11, addresses alternatives and associated feasibility for rail system/roadway improvements within the region and models rail system improvements to develop a realistic cost/benefit analysis.

The next step in this analysis would be to continue to review and analyze current projected freight flow volumes to determine possible freight flows to and/or from the conceptual Trans-Texas Corridor routes and truck to rail freight shifts within the San Antonio region. Alternate uses for the existing freight rail corridor, the result of possible excess capacity generated by the identified rail improvements, would also support the MPO's 2025 multimodal transportation plan.

The last step would be to proceed with an environmental impact study, with an emphasis on current and proposed land use for a recommended through-freight alignment. The alternate uses for the existing freight rail corridor and current and proposed land use carries with it the increased potential for economic developments that could accompany new intermodal facilities, logistics parks, or mega-industrial or manufacturing facilities intended to allow the San Antonio region to flourish economically during this period of growth.

SECTION 3: FREIGHT OPERATIONAL STUDY

Highway Network

Planning for the San Antonio highway network began during the World War II era and has been phased in over the past 60 years to make up the infrastructure that is in place today. The beginning of the network was based on the existing US and state highways that traversed the area.

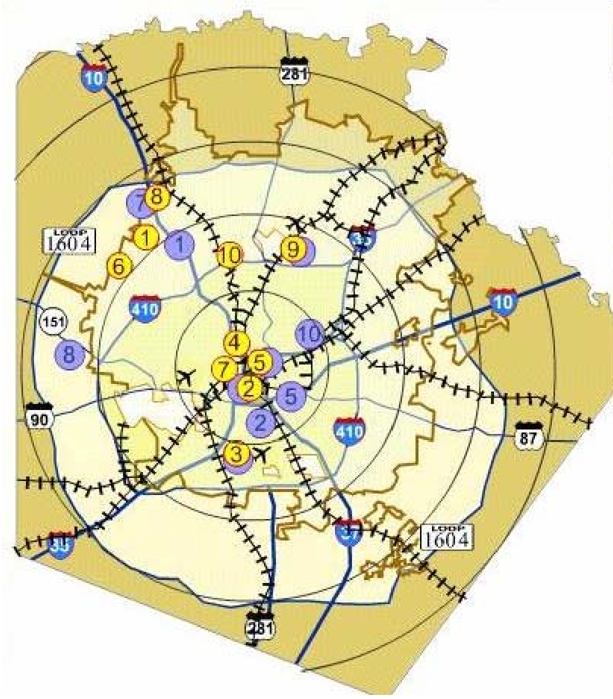
As is typically the case throughout the country, certain roadways paralleled existing rail corridors, which is the case for IH-10 from the downtown area westward and Highway 78 east of San Antonio.

Table 3-1 shows the progression of the state highway system into the existing interstate network for the San Antonio region. As city streets and roads became over-burdened with traffic, roadway enhancements and upgrades provided additional capacity and were given state highway designations. Similarly, as these roadways reached capacity, there was a progression to construct the U.S. Highway and interstate network.

TODAY	U.S. HWY	PRE-U.S. HWY DESIGNATION	PRE-FREEWAY ROUTING
IH10 - W	US 87	SH 9/SH 27	Fredericksburg Rd., N. Flores St.
IH10 - E	US 90	SH 3	E. Commerce St.
IH35 - N	US 81	SH 2	Broadway, Austin Hwy., Randolph Blvd.
IH35 - S	US 81	SH 2	Nogalitos St., New Laredo Hwy.
IH37	US 181	SH 16	S. Presa St.
US 90W	US 90	SH 3	W. Commerce St., Old Hwy 90 W
US 281N	US 281	SH 66	San Pedro Ave.
LP 410	N/A	LP 13/LP 410	Today's I-410 east of NW Military Hwy. to Austin Hwy., then south along today's I-35N to WW White Rd., then along today's routing of WW White Rd. and SE/SW Military Dr.

Table 3-1: San Antonio Roadways

As would be expected of a central business district, five of the top ten private companies (by employee count) are located in the heart of the downtown San Antonio area, adding to the volume of traffic on the highway network. Figure 3-1 depicts the locations of these companies.



Top 10 Private Employers	
Company	Employed In San Antonio
1. United Service Automobile Association (USAA)	16,500
2. H.E.B Food Stores	13,900
3. Zachry Construction Corp	12,735
4. SBC Communications	6,677
5. Baptist Health System	5,300
6. Methodist Healthcare System	4,670
7. Southwestern Bell Telephone Co.	4,589
8. Administaff, inc.	4,300
9. Taco Cabana	4,000
10. Hawkins Personnel Group	3,545

Figure 3-1: Top 10 (by employee count) Private Employers in San Antonio (shown in yellow)

Freight Movement

The exploration of the future freight outlook requires that the best available tools be used to examine the current/base year (1998) and future year (2025) commodity flows within the region.

The following is a description of the tools used in the analysis of freight movements for this study. Technical information on truck freight flows, rail freight movements, and a comparison of truck and rail movements for the San Antonio region follows the discussion of freight modeling methods. It is through an understanding of the movement of truck and rail freight that the region can begin to develop ways to accommodate and capitalize on future commodity movements.

Freight Model Methods

The primary tool used to determine future truck and rail freight activity is the Texas Statewide Analysis Model, referred to as “SAM”. SAM is a travel demand simulation modeling package developed for and used by TxDOT to study and evaluate the movement of people and freight throughout the state. The SAM is actually a large group of interrelated models that generate passenger trip estimates and freight tonnage flows for highway, aviation, and railroad networks, as well as waterway facilities along the Texas Gulf Coast. The maps and data produced by the SAM are useful in planning transportation system improvements and addressing future transportation system needs and priorities.

SAM was developed using base year (1998) transportation planning data to validate the adequacy of the model in estimating passenger flows by travel mode. In urban areas such as San Antonio, Dallas-Fort Worth, Houston, Austin, etc., transportation data from existing urban models was extracted. In the remaining rural areas, national and state travel survey and demographics data (population, employment, and other socioeconomic factors) was used to prepare travel estimates, which were then compared to traffic counts. SAM freight models were used to develop estimates of freight flow (tonnage) and identify locations of heavy truck traffic.

Model Calibration

Transportation and travel survey data necessary for freight modeling is less comprehensive than for passenger modeling. Therefore, SAM freight models were developed using base year and future/forecast year (2025) data, made available from three primary sources:

- *Reebie Transearch Database* – This 1998 survey data includes a sample of all Texas freight movements (within, to, from, and through the state), but does not include freight movements between Texas and Mexico.

- *Wharton Economic Forecasting Associates (WEFA)* – Similar to the Reebie data, the WEFA data included only intra-U.S. flows and did not include freight movements between Texas and Mexico.

- *Latin America Trade Transportation Study (LATTS)* – This study collected data from the DRI/Mercer World Sea Trade Service (WSTS), which integrates world trade databases and economic/trade models to produce historical data and forecasts of freight movements around the world, including freight movements between Texas and Mexico.

Additionally, Surface Transportation Board (STB) Waybill Data from 2002, 2003, and 2004 was obtained and used as another level of calibration for freight rail movements throughout the state. The STB data, along with actual rail tonnage maps provided by the freight railroads, were compared as a process check to validate current rail freight volumes, thus establishing a defendable prediction of forecasted rail freight movements throughout the state.

The freight model produces freight flow tonnage estimates based on the following nine commodity types:

- Agriculture
- Raw materials
- Food
- Textiles
- Wood
- Chemicals/petroleum
- Building materials
- Machinery
- Secondary

Trip Generation

Trip generation is the process of converting roadway travelers (people) and employment (jobs) into trips. These can be auto trips, truck trips, and tons of commodities within a defined geographic area. All trip generation model estimates for the freight model were developed at the county level because Reebie freight data was defined in terms of freight origins and destinations by county. The trip generation model is based on a series of equations, which are the result of the relationship between variables that include employment types and special freight handling facilities to tonnages produced or attracted to respective counties.

Freight transportation demand growth is effected by increases in both employment and employee productivity. The trip generation equations estimate freight tonnages based on increases in employment and employee productivity. These estimates were then compared to 1998 Reebie control total data. The equations were iteratively adjusted to obtain reasonably accurate freight tonnage estimates for commodity and movement type.

Freight movement was calculated using scientific equations and these calculations were compared to 1998 freight data for individual counties. Adjustments were made to develop accurate totals for use in this Study.

Lastly, average daily trip tables are the result of the ratio of the annual values to the number of days in a year (365). The freight model estimated that overall tonnage movements at the county and region level are accurate and reasonable in replicating base and future freight movements. Similarly, the freight flow estimates over the various highway network routes are also accurate and reasonable.

2025 Roadway Network

The SAM includes anticipated roadway improvements through the year 2025, which are based on future growth and mobility needs. Table 3-2 and Figure 3-2 depict the network improvements updated in the SAM to reflect projects cited in the San Antonio - Bexar County MPO Metropolitan Transportation Plan (MTP)– Mobility 2030 and the TTC–35 Draft Environmental Impact Statement (DEIS).

Route	Improvement Type	Description
FM 1535	From 2 to 6 Lanes	From SL 1604 to Wurzbach Pkwy
FM 2252	From 2 to 6 Lanes	From FM 3009 to IH410
FM 2536	From 2 to 4 Lanes	From SL 13 to IH 410
FM 2696	From 2 to 4 Lanes	From SL1604 to Wilderness Oak
FM 3009	From 2 to 6 Lanes	From IH 35 to FM 2252
FM 3487	From 2 to 6 Lanes	From FM 471 to IH 410
FM 471	From 2 to 6 Lanes	From FM 3487 to FM 1560
IH 10	From 6 to 10 Lanes	From FM 3351 to SL 1604
IH 35	From 6 to 8 Lanes	From SL 1604 to N New Braunfels Ave
IH 35	From 6 to 10 Lanes	From IH 410 to Bexar County Line
IH 37	From 4 to 6 Lanes	From IH 410 to Hardy Rd
IH 410	From 6 - 10 Lanes	From US 90 to IH 35
SH 123	From 2 to 4 Lanes	From FM 466 to IH 10
SH 130	New 6 Lane Roadway	From IH 10 to SH 80
SH 151	From 4 to 6 Lanes	From SL1604 to Westover Hills Blvd
SH 16	From 4 to 8 Lanes	From SL1604 to IH 410
SH 211	New 2 Lane Roadway	From FM 1957 to FM 471
SH 46	From 2 to 4 Lanes	From FM 758 to Alves Ln
SL 1604	From 4 to 6 Lanes	From FM 2696 to FM 1346
US 281	From 4 to 8 Lanes	From E Borgfeld Dr to SL 1604
FM 1103	From 2 to 4 Lanes	IH 35 N to FM 78
US 90	From 4 to 6 Lanes	From SL1604 to SH211

Table 3-2: Future Network Improvements (1998 to 2025)

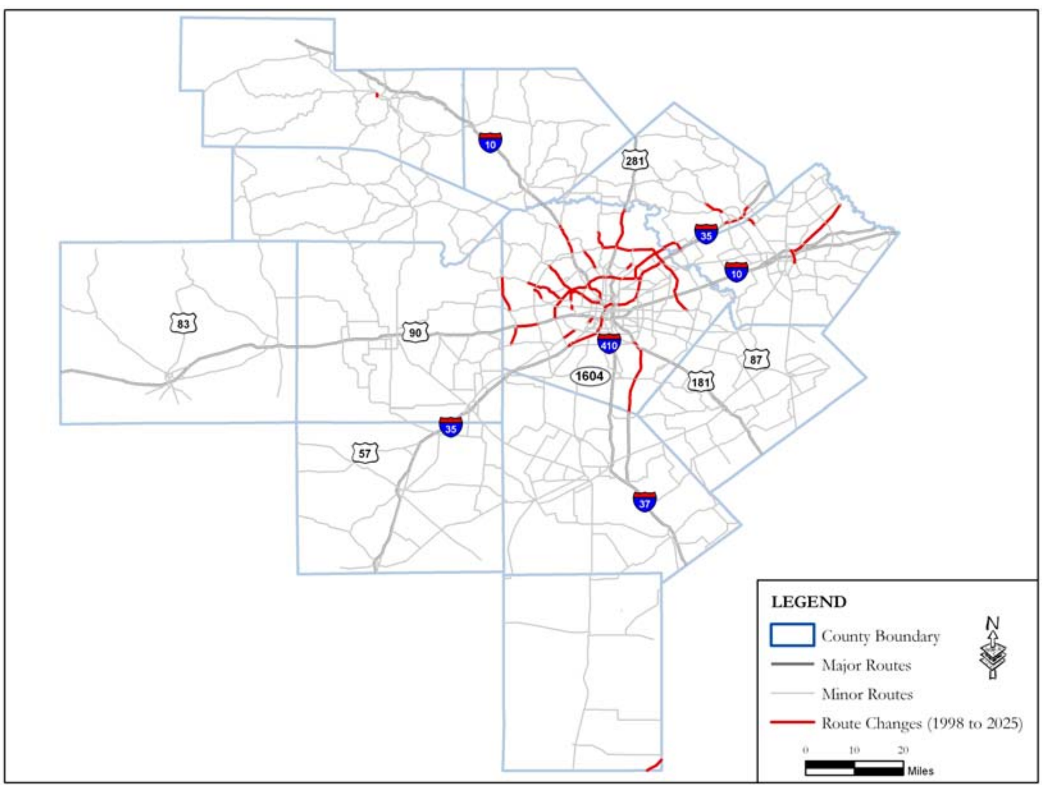


Figure 3-2: Future Network Improvements (1998 to 2025)

Mode Choice and Assignment

The statewide freight flow tonnage estimates produced at the county level are allocated to highway, rail, and waterway modes by a mode choice model. While rail and waterborne movements were assigned to their respective networks at the county level, information for the highway freight tonnage estimates was provided from smaller geographic areas (traffic analysis zones — TAZ) prior to being assigned to the road network. In addition, heavy truck flow estimates for the highway network were derived through factoring of the freight tonnage estimates. Variables of vehicle load factor (by commodity group and related trip length) were applied to the freight tonnage values. Truck freight movements and percentages and truck traffic and associated issues support the requirement for a shift in traffic to other possible routes.

Truck Freight Movements and Commodities

The movement of truck freight into, within, and out of the region is significant today and will continue to be a key modal choice to transport goods and materials for Texas and the country.

Truck Movements for San Antonio, the State, and the Country

Table 3-3 illustrates that while the movement of truck tons within the region (internal to internal) is forecasted to increase by nearly 3 million tons, a much larger increase occurs for tonnage movements coming into (54.6 million) and out of (46 million) the region. The table describes each movement type that would either originate or end in the San Antonio Region. For instance, internal to internal movements occur within the region while all other movements (internal to external; external to internal) occur either between the San Antonio Region and other Texas counties or between the San Antonio Region and the rest of US and Mexico. The 54.6 million additional truck tons projected to enter the San Antonio District was calculated by taking the total difference for the external to internal movements between 1998 and 2025. The total additional tonnage of 46 million tons projected to leave the San Antonio Region between 1998 and 2025 was calculated from the total difference of the internal to external movements. Essentially, these figures demonstrate the importance of truck freight activity in the region, and how this area plays an important economic role for the entire state of Texas and the nation as a whole.

Annual Truck Tons				
Origin	**Termination**	**1998**	**2025**	**Percent Change**
Internal to Internal				
San Antonio District	San Antonio District	2,555,208	5,393,211	111%
Internal to External				
San Antonio District	Other Texas Counties	20,423,408	50,301,502	146%
San Antonio District	Western US	430,247	1,198,528	179%
San Antonio District	Northern US	2,581,484	7,191,168	179%
San Antonio District	Eastern US	2,151,237	5,992,640	179%
San Antonio District	Mexico	3,872,226	10,786,752	179%
External to Internal				
Other Texas Counties	San Antonio District	40,802,299	81,691,964	100%
Western US	San Antonio District	413,902	1,067,853	158%
Northern US	San Antonio District	2,483,411	6,407,118	158%
Eastern US	San Antonio District	2,069,509	5,339,265	158%
Mexico	San Antonio District	3,725,116	9,610,677	158%
	Total	**81,508,046**	**184,980,677**	**127%**

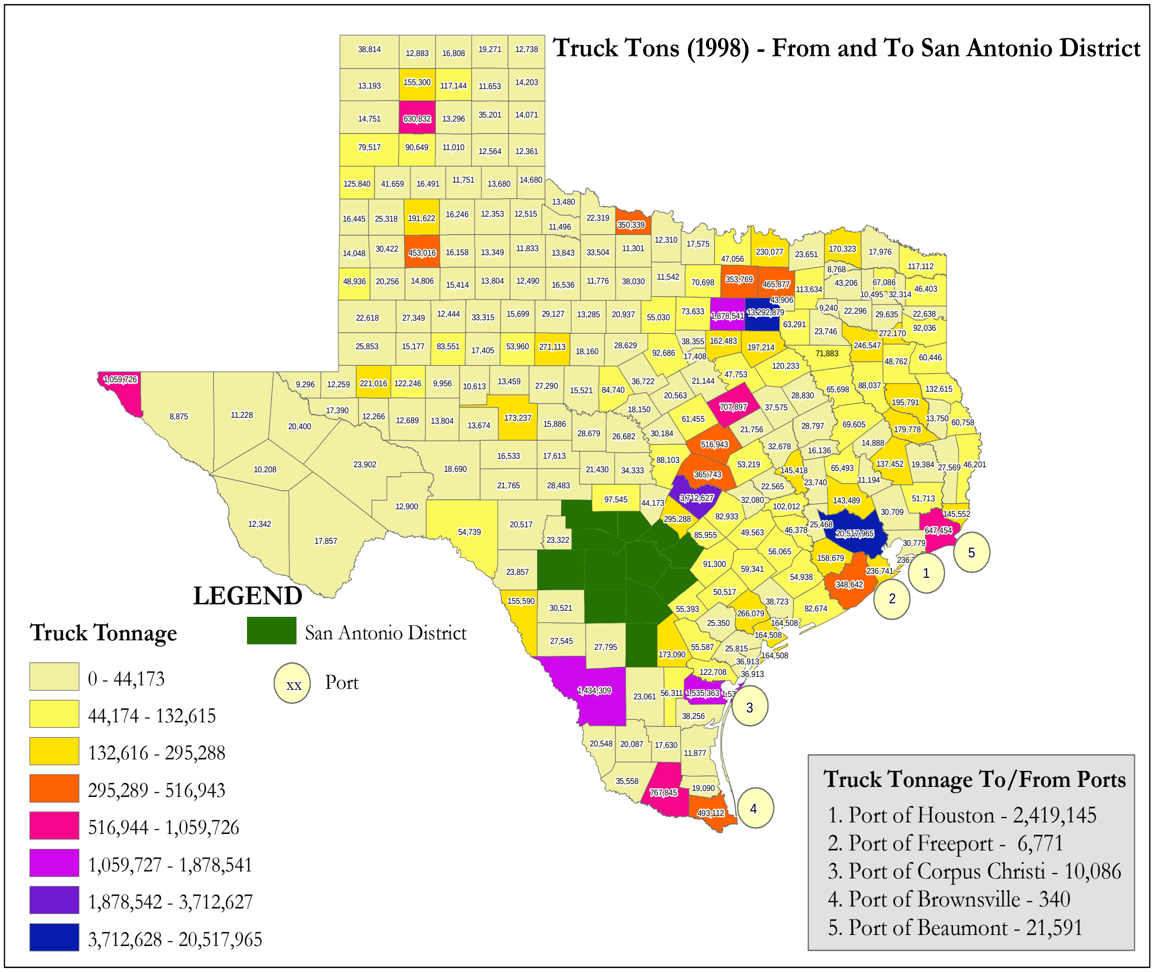
*Source: Statewide Analysis Model based on 1998 Reebie Transearch Data, Wharton Economic Forecasting Associates and Latin American Trade Transportation Study

Table 3-3: Truck Freight Movements

Truck Movements within the State

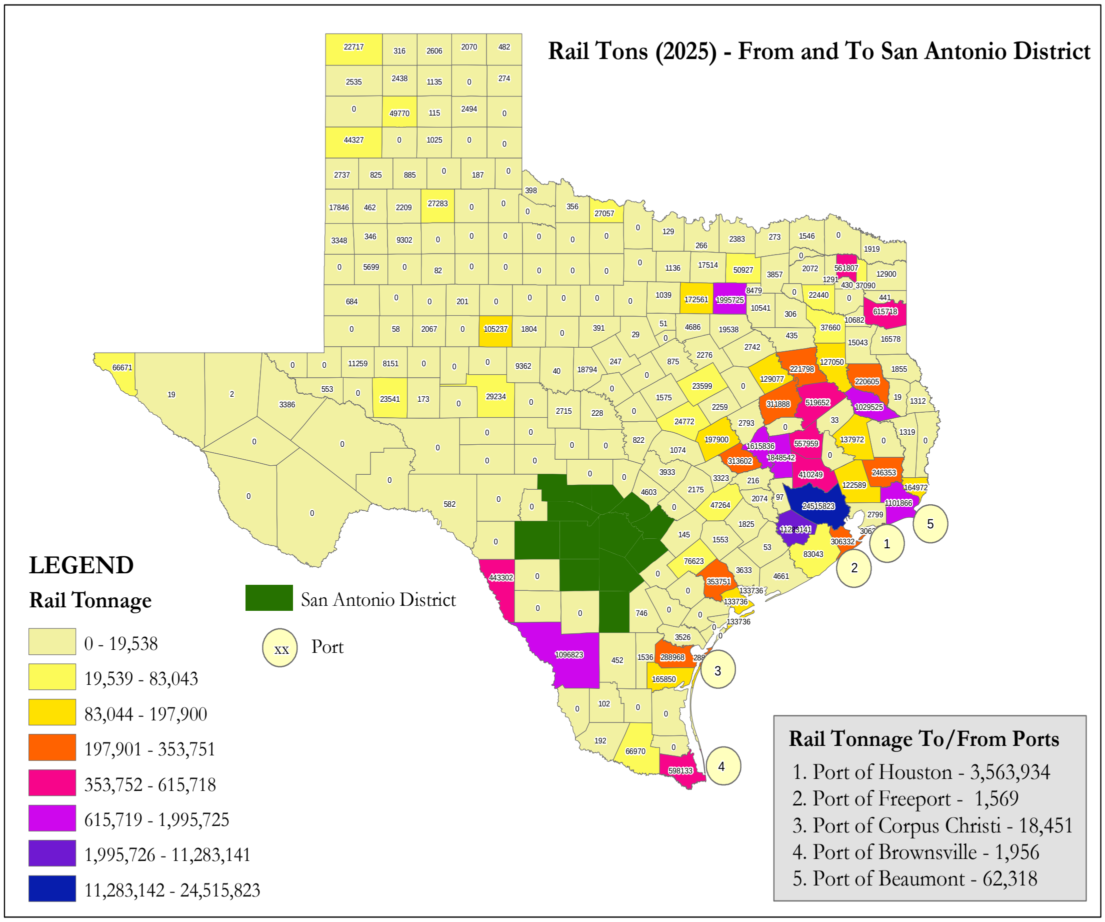
The two potential movement types include those to/from other Texas counties and to/from locations outside of Texas. Figure 3-3 illustrates that in 1998 large numbers of trucks were moving between San Antonio and Houston, Laredo, the Lower Rio Grande Valley, El Paso, and the Dallas/Fort Worth Metroplex. Although trucks were moving to other parts of the state, their final destination remains in those major growth markets. Figure 3-4 shows the trend of the majority of truck freight movement occurring between the major urban areas. In addition to the major cities previously mentioned, other areas along the IH-35 corridor, as well as the cities of Odessa, Lubbock, and a larger portion of the Houston area, show an increase in the relationship of freight movement with the San Antonio region in the future.

These trends heighten the need to plan and accommodate for trucks along the major highway corridors both inside and outside of the major urban centers. With most highway facilities nearing capacity, new corridors such as the Trans Texas Corridor may play an integral role in keeping auto and truck traffic moving, potentially benefiting the economy.



Source: Statewide Analysis Model based on 1998 Reebie Transearch Data, Wharton Economic Forecasting Associates and Latin American Trade Transportation Study

Figure 3-3: 1998 Truck Movements within Texas To and From San Antonio



Source: Statewide Analysis Model based on 1998 Reebie Transearch Data, Wharton Economic Forecasting Associates and Latin American Trade Transportation Study

Figure 3-4: 2025 Truck Movements within Texas To and From San Antonio

Truck Movements Outside of the State

Referring again to Table 3-3, it is noted there are large increases in truck freight activity to and from other parts of the country to the region from 1998 to 2025. These movements represent trucks that are relegated to long haul trips. Major movements in 1998 can be seen from Louisiana, Oklahoma, New Mexico, and Mexico. Similar patterns were found from San Antonio to destinations outside of the state. Forecasting truck movements into and out of the state from the region identifies a trend that depicts dramatic increases in truck activity. This activity, as shown in Figure 3-5 for the 1998 base year and Figure 3-6 for projections to 2025, clearly demonstrates increased movement from Mexico, New Mexico, Louisiana, and Oklahoma to the San Antonio region.

These movements outside of the state of Texas further illustrate the need for additional truck allowance on the interstate system. Additionally, with truck freight occupancy on the roadway network increasing, resulting in additional areas where demand is exceeding roadway capacity, long haul truck movement may be better served by shifting the freight cargo to rail.

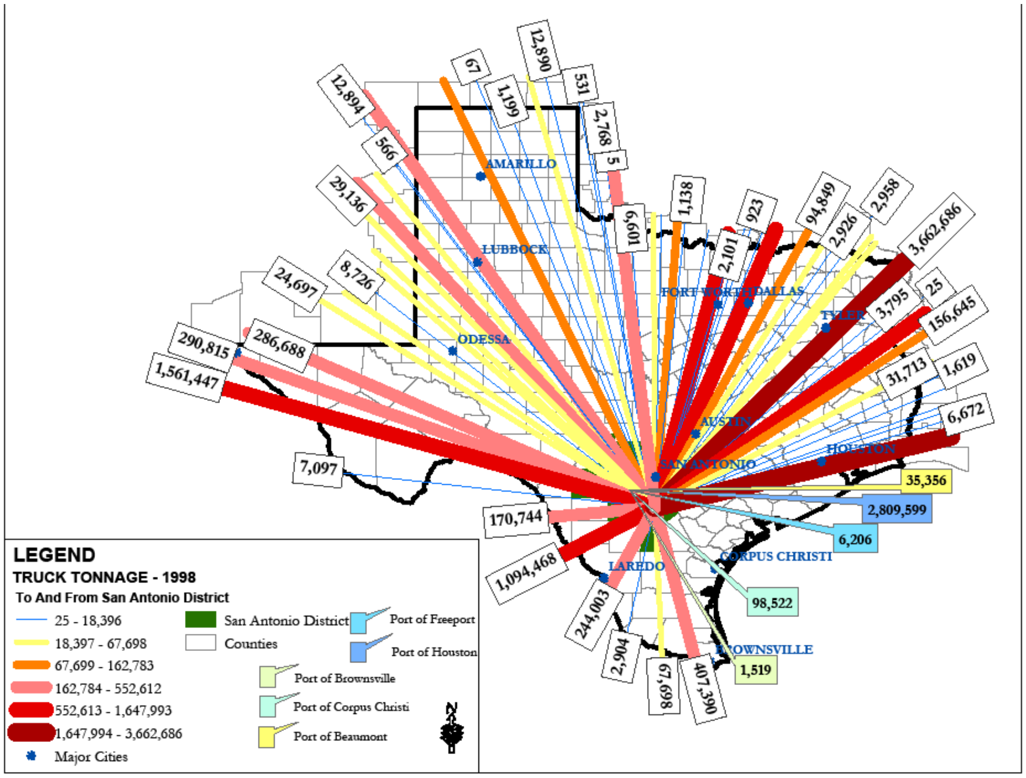


Figure 3-5: 1998 Truck Movements From Outside of Texas to San Antonio

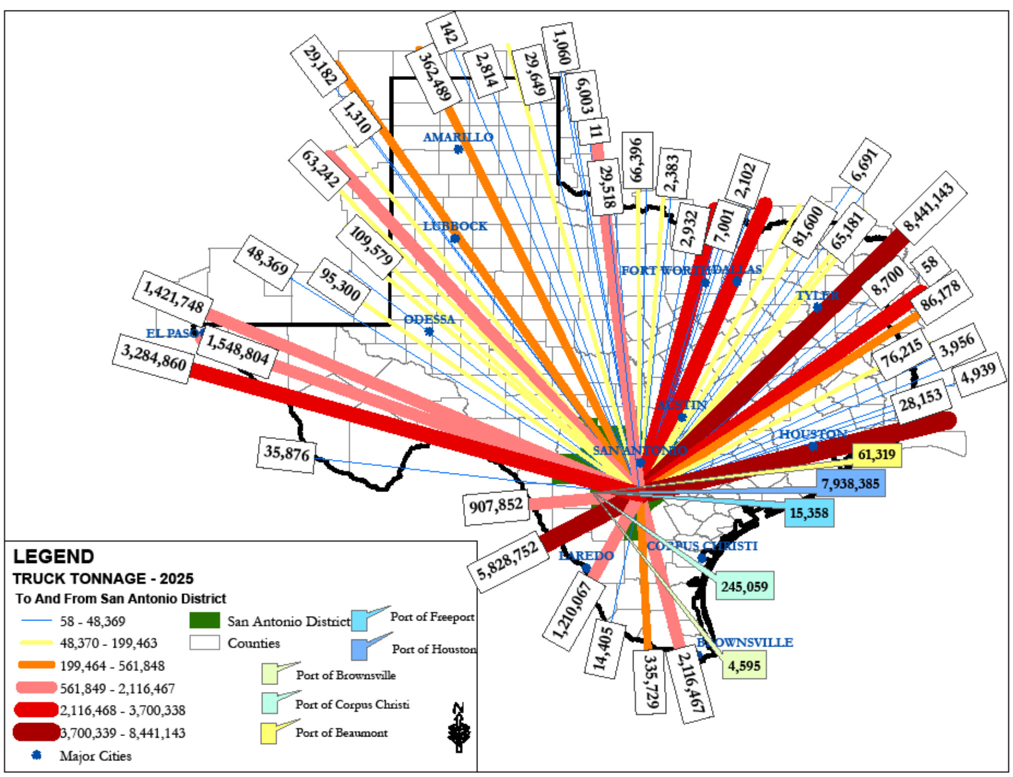


Figure 3-6: 2025 Movements From Outside of Texas to San Antonio

The overall truck tonnage movement from and to the San Antonio District was summarized by dividing the area within the state into specific areas of different distances from San Antonio as well as separate regions of Texas. The area inside of Texas was broken into radii's of 50, 100, 300, and over 300 miles from the San Antonio region. The regions outside of the state were identified as Western US, Northern US, Eastern US, and Mexico. The modeling efforts determined truck tonnage distribution for each area. Figure 3-7 shows the distribution of truck tonnage for each region projected in 2025.

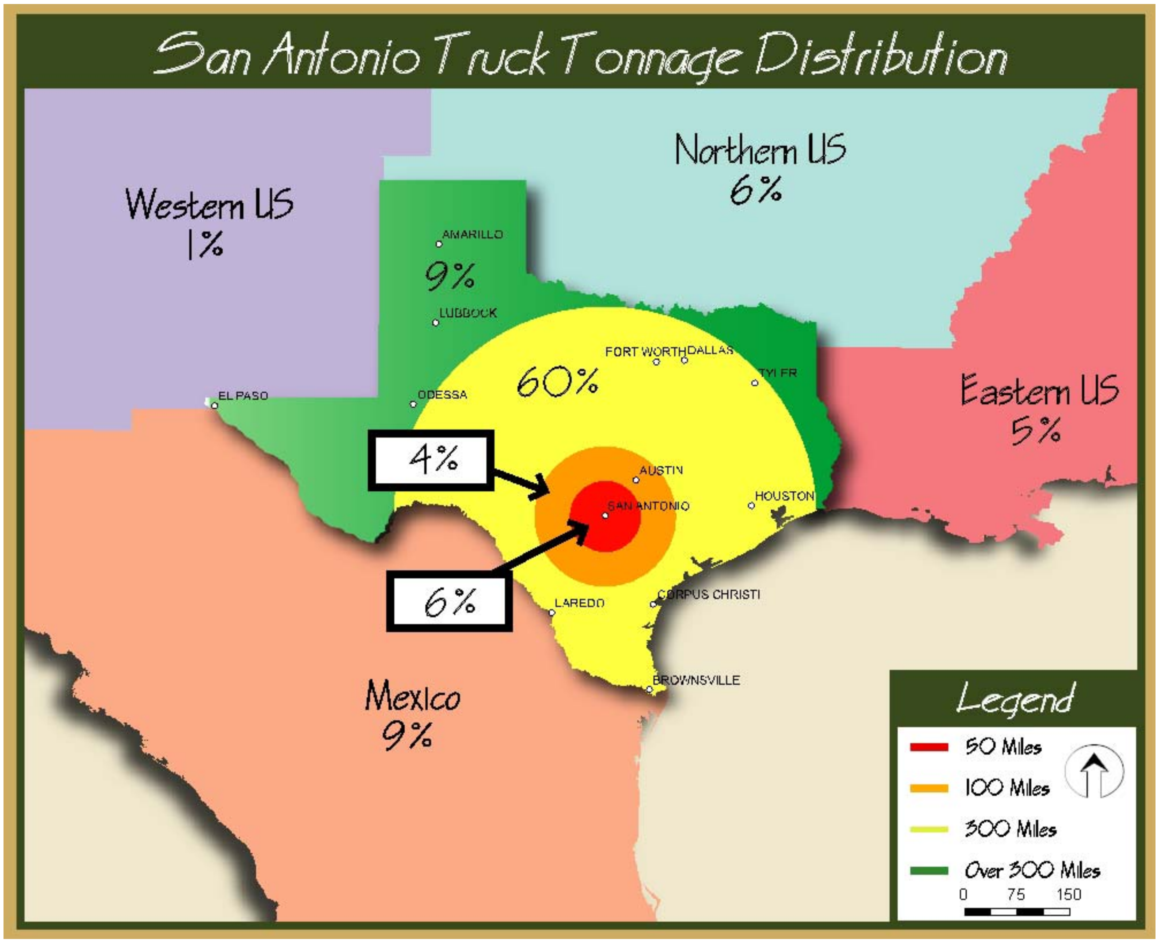


Figure 3-7: 2025 Truck Tonnage Distribution for San Antonio Region

The analysis showed that six percent of truck tonnage would stay within the San Antonio region while 60 percent is projected to travel within Texas between 100 miles and 300 miles from the area. The projections showed that 70 percent of truck freight traffic would travel within 300 miles of the San Antonio region. Nine percent of the truck freight is distributed to an area within Texas outside of the 300 mile radius. The remaining percentages are split between Mexico (9 percent), Western US (1 percent), Northern US (6 percent), and Eastern US (5 percent).

Truck Commodity Trends

Commodity trends provide insight into the truck movement internal and external to Texas. With all movements combined, the overall truck tonnage is projected to more than double within the region by 2025. As Table 3-4 indicates, textiles will be the fastest growing commodity with more than 290 percent growth. Other commodities of similar growth are building materials (220 percent) and machinery (180 percent). All of the nine commodity groups show significant increases and represent a very positive economic outlook for the entire region. This substantial growth will necessitate additional infrastructure to maintain levels of freight movement service.

Commodity	Truck Tons		
	1998	**2025**	**Percent Increase**
Building Materials	12,492,532	40,009,693	220%
Food	15,665,961	38,856,593	148%
Raw Materials	16,188,450	25,336,756	57%
Secondary	9,969,503	24,204,712	143%
Chemical/ Petroleum	14,662,661	22,409,429	53%
Wood	6,598,873	16,696,064	153%
Machinery	4,589,124	12,840,658	180%
Textiles	758,979	2,974,744	292%
Agriculture	581,969	1,652,040	184%
Total	**81,508,052**	**184,980,689**	**127%**

Table 3-4: Truck Commodity Growth

Analyzing these commodities assists in further understanding the makeup of freight tonnage. The greatest commodity volumes moving by truck are generally low value, bulk materials — consistent with traffic moving through bulk ports. The leading products moving by truck (in terms of tonnage percentage in the region) are raw materials, food, secondary products, chemical/petroleum products, and building materials. Secondary products are an exception to the low-value tendency among the top commodities (by weight). Secondary products consist of re-handled freight from warehouse or distribution centers, and the truck drayage portions of truck/rail or truck/air intermodal trips. Figures 3-8, 3-9 and 3-10 further illustrate the commodity tonnage within the region for 1998 and 2025.

Based on information from the U.S. Department of Transportation, the top 10 commodities transported by trucks in U.S.-North America Free Trade Agreement (NAFTA) trade accounted for 71 percent of the total U.S.-NAFTA truck trade. Figure 3-10a illustrates the breakdown of commodities hauled by trucks in 2005.

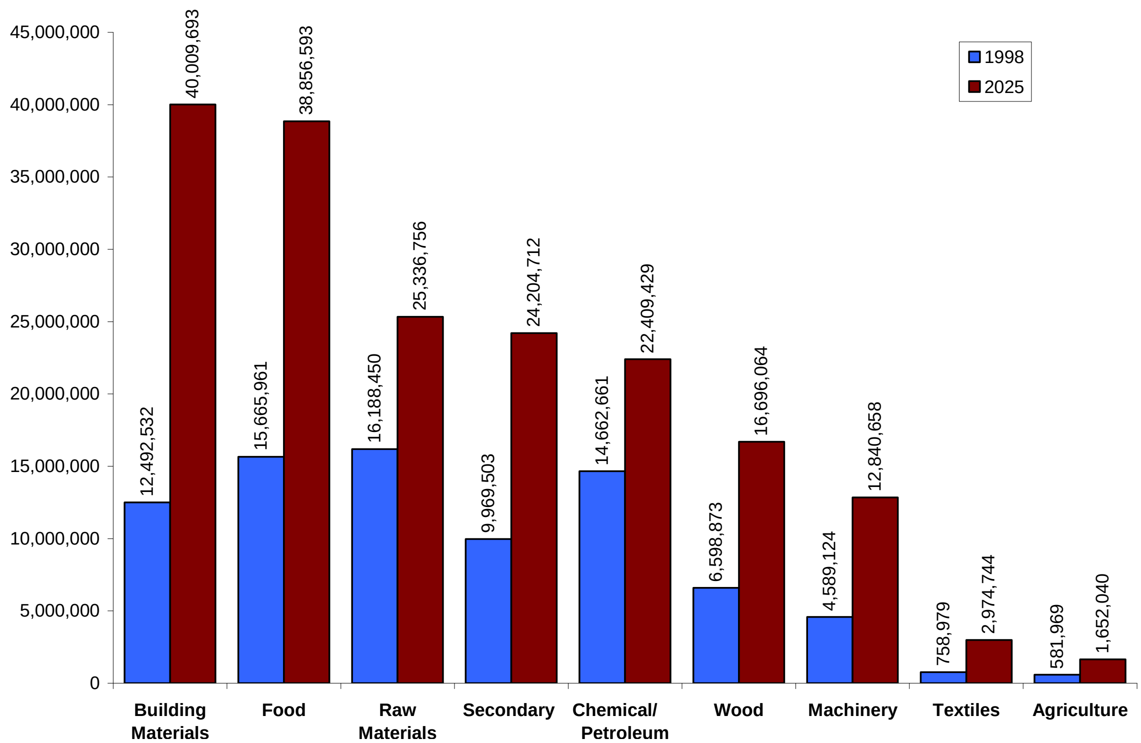


Figure 3-8: Total Truck Tons by Commodity

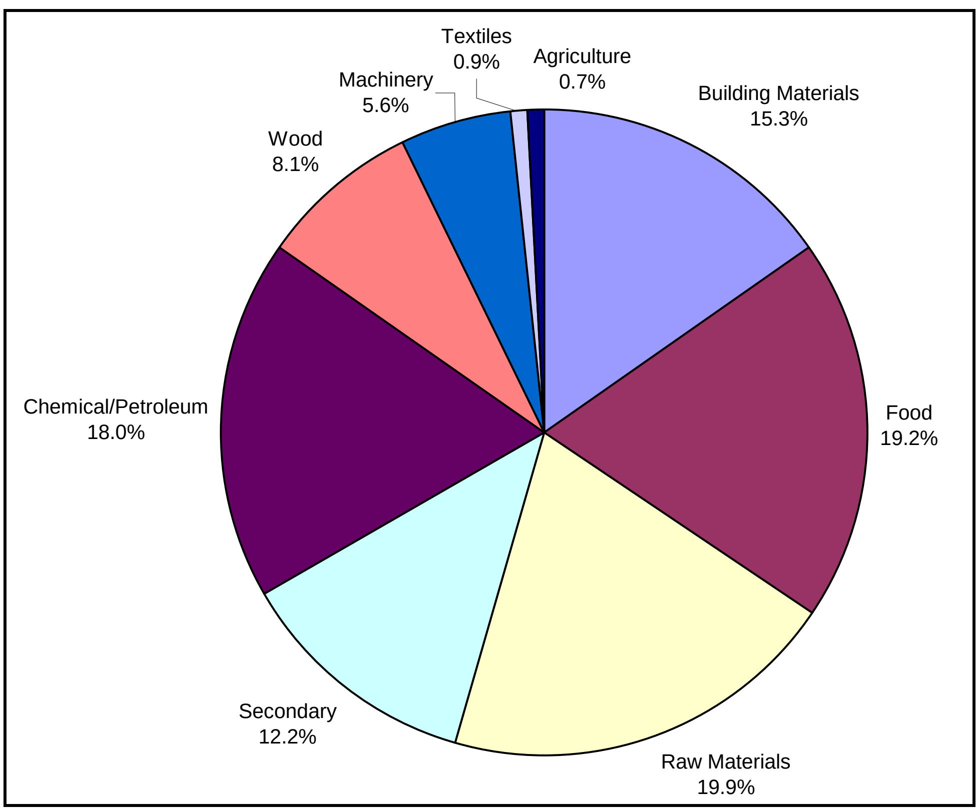


Figure 3-9: Percentage of Truck Tons by Commodity (1998)

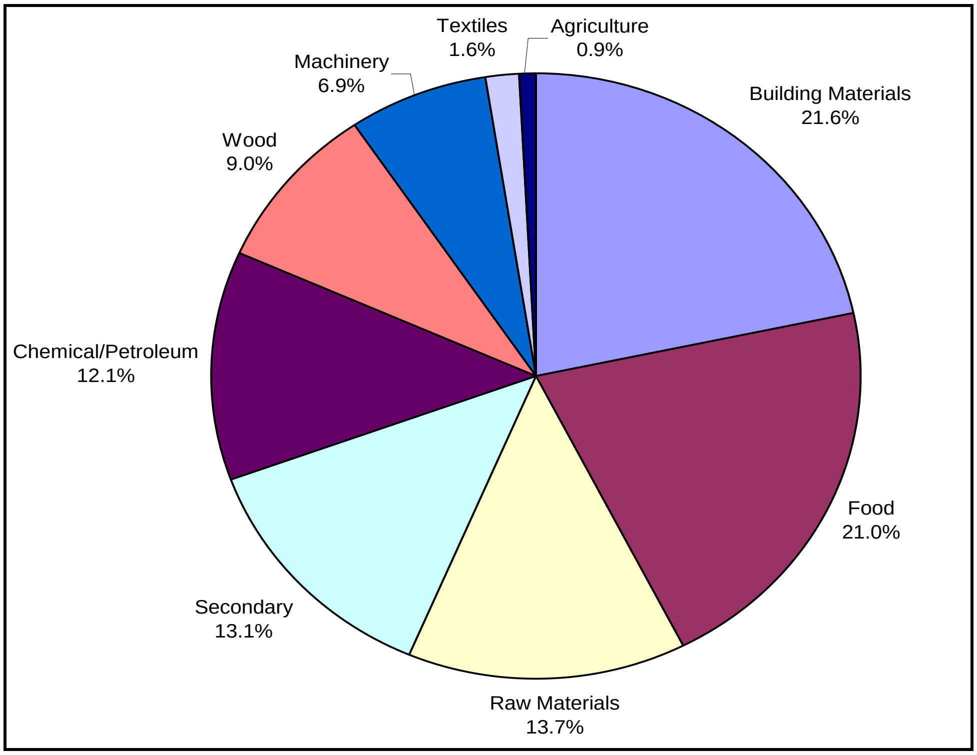
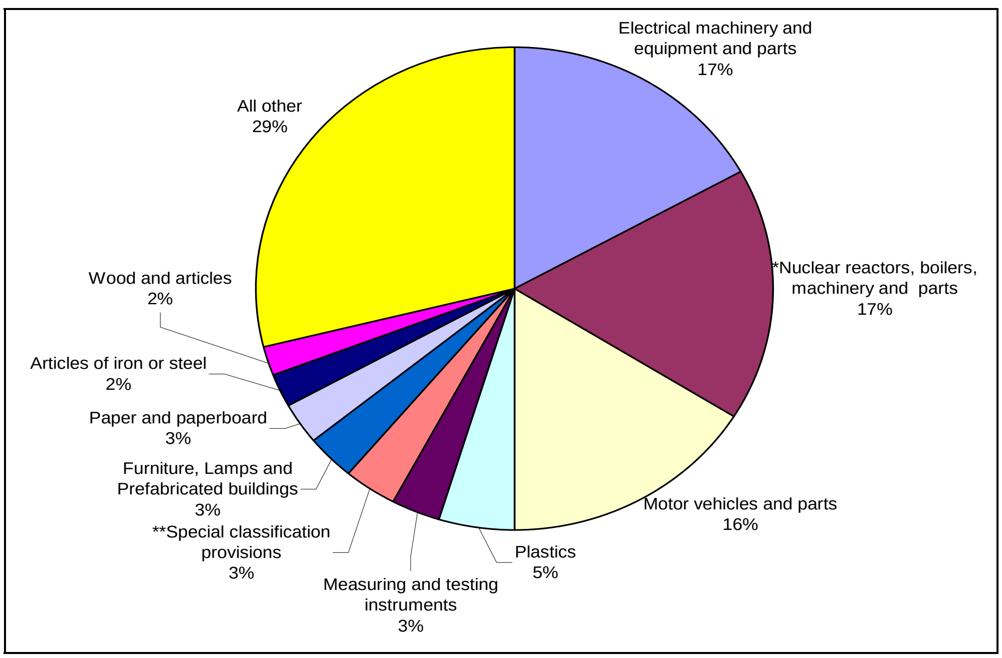


Figure 3-10: Percentage of Truck Tons by Commodity (2025)



Source: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics, Transborder Freight Data as of April 2005.
*"Nuclear reactors and parts" is a very small portion of trade under this commodity grouping. The majority of trade for this commodity is computer-related machinery and parts.
**Special classification provisions" is primarily made up of U.S. goods exported and returned without having been improved in value or condition for imports and an estimate of low value shipments for exports.

Figure 3-10a: Truck Freight Tonnage by Commodity – National (2005)

The truck tonnage movement of hazardous materials was not specifically accounted for in the 1998 Reebie data. Therefore, a methodology was developed to calculate existing and projected truck tonnages carrying hazardous materials. The methodology included determining the number of trucks from existing vehicle classification counts performed by TxDOT. Year 2003 traffic volumes were available for the analysis, while future growth was determined based on projections as calculated in the SAM.

While no specific information was available to account for the percentage of hazardous materials transported on the San Antonio Region roadways, previous studies were reviewed in order to develop a reasonable percentage of truck traffic along these corridors that would carry hazardous materials. A range of percentages of trucks carrying hazardous cargo were found on various corridors within the country, while a report of national statistics prepared for the Federal Highway Administration showed a national average of 7 percent.

Once the number of trucks carrying hazardous cargo was calculated, a conversion to the amount of tonnage was performed. The conversion to annual truck tons was performed using a range of occupancy. The range assumed that the cargo occupied between 50 and 100 percent of the trailers. The results of the analysis for each corridor are shown in the Table 3-5 for the IH 10 and IH 35 corridors.

Corridor	**Average Daily Truck Volume Carrying Hazardous Materials**		**Annual Truck Tonnage Carrying Hazardous Materials**	
	2003	**2025**	**2003**	**2025**
IH 10 East of IH 35	792	1,400	3,548,000 - 6,653,000	6,272,000 - 11,760,000
IH 10 West of IH 35	576	1,018	2,580,000 - 4,838,000	4,562,000 - 8,553,000
IH 35 North of IH 10	1,440	2,546	6,451,000 - 12,096,000	11,404,000 - 21,383,000
IH 35 South of IH 10	504	891	2,258,000 - 4,234,000	3,991,000 - 7,484,000

Table 3-5: Estimated Hazardous Cargo Movement within the San Antonio Region on IH 10 and IH 35

Truck Traffic Volumes

Once truck freight movements were developed and the commodity types identified, the model assigned all the tonnage to trucks and placed them on the highway system. In order to identify constraints within the region that would hinder truck traffic movement, it was vital to determine roadway segments that have the highest percentage of trucks both currently and in the future.

Table 3-6 represents 2003 data at highway locations within the region where permanent count stations were located. The SAM was used to predict future year (2025) truck volumes, which are shown in Table 3-7. Figure 3-11 shows the locations of the permanent count stations referenced in Tables 3-6 and 3-7. It is important to note that the 2025 model includes planned improvements for the San Antonio roadways as listed in Table 3-2.

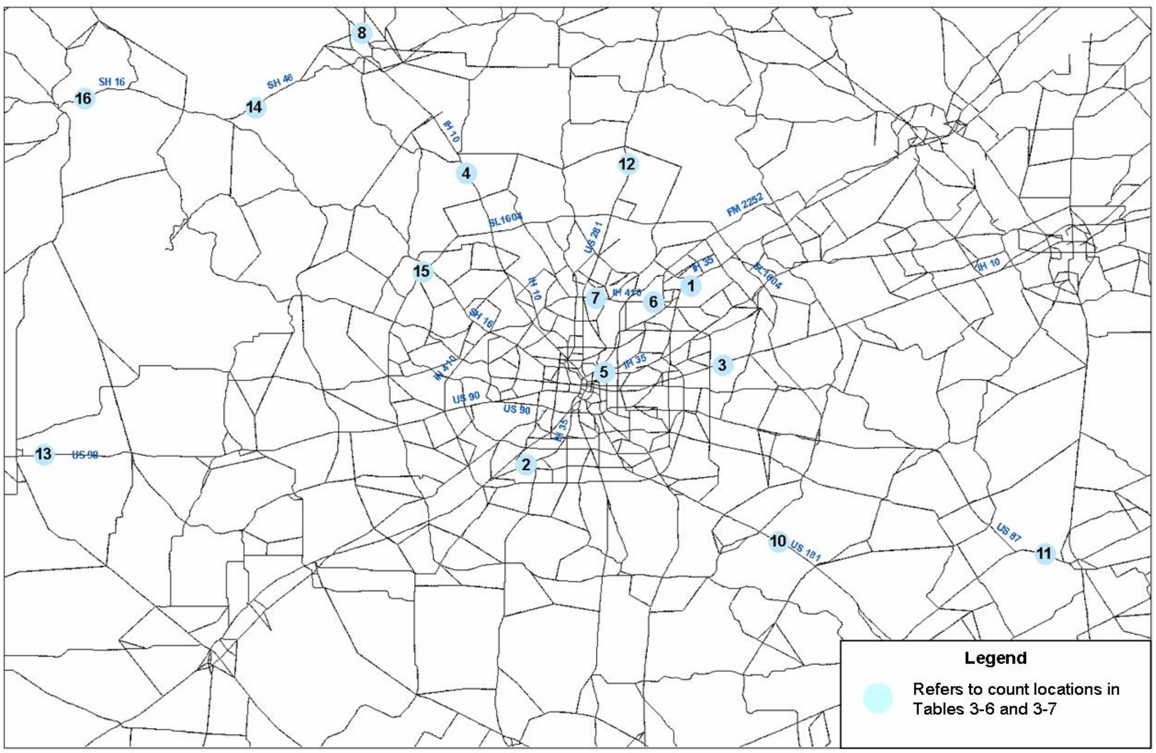


Figure 3-11: Permanent Count Station Locations

Location		2003			
		Total Volume	Percent Trucks	Truck Volume	Number of Lanes
1	I35, N of I410	164,620	0.11	18,785	8
2	I35, S of I410	30,145	0.21	6,396	4
3	I10,E of I410	38,965	0.27	10,400	4
4	I10, S of FM3351	55,248	0.14	7,908	4
5	I37, N of I10	107,080	0.06	6,120	6
6	I410,W of I35	113,948	0.05	6,075	6
7	I410, E of US 281	126,855	0.04	4,932	6
8	US87, N of SH46	10,027	0.07	672	4
9	US90, NE of US83 near Uvalde	5,592	0.26	1,480	2
10	US181, SE of LP1604	15,416	0.10	1,480	4
11	US87, W of Stockdale	7,637	0.24	1,853	4
12	US281, N of San Antonio	14,432	0.14	1,956	4
13	US90, E of Hondo	9,007	0.20	1,814	4
14	SH46, E of Bandera	4,556	0.12	557	4
15	LP1604, NW of San Antonio	51,863	0.11	5,745	4
16	SH16, E of Bandera	11,241	0.14	1,518	2

Table 3-6: 2003 Truck Traffic Volumes

Location		2025			
		Total Volume	Percent Trucks	Truck Volume	Number of Lanes
1	I35, N of I410	287,500	0.11	32,807	10
2	I35, S of I410	57,761	0.21	12,255	4
3	I10,E of I410	74,661	0.27	19,927	4
4	I10, S of FM3351	105,861	0.14	15,153	8
5	I37, N of I10	162,500	0.06	9,287	6
6	I410,W of I35	218,336	0.05	11,640	10
7	I410, E of US 281	162,500	0.04	6,318	6
8	US87, N of SH46	19,213	0.07	1,288	4
9	US90, NE of US83 near Uvalde	10,715	0.26	2,836	2
10	US181, SE of LP1604	29,539	0.10	2,836	4
11	US87, W of Stockdale	14,633	0.24	3,551	4
12	US281, N of San Antonio	27,653	0.14	3,748	6
13	US90, E of Hondo	17,258	0.20	3,476	4
14	SH46, E of Bandera	8,730	0.12	1,067	4
15	LP1604, NW of San Antonio	65,000	0.11	7,200	4
16	SH16, E of Bandera	21,539	0.14	2,909	2

Table 3-7: 2025 Truck Traffic Volumes

Traffic Capacity Analysis

Once the truck volumes were established, vehicular traffic was added and congestion levels were calculated using a volume to capacity ratio (V/C). The V/C ratio is a measure of the volume of vehicles divided by the capacity of the roadway. The V/C defines whether or not a roadway can accommodate the assigned demand. V/C ratios are used to broadly define problem areas on major arterials and highways while allowing decision makers to make operational decisions at intersections and on-ramps. The higher a V/C, the more congested the roadway. The following descriptions are typically used for the various levels of V/C:

- V/C greater than 0.75 = Heavy Congestion
- V/C of .50 to .75 = Moderate Congestion
- V/C of less than .50 = Low or No Congestion

Using the model, roadway segments that resulted in a V/C of over 0.75 were considered congested. As the level of detail for the SAM analysis does not provide an accurate determination of the V/C for specific roadways, it was necessary to divide the District into smaller traffic analysis zones that could be used to determine an average V/C. While it would be desirable to improve all areas that have congestion, it is not always feasible due to economic considerations. Therefore, identifying areas with a V/C over 0.75 is a reasonable approach, especially if there is also the presence of a high percentage of truck traffic.

Figures 3-12 and 3-14 shows the areas of congestion region-wide while Figures 3-13 and 3-15 highlight the areas of congestion in the city of San Antonio for years 1998 and 2025.

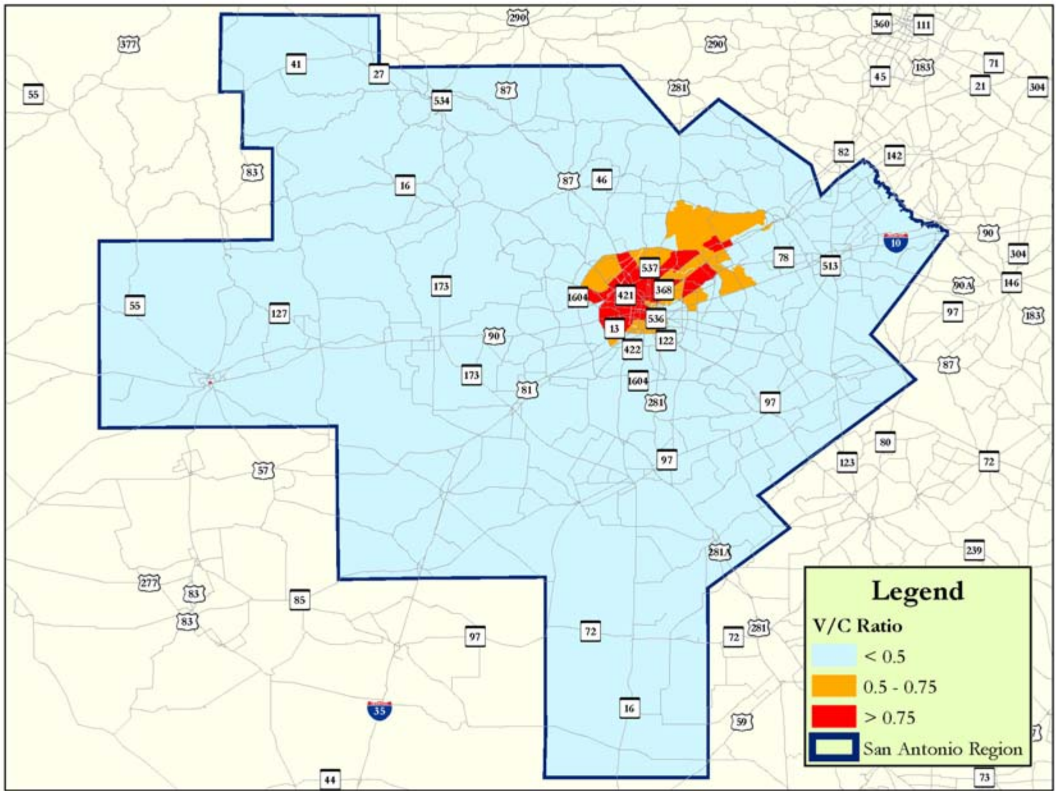


Figure 3-12: 1998 Congestion for San Antonio District

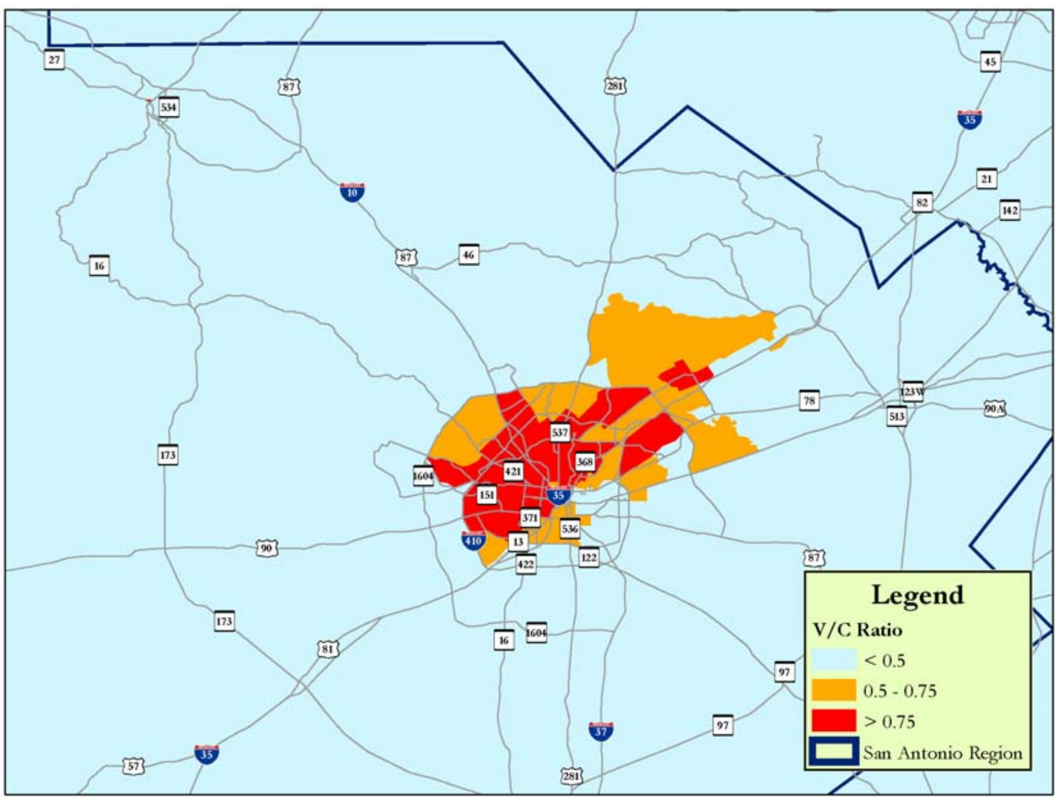


Figure 3-13: 1998 Congestion for City of San Antonio

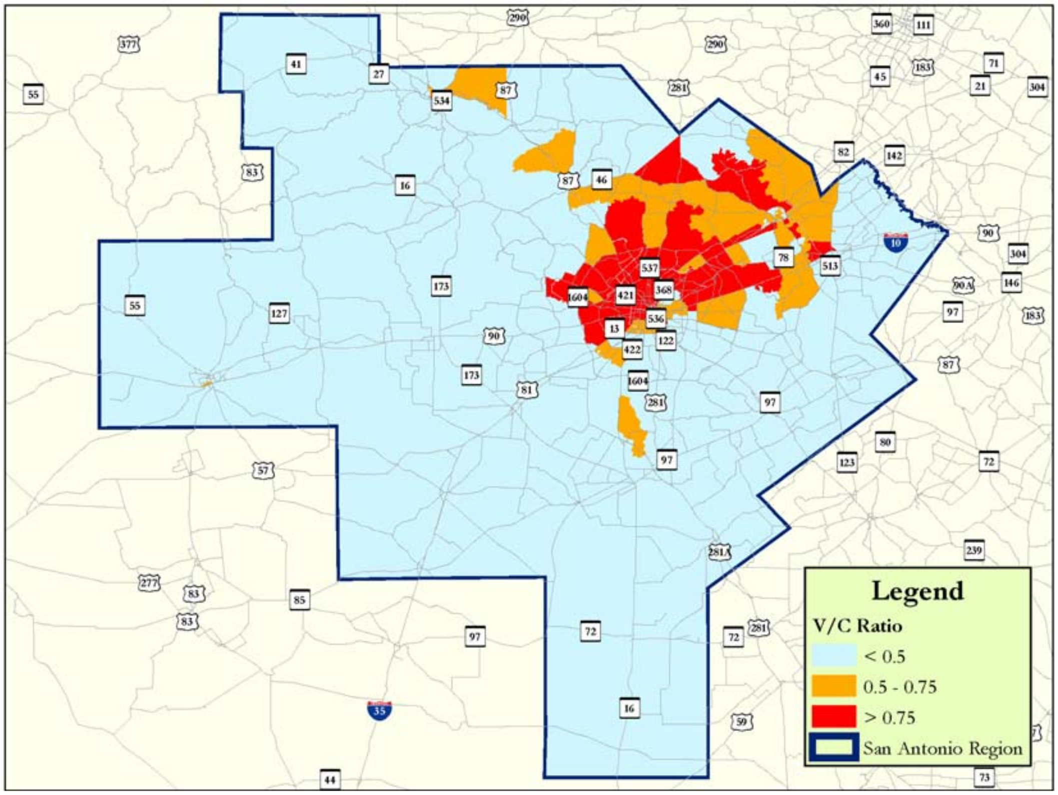


Figure 3-14: 2025 Congestion for San Antonio District

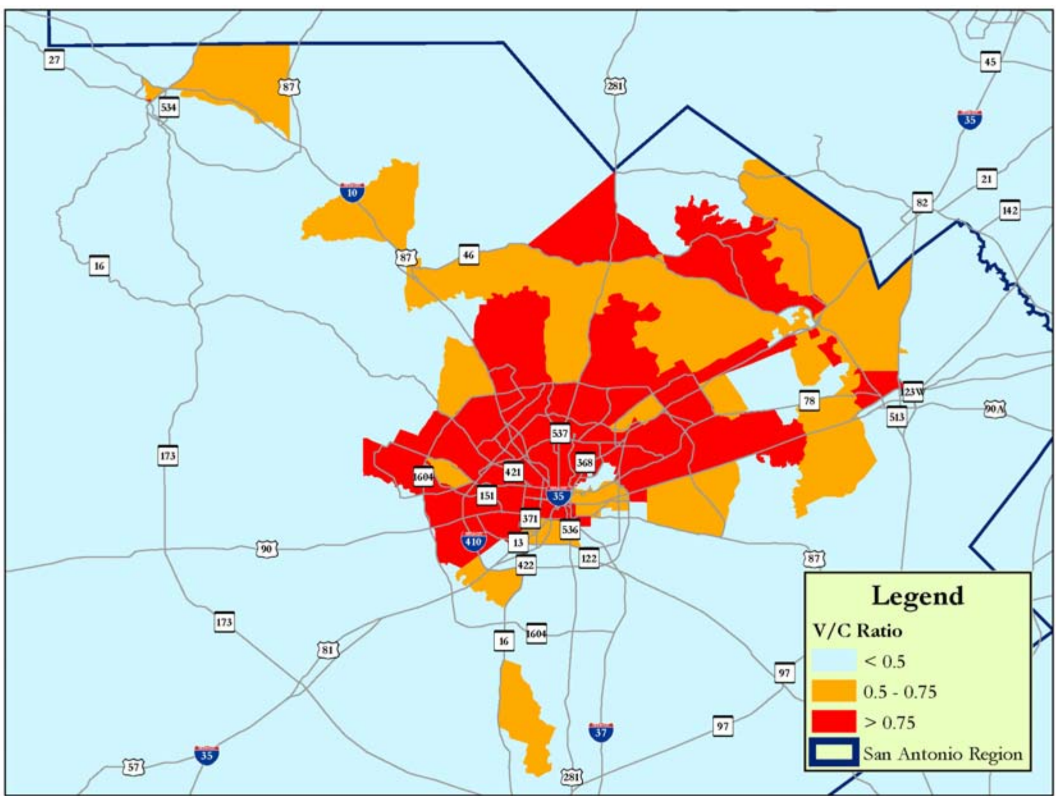


Figure 3-15: 2025 Congestion for City of San Antonio

As the previous figures show areas of congestion for the San Antonio region, information from the existing count station locations were used to estimate V/C ratios. The resulting V/C calculations for the areas near the existing count locations are shown in Table 3-8. Figures 3-16 and 3-17 graphically display the information presented in Table 3-8. The following areas were determined to be severely congested by 2025:

- I-10, E of I-410 (27 percent trucks)
- SH-16, E. of Bandera (14 percent trucks)
- I-35 North of I-410 (11 percent trucks)
- LP 1604, NW of San Antonio (11 percent trucks)
- I-37, N of I-10 (6 percent trucks)
- I-410, W of I-35 (5 percent trucks)
- I-410, E of US 281 (4 percent trucks)

Location		2003		2025	
		Capacity	V/C Ratio	Capacity	V/C Ratio
1	I35, N of I410	184,000	0.89	230,000	1.25
2	I35, S of I410	80,000	0.38	80,000	0.72
3	I10,E of I410	80,000	0.49	80,000	0.93
4	I10, S of FM3351	80,000	0.69	184,000	0.58
5	I37, N of I10	130,000	0.82	130,000	1.25
6	I410,W of I35	130,000	0.88	230,000	0.95
7	I410, E of US 281	130,000	0.98	130,000	1.25
8	US87, N of SH46	40,000	0.25	40,000	0.48
9	US90, NE of US83 near Uvalde	20,000	0.28	20,000	0.54
10	US181, SE of LP1604	40,000	0.39	40,000	0.74
11	US87, W of Stockdale	40,000	0.19	40,000	0.37
12	US281, N of San Antonio	64,000	0.23	96,000	0.29
13	US90, E of Hondo	40,000	0.23	40,000	0.43
14	SH46, E of Bandera	40,000	0.11	40,000	0.22
15	LP1604, NW of San Antonio	52,000	1.00	52,000	1.25
16	SH16, E of Bandera	20,000	0.56	20,000	1.08

Table 3-8: Capacity Summary

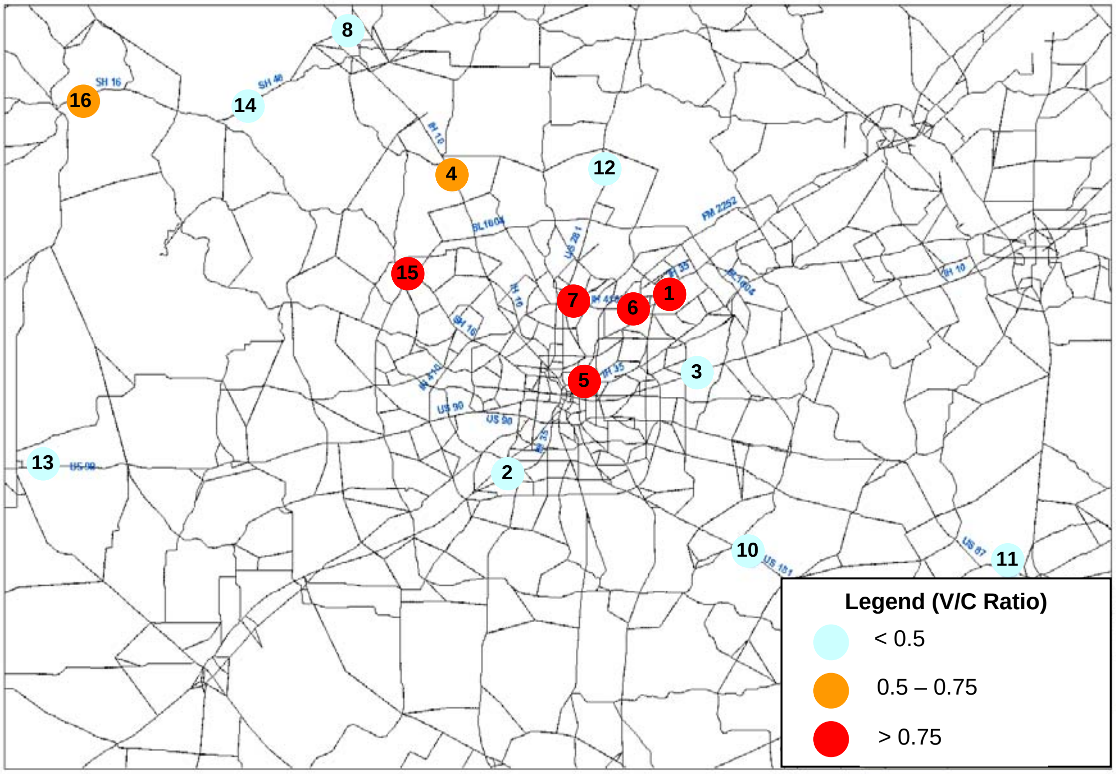


Figure 3-16: 1998 Congestion Near Existing Count Locations

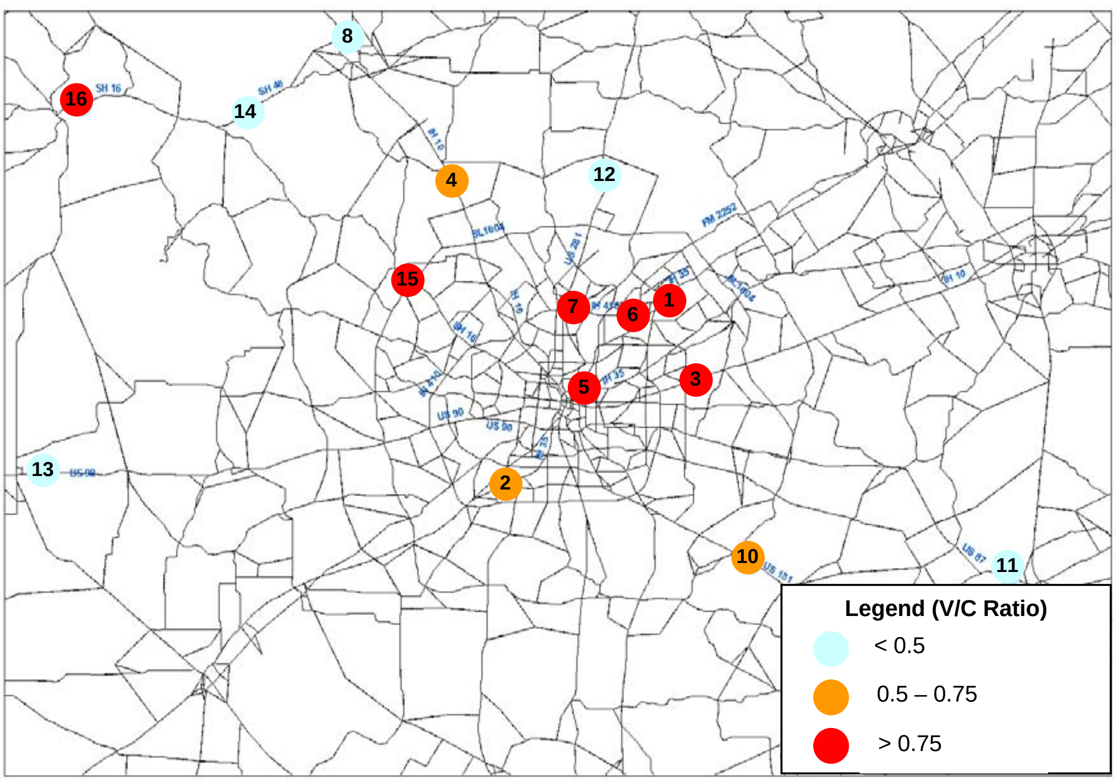


Figure 3-17: 2025 Congestion Near Existing Count Locations

The efficiency of truck and vehicle movement was evaluated by determining the travel distance within specific time periods from the San Antonio region. Figure 3-18 shows the projected vehicle travel times as they vary by travel distance from the San Antonio region if no capacity improvements were implemented, while Figure 3-19 illustrates the projected travel times that would be experienced if the planned 2025 improvements were constructed.

The results show that the travel times per specified distance that a truck could travel would be reduced once the planned improvements are constructed. The planned improvements for the San Antonio region as well as those improvements planned in other regions were incorporated for this analysis. For instance, with planned improvements it is projected that trucks could travel from San Antonio through the Dallas/Fort Worth Metroplex, Houston region, and Austin within the studied time frames. Without the planned improvements incorporated throughout the state, truck traffic would not be able to travel through the Dallas/Fort Worth Metroplex, Houston region, or Austin within the eight hour travel time. Model results showed that traveling through the major urban areas from San Antonio would take trucks between 10 and 14 hours without the planned improvements.

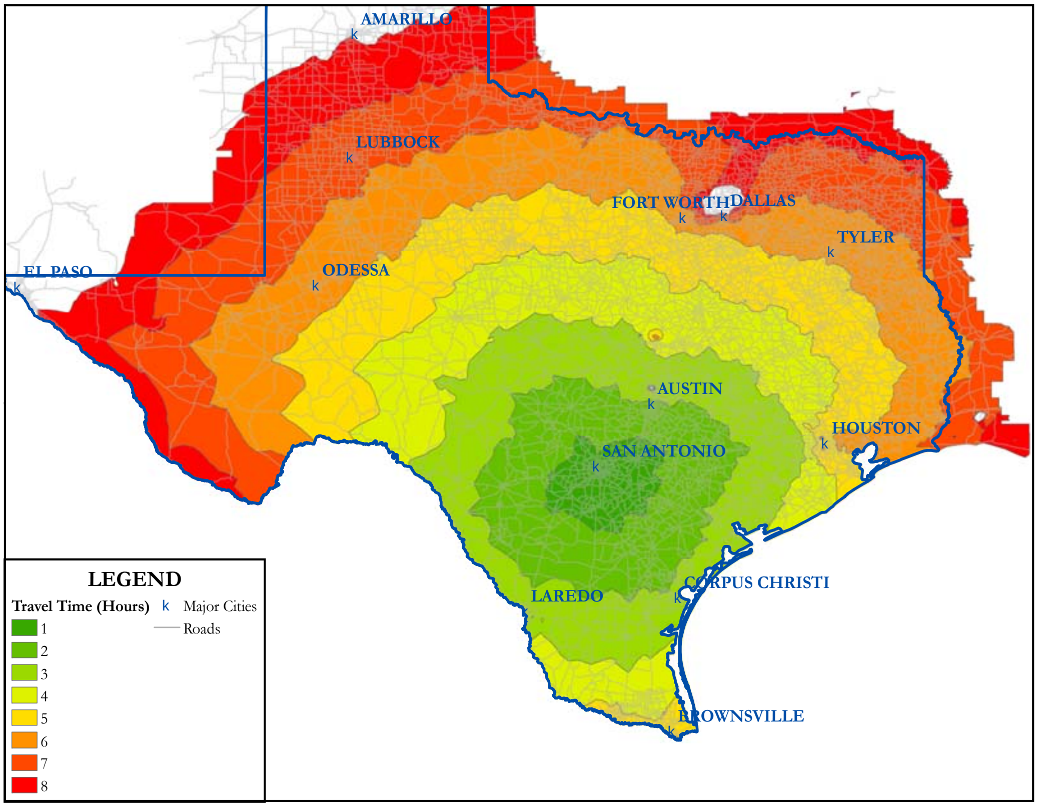


Figure 3-18: San Antonio Region Travel Time with No-Build Network - 2025

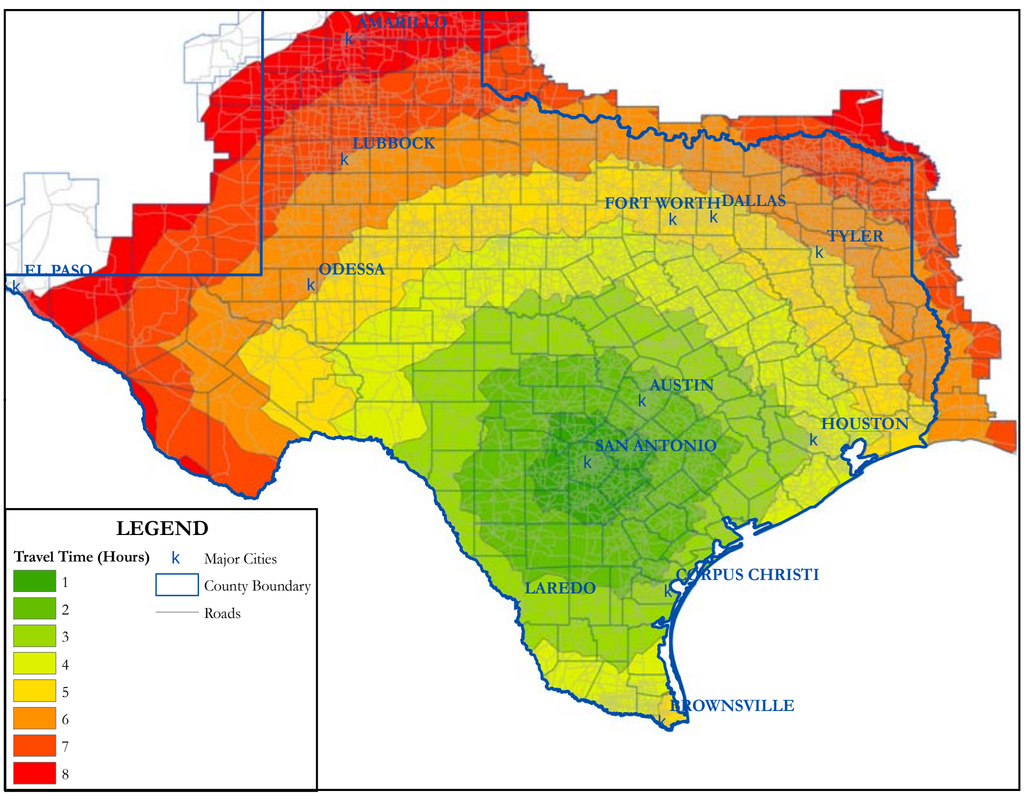


Figure 3-19: San Antonio Region Travel Time with Planned Improvements - 2025

Roadway Infrastructure Alternatives Analysis and Evaluation

The analysis shows that a large portion of the major roadways within the city of San Antonio would experience severe congestion by the year 2025. With this level of expected congestion, improvements to the city's transportation system are needed to continue efficient movement of goods throughout the state. This section provides an analysis of alternatives to improve the movement of trucks within the region. The alternatives that were analyzed included the following:

- Roadway capacity improvements including relocating roadways and dedicated truck lanes;
- Highway-railroad grade separations and closures; and,
- Shifting freight cargo from trucks to rail.

Roadway Capacity Improvements

Heavy trucks will continue to serve a much needed purpose for both local and regional service. A number of facilities located within the city use trucks to ship goods to local businesses and warehouses as well as regional locations. Therefore, it is necessary to make local roadway capacity improvements if the desire is to maintain efficient movement of truck freight. Roadway capacity improvements can come through operational or geometric means. Operational improvements include more efficient signal timing, signing, striping or the use of intelligent transportation systems. Operational improvements are considered lower cost and do not require additional right-of-way.

Geometric improvements can include additional lanes for through or turning traffic as well as using channelization methods that would encourage increased traffic flow. The planned roadway capacity improvements and new location roadways for the San Antonio region were provided in the Metropolitan Transportation Plan developed by the San Antonio – Bexar County Metropolitan Planning Organization. Reasonably foreseeable future highway projects shown in the TTC-35 Draft Environmental Impact Statement were also included. The roadway capacity upgrades described in Table 3-2 and Figure 3-2 were applied to the 2025 roadway network.

Dedicated truck lanes may provide timely and efficient truck flows if provided in the proper locations. The interaction of trucks and passenger cars decreases the capacity of a roadway. The separation of truck traffic and passenger cars may provide a more efficient use of the roadway and result in safer driving conditions. Specifically, the Trans Texas Corridor plan is for an all-Texas transportation network of corridors up to 1,200 feet wide. The corridors would include separate toll-ways for passenger vehicles and trucks as well as for high-speed passenger rail, high-speed freight, commuter rail and a dedicated utility zone. Roadways that provide separate truck lanes may benefit both truck and passenger mobility.

A planning study is currently underway for the Trans-Texas Corridor along IH 35 (TTC-35) from Laredo to the Red River. TTC-35 is the proposed multi-use, statewide network of transportation routes in Texas that would incorporate existing and new highways, railways, and utility rights-of-way. Ultimately the corridor would connect Mexico to Canada.

Preferred corridor alternatives for TTC-35 projects in the San Antonio region have been determined and are presented in the Tier 1 Draft Environmental Impact Statement (DEIS). According to the DEIS, the strategy for TTC-35 near San Antonio is to utilize the existing IH 35 corridor from Laredo to the Bexar County line. The corridor would then travel east-west on the southern portion of the county and avoid the urban area on the east side of the city. The corridor would then parallel the existing IH 35 corridor north of San Antonio. For trucks desiring to travel north or south of San Antonio, TTC-35 would serve as a bypass route for the city. This type of route would benefit a number of the already overloaded and projected congested roadways. For instance, providing a north-south bypass route around San Antonio would decrease the number of trucks that might otherwise utilize IH-410.

Table 3-7 depicts the high truck volumes that are projected to move through the city in 2025. Figure 3-15, shows that the core of the city is highly congested. A regional route that allows a portion of truck traffic to bypass the city core may potentially reduce the congestion levels along San Antonio's transportation system.

Grade Separation/Closures

Grade separations and crossing closures at roadway-railroad crossings are identified in this report (Section 7) as potential improvements and were modeled to determine their impacts on delay time, fuel consumption, and emissions within the study area. Grade separations consist of bridges (overpass or underpass) to separate the railroad from the streets. A grade separation allows increased capacity on a roadway since the delay due to passing trains is eliminated. Crossing closures consist of closing the street and rerouting traffic at the intersection with the railroad.

Shift Cargo from Trucks to Rail

The final strategy that could be implemented to improve truck flow on San Antonio area roadways is to reduce the number of trucks needed on the roadway by relying more on freight rail to move cargo. By using freight rail more to ship regional cargo, the number of trucks that need to be on local roadways will be reduced. As shown in Figure 3-7, approximately 70 percent of truck traffic originates within a 300 mile radius from the San Antonio region. A scenario was developed that shifted 15 percent of cargo that was normally shipped by truck a distance greater than 300 miles to rail cars.

Alternatives Analysis

The analysis of alternatives was determined through an evaluation that included a comparison of mobility measures of effectiveness (MOE). The MOE's that were used in this evaluation were delay, emissions and fuel consumption due to delay. A daily cost was associated with each of the MOE's. The following alternatives were analyzed and compared:

- No-build;
- Planned roadway capacity improvements;
- Planned roadway capacity improvements with a 15 percent cargo shift from truck to rail;
- Grade separations/closures;
- Grade separations/closures with 15 percent shift from truck to rail.

The no-build case for the analysis was developed using the existing roadway network with the projected 2025 traffic volumes. The planned improvements proposed in the 2030 MTP and TTC-35 DEIS include a combination of roadway capacity upgrades and new location roadways. Figures 3-20, 3-22 and 3-24 show the comparison of results for the no-build, planned roadway capacity improvements, and planned roadway capacity improvements with a 15 percent cargo shift from truck to rail. Figures 3-21, 3-23 and 3-25 provide an associated estimated daily cost for each of the MOE's. These results show a comparison for the entire San Antonio region. As shown in the following figures, a shift of 15 percent of truck cargo to rail cars has little impacts on delay, fuel consumption, and emissions on the roadways.

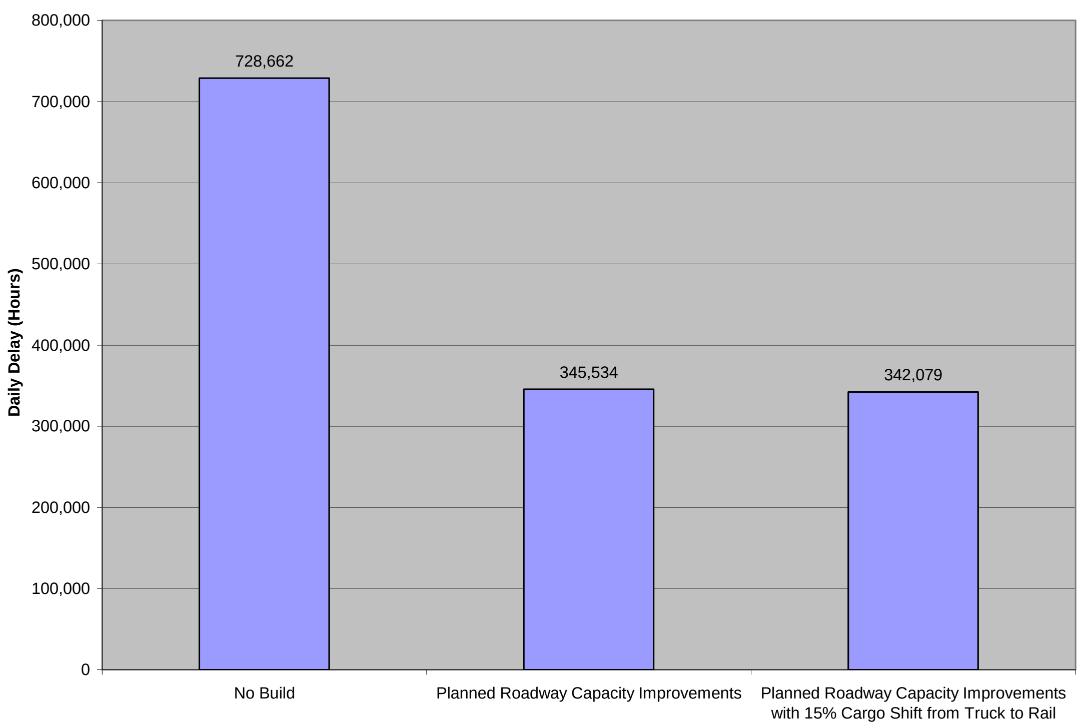


Figure 3-20: Comparison of Total Daily Delay for San Antonio Region

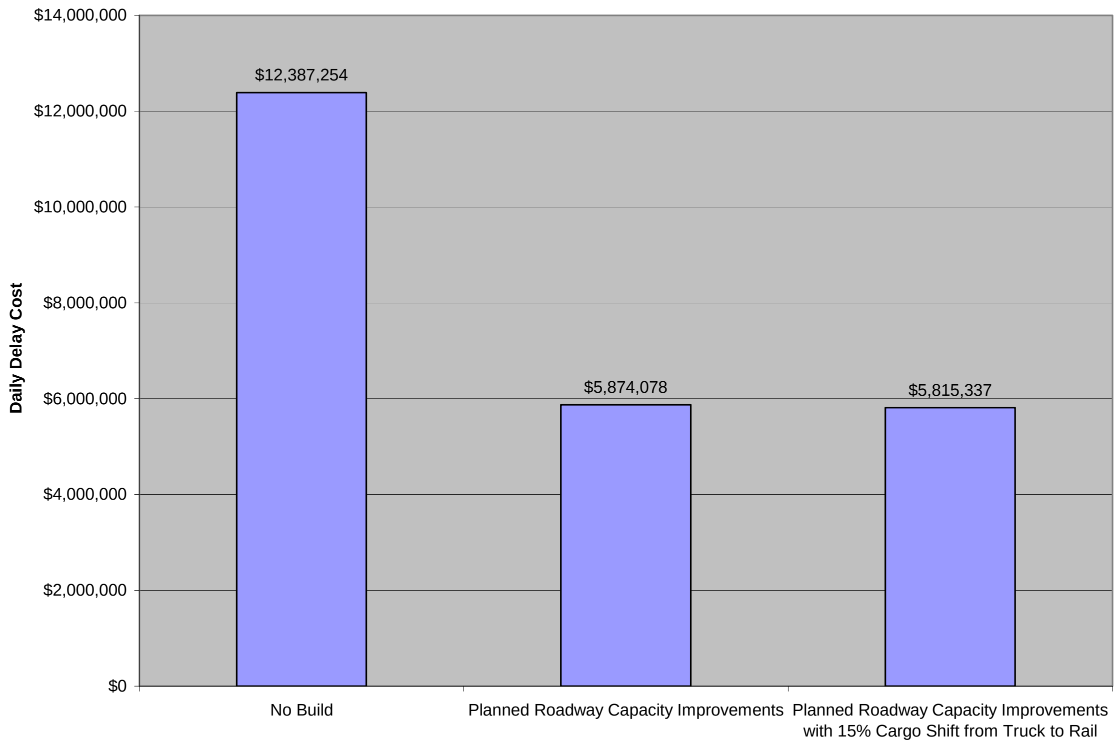


Figure 3-21: Comparison of Total Daily Delay Cost for San Antonio Region

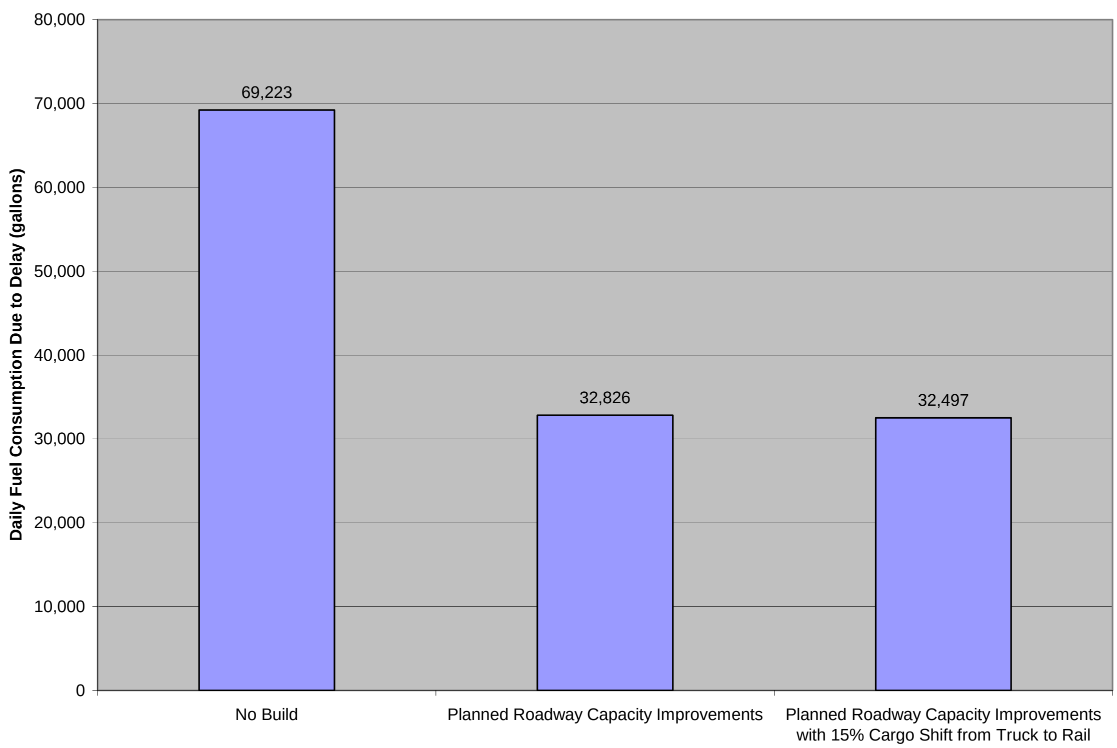


Figure 3-22: Comparison of Total Daily Fuel Consumption Due to Delay for San Antonio Region

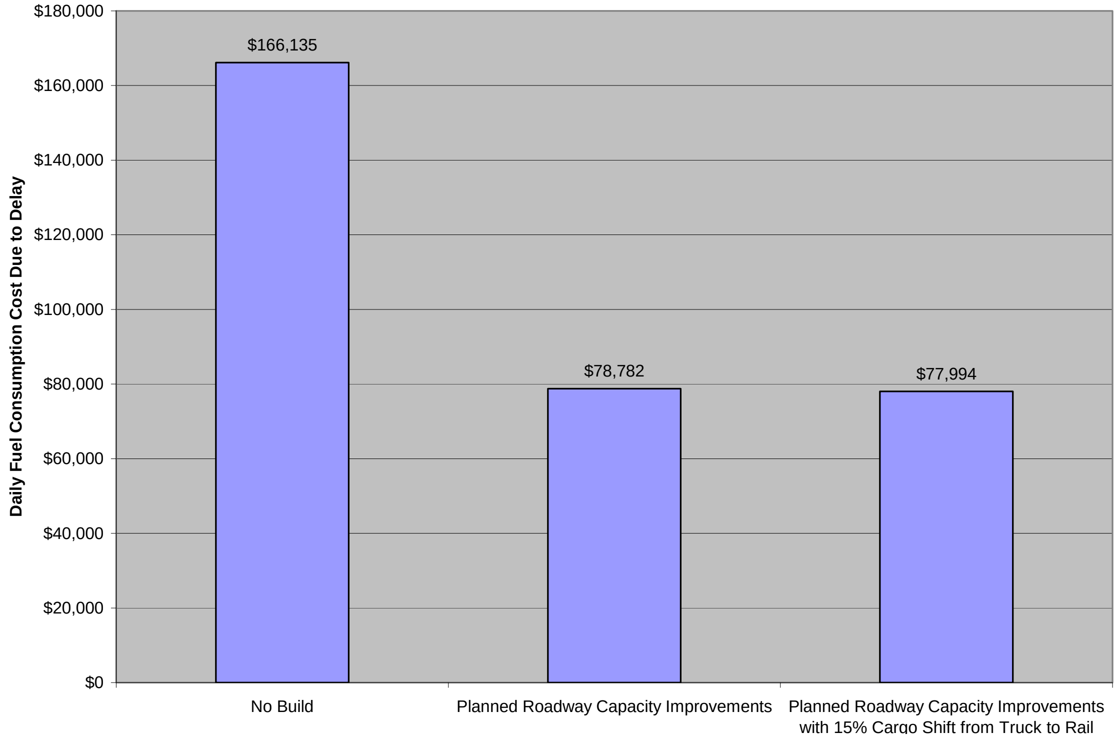


Figure 3-23: Comparison of Total Daily Fuel Consumption Cost Due to Delay for San Antonio Region

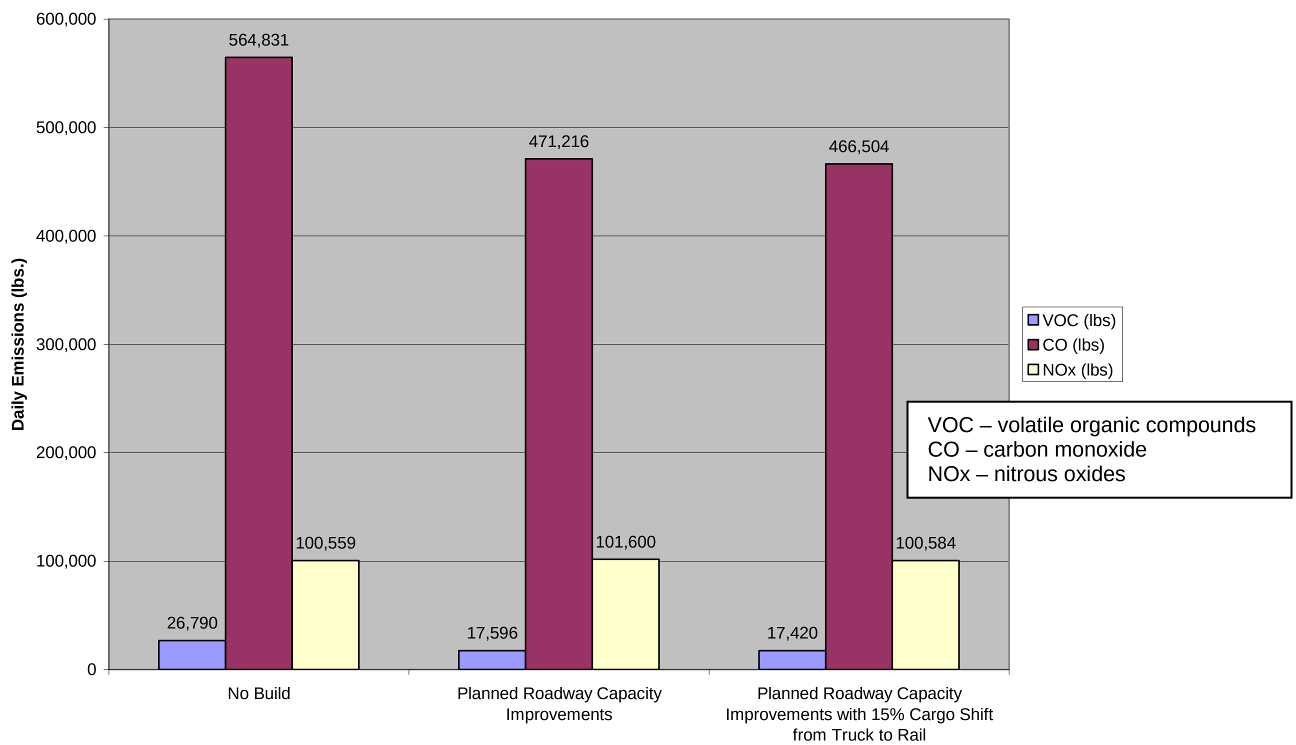


Figure 3-24: Comparison of Total Daily Emissions for San Antonio Region

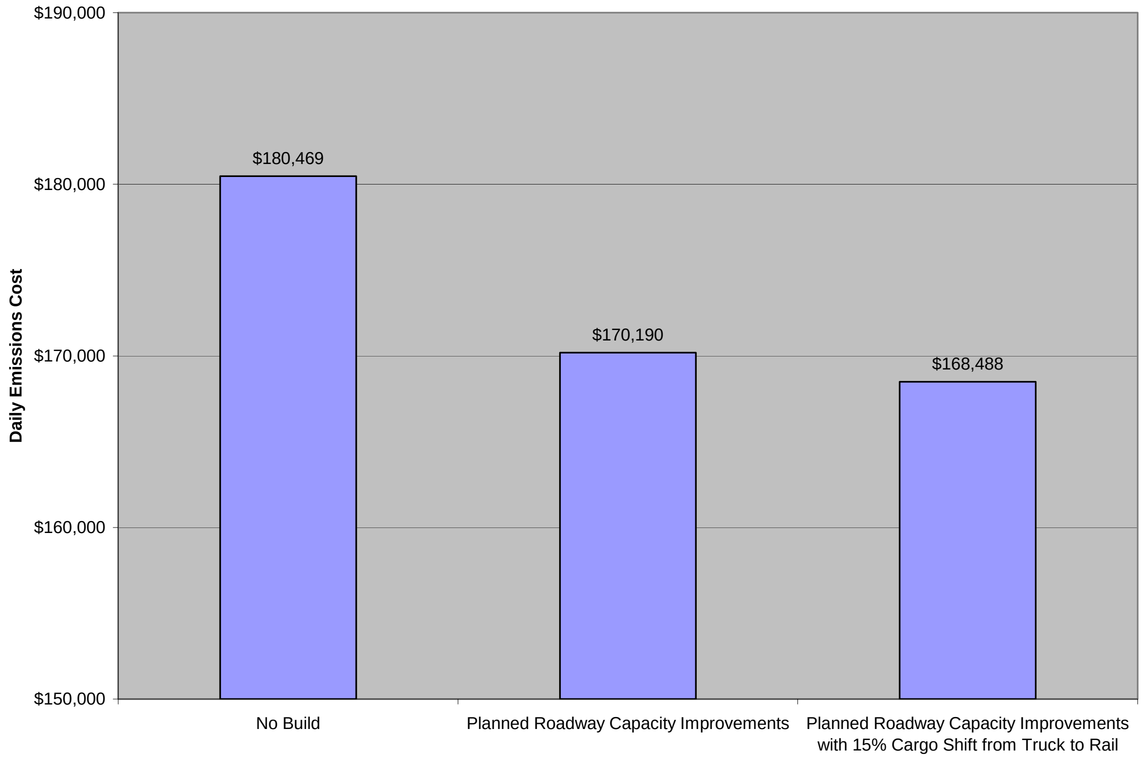


Figure 3-25: Comparison of Total Daily Emissions Cost for San Antonio Region

Implementing the planned roadways improvements identified in the 2025 MTP and TTC-35 DEIS resulted in the largest improvement in terms of reduced delay, fuel consumption, and emissions. The planned improvements are projected to decrease daily delay by approximately 53 percent which would result in a cost savings of nearly $6.6 million per day. Therefore, the implementation of the planned improvements is projected to save the traveling public approximately $1.9 billion for the entire year 2025. Shifting 15 percent of truck cargo to rail is projected to result in an additional 1 percent savings in delay or approximately $60,000 per day. The cargo shift was performed for trucks with routes greater than 300 miles from the San Antonio region. The reduction of trucks on roadways within the San Antonio region resulting from the cargo shift was less than 2 percent.

It was estimated that approximately 36,000 gallons of fuel or $88,000 per day would be saved as a result of constructing the planned capacity improvements. The cargo shift is projected to save approximately 326 gallons or $800 per day.

Emissions calculations are based on projected vehicle-miles of travel and projected vehicle speeds. The vehicle-miles of travel typically increase for scenarios that include adding lanes to the roadway system. However, new roadways will help to reduce travel distances between origins and destinations which will reduce the total number of miles traveled. A comparison between the vehicle-miles of travel for the no-build and planned improvements resulted in a reduction of approximately 800,000 vehicle miles or 1 percent. The average vehicle speed within the San Antonio region due to the implementation of the planned improvements increased approximately 5 percent. The emissions cost savings per day for the planned improvements was estimated as approximately $10,000, while the savings for the cargo shift was projected as an additional $2,000 per day.

An analysis was also performed to determine the benefit for implementing the grade separations and crossing closures as well as the cumulative benefit of the grade separations and closures with the 15 percent cargo shift from truck to rail. The no-build scenario was considered the base case. Total delay, fuel consumption and emissions comparisons are shown in Figures 3-26, 3-28 and 3-30 while cost comparisons for each of the MOE's are shown in Figures 3-27, 3-29 and 3-31.

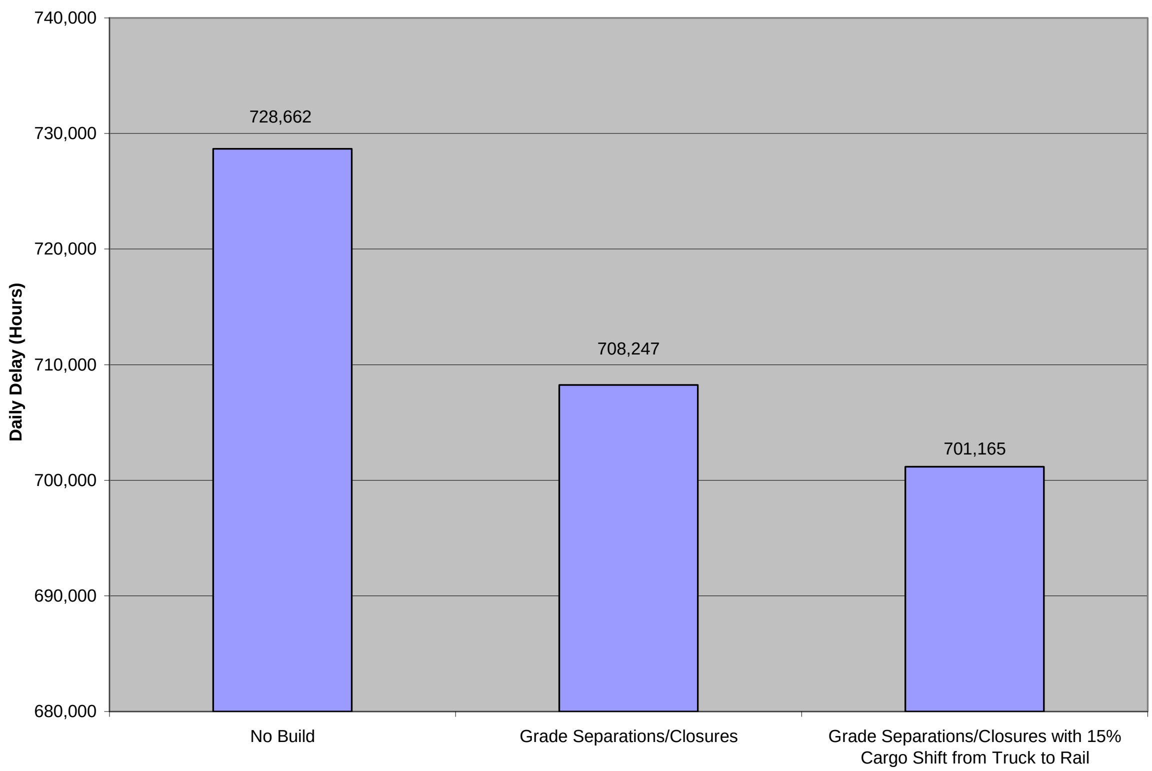


Figure 3-26: Comparison of Total Delay for San Antonio Region

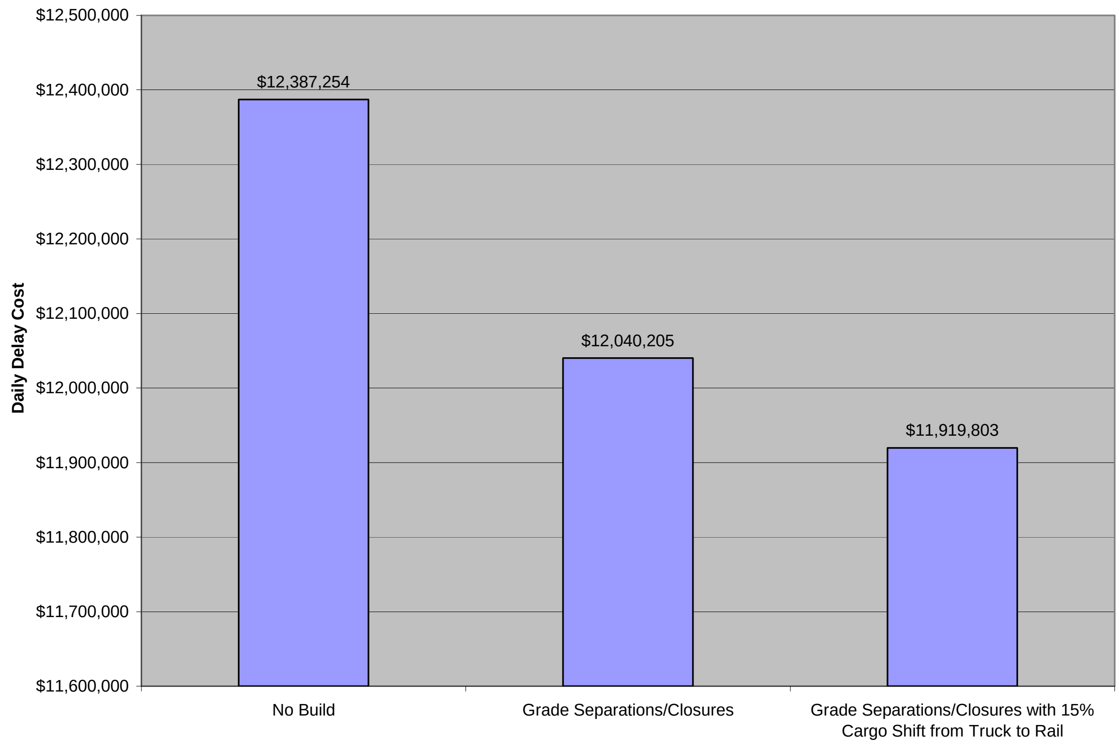


Figure 3-27: Comparison of Total Delay Cost for San Antonio Region

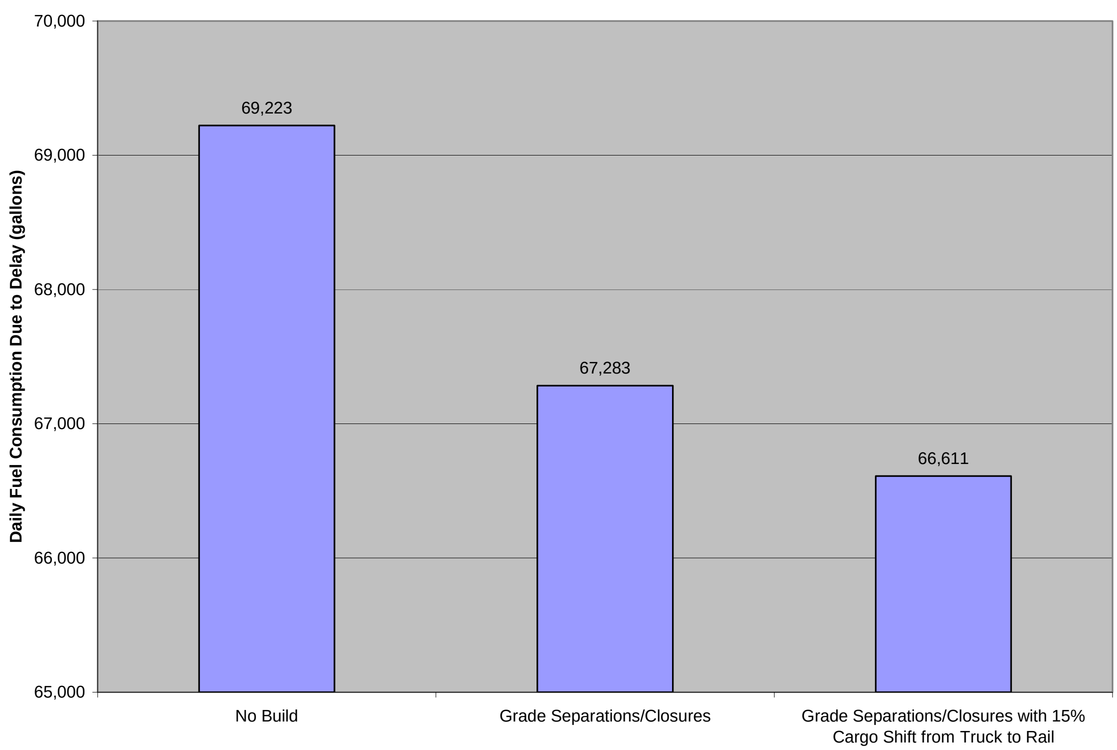


Figure 3-28: Comparison of Total Daily Fuel Consumption due to Delay for San Antonio Region

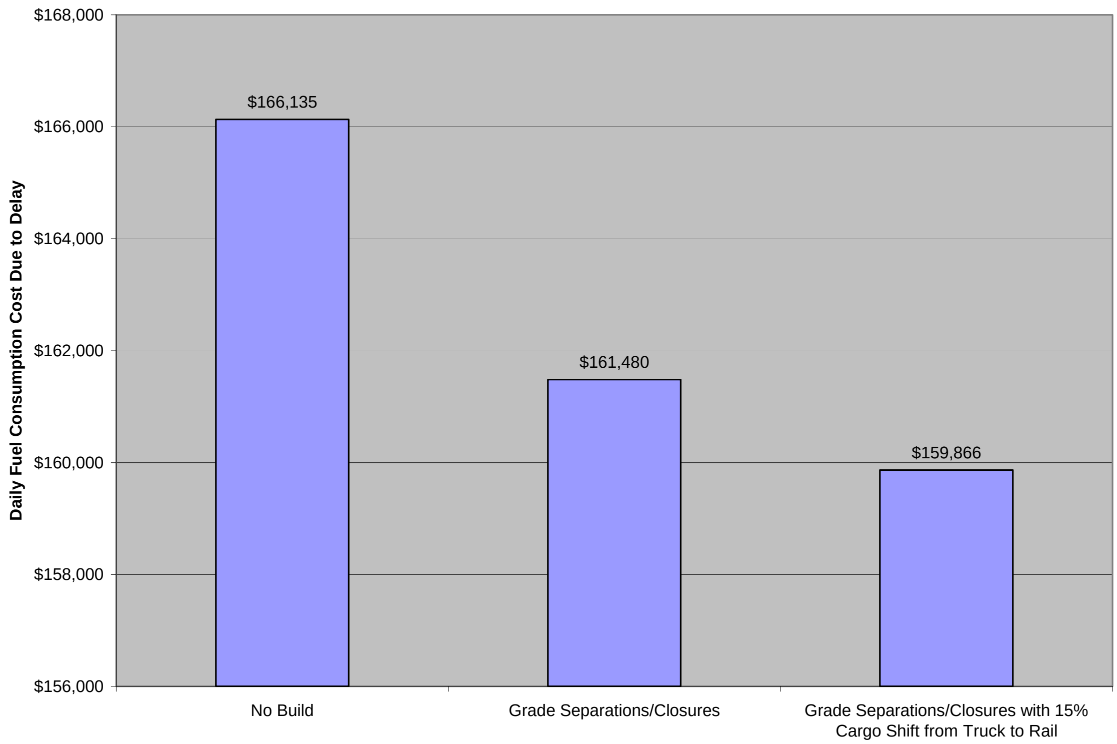


Figure 3-29: Comparison of Total Daily Fuel Consumption Cost due to Delay for San Antonio Region

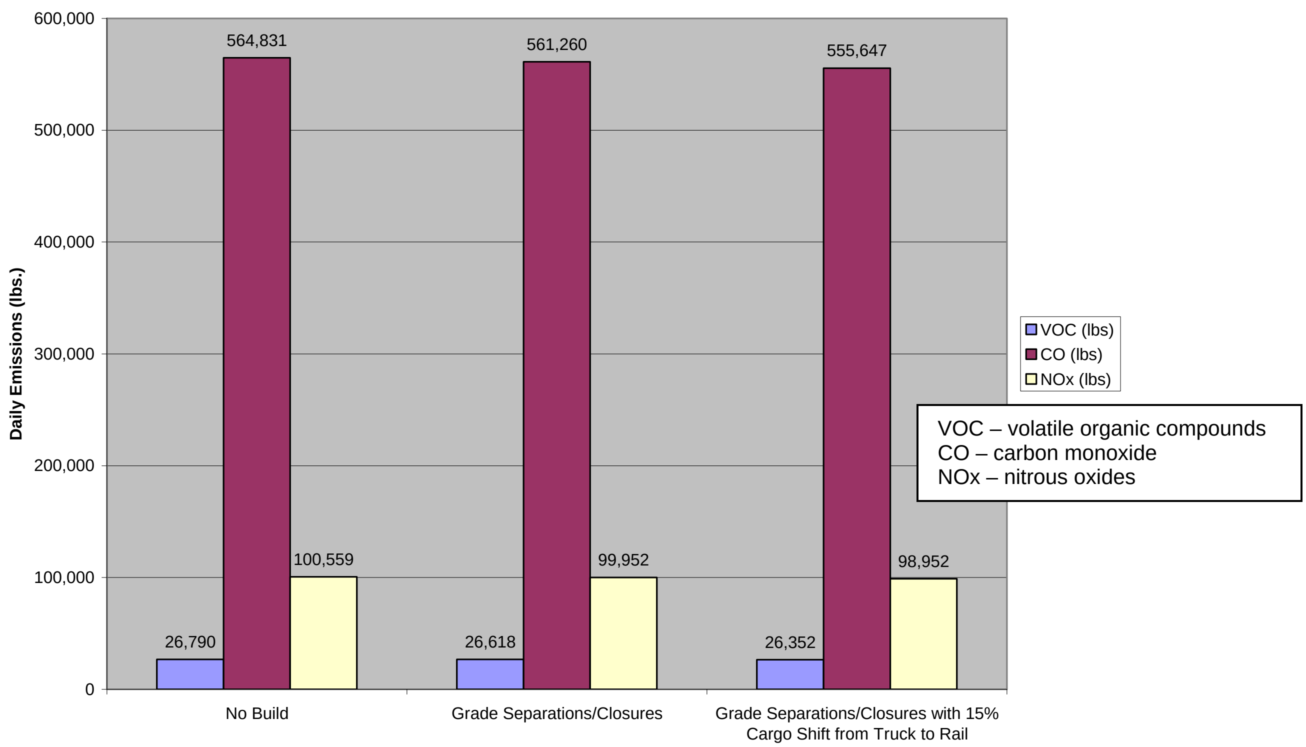


Figure 3-30: Comparison of Total Daily Emissions for San Antonio Region

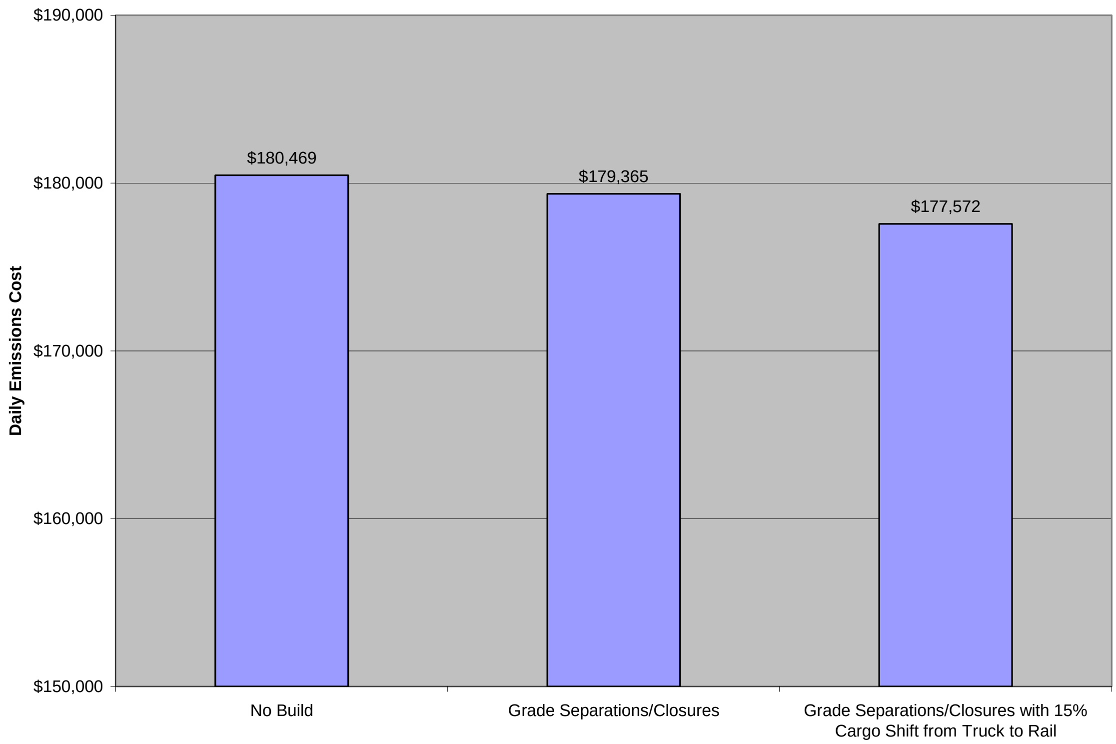


Figure 3-31: Comparison of Total Daily Emissions Cost for San Antonio Region

The modeled grade separations and closures as well as the cumulative scenario including the grade separations and closures with the cargo shift resulted in reduced delay and fuel consumption, although showed little benefit in terms of reduced emissions. The daily delay savings for implementing the recommended grade crossings and closures was projected as 20,400 hours with an estimated cost savings of $347,000 per day. The cumulative effect of the grade separations and closures with the cargo shift is projected to result in a savings of approximately 27,000 hours and $470,000 per day between the no-build scenario and the grade separations/closures. This cost would translate into an annual cost savings of approximately $132 million.

The savings in fuel consumption due to the grade separations and closures was estimated as nearly 2000 gallons and approximately $4,700 per day. The fuel consumption savings due to the cumulative effect of the grade separations and closures with the cargo shift was projected as 2,600 gallons and approximately $6,300 per day. Therefore, the cargo shift resulted in less than a 1 percent improvement for fuel consumption savings.

The emissions analysis projected that grade separations and closures would save the San Antonio region approximately $1,200 per day. The cumulative effect of the grade separations and closures were projected to improve the region by approximately $2,900 per day which would translate into approximately $870,000 per year.

The analysis projected that implementing the planned roadway capacity improvements resulted in a total cost savings of over $6.6 million per day. The planned improvements with the cargo shift resulted in a projected total daily savings of nearly $6.7 million. Implementing the grade separations and closures resulted in a projected daily savings of over $350,000 while the cumulative savings of the grade separations and closures with the cargo shift resulted in nearly $477,000 savings per day. A total cost savings of nearly $7.1 million per day was projected when the planned roadway capacity improvements, grade separations and closures and the 15 percent cargo shift from truck to rail were combined. Figure 3-32 illustrates the total projected cost savings for each of the alternatives as compared to the no-build scenario.

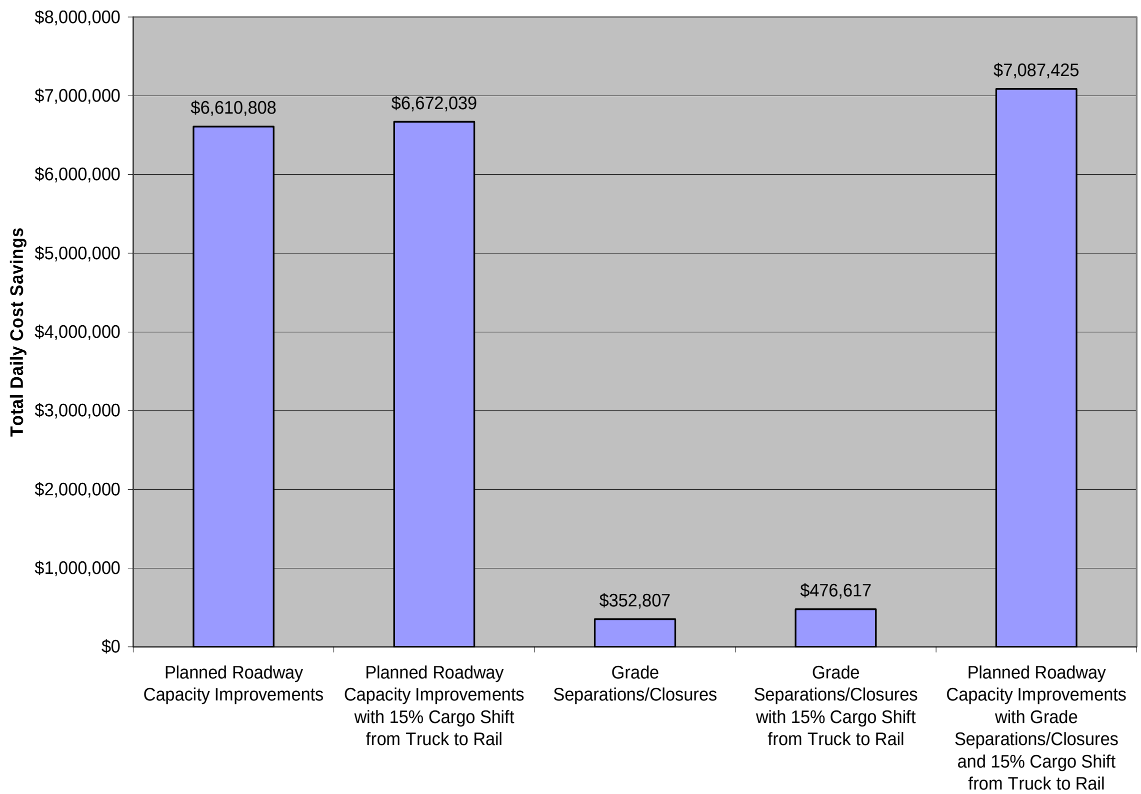


Figure 3-32: Comparison of Total Cost Savings as Compared to the No-build

Improvement to Truck Facility Access

The MTP - Mobility 2030 developed by the San Antonio-Bexar County MPO identifies a number of planned projects for implementation. These projects were incorporated into the SAM roadway network for the congestion analysis. Increased mobility of freight was one of the goals identified by the MPO in developing the project list. Although not analyzed individually, the planned projects when analyzed all together were shown to improve both general traffic and truck freight movement.

The primary location of heavy truck movement occurs on the state highway system, especially the interstate highways. Maintenance, capacity upgrades, and new roadways are planned for the state system within the District. As most of the congestion occurs within the city of San Antonio, the majority of the projects are located within the city. The state highway system carries a heavy truck percentage, so it is important to provide adequate connections to the state system from areas of heavy truck movement. These areas of heavy truck movement could include airports, industrial yards and intermodal facilities. Most of the connections to the state highway and interstate system from these facilities occur on arterial and collector streets. Therefore, it is important to also focus on freight movement along arterial and collector streets within areas of heavy truck movements. Some of the specific areas of major truck movement have been identified in the form of ports, intermodal facilities, airport and industrial parks, as shown in Figure 3-33 and listed as follows:

- Port San Antonio (formerly Kelly Air Force Base);
- UP Intermodal Facilities
  - San Antonio Terminal
  - San Antonio TOFC (Trailer on Flat car)
  - San Antonio Intermodal Terminal (under construction)
- San Antonio International Airport
- Industrial Parks near IH 410/IH 35 and IH 410/IH 10 Interchanges
  - Eastwood Industrial Park
  - Rittman Industrial Park
  - Friedrich Industrial Park

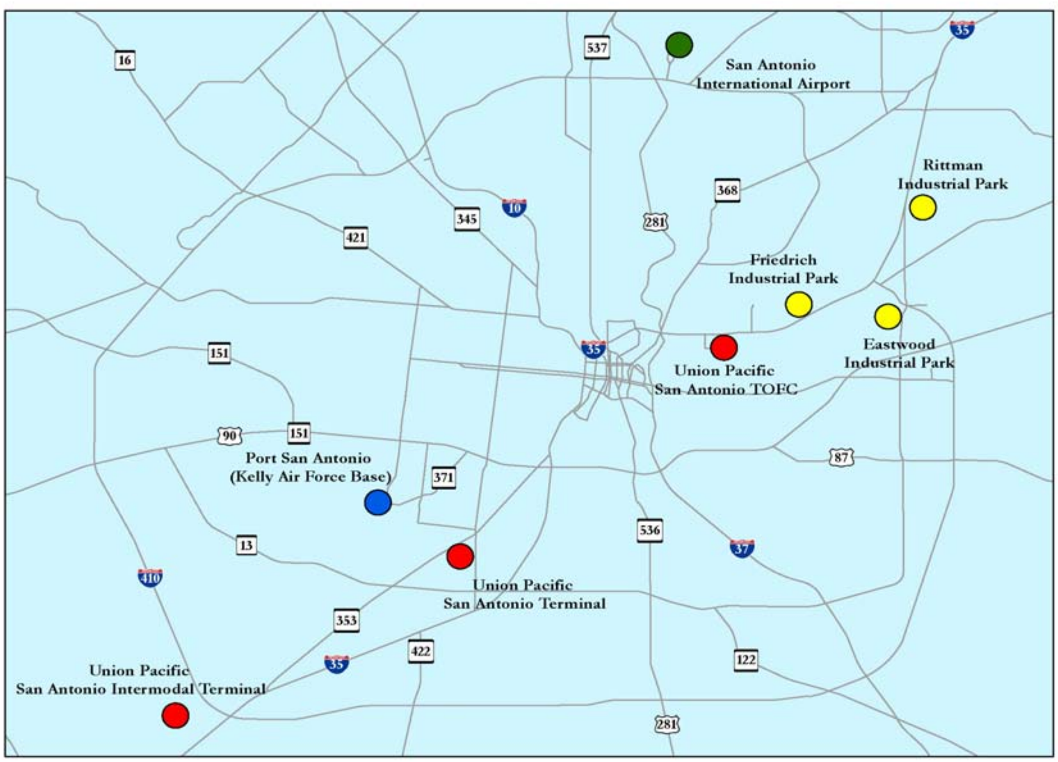


Figure 3-33: Major Truck Facilities in San Antonio

It is important to provide sufficient connection to the state system for all of these locations so as to promote efficient truck movement. Each of these facilities mentioned above are located in close proximity to the state highway system.

Port San Antonio (formerly Kelly Air Force Base) covers approximately 2000 acres and is being master planned and incorporated into the city's system of development. Roadway projects are being planned that provide improved access to the Port's airfield and rail-served facilities from the city and state roadway systems. These roadway projects are included along Cupples Road, General Hudnell/Spur 371, and Billy Mitchell Boulevard. These roadways provide access to US 90. Additionally, new north-south thoroughfares will be provided into the Port for access to facilities.

UP currently operates two intermodal facilities and is planning a third facility. The San Antonio Terminal serves Port San Antonio while the San Antonio TOFC is located near New Braunfels Avenue and IH 35, east of US 281. UP is planning a new 300-acre facility approximately 13 miles southwest of downtown San Antonio which will replace the San Antonio Terminal. Located southwest of the IH 35/IH 410 interchange, this new facility will provide direct access to the state highway system. The new San Antonio Intermodal Terminal (SAIT) will handle general merchandise containers and trailers for retailers and distribution centers, as well as auto parts for Toyota's new San Antonio plant. The Toyota plant is located south of the city, north of Loop 1604 between SH 16 and US 281.

The San Antonio International Airport is located on the north side of San Antonio at the intersection of Loop 410 and US 281. It is approximately 10 miles from the central business district as well as having IH 35 to the east and IH 10 to the west. Truck movement occurs at the two cargo facilities on airport property as well as warehouses in the vicinity of the airport.

Three industrial parks are located in the vicinity of the interchanges of IH 410/IH 35 and IH 410/IH 10. Rail line access is provided for these industrial parks and heavy truck movement is projected in the vicinity.

Focused studies to evaluate access and mobility needs for these facilities and others will be needed as the truck movement increases for the San Antonio District. Operational and geometric improvements could be implemented as a result of these focused studies.

Rail Freight Movements and Commodities

The SAM was not specifically designed to analyze freight rail movement, and as a result, the 1998 base year freight rail volumes (based on 1998 Reebie data and incorporated into SAM) were well below 1998 actual freight tonnages. SAM, however, incorporates methodology and analytical techniques within the model that are appropriate to forecast percentages of commodity growth. Freight railroads, because they are a private industry, do not typically publicize their internal forecasts for commodity growth, which complicated the availability of accurate information to be used for the base year within SAM. To get a more accurate and updated picture of the 2004 and subsequent 2025 rail freight movements, data was collected from the STB Waybill Data. The STB data along with rail tonnage maps, shown in Figure 3-34, were compared for accuracy and provide a clear picture of the current and future outlook for freight movements throughout the state. For example, data provided by UP for the purpose of this study depicted in Figure 3-34, shows that in 2004 there are 98 Million Gross Tons (MGT) of freight rail coming into the area, and 95 MGT leaving the area. This correlates to approximately 56 million revenue tons of freight coming in and 54 million revenue tons of freight going out, or over approximately 50 trains daily in the area.[1]

Rock and coal trains in the area account for over 10 MGT, or nearly 600 rail cars daily. On average, there are nearly 6,500 rail car movements within the San Antonio area on a daily basis. As will be seen later in this section, the approximate 110 million revenue tons of rail freight moved within the area in 2004 is comparable to that determined via SAM after the input of typical incremental growth from 1998 to 2004.

Freight rail commodity movements were analyzed within Texas, and also those commodities destined for other locations within the country and/or Mexico, as determined by SAM. The growth patterns resulting from SAM forecasting were then applied to these patterns, providing forecasts based on 2004 actual information. It is also important to note that products coming into Texas also come from air cargo and water vessels.

[1] Percentage of million revenue tons to million gross tons based on data compiled from 2003 Surface Transportation Board waybill data statistics.

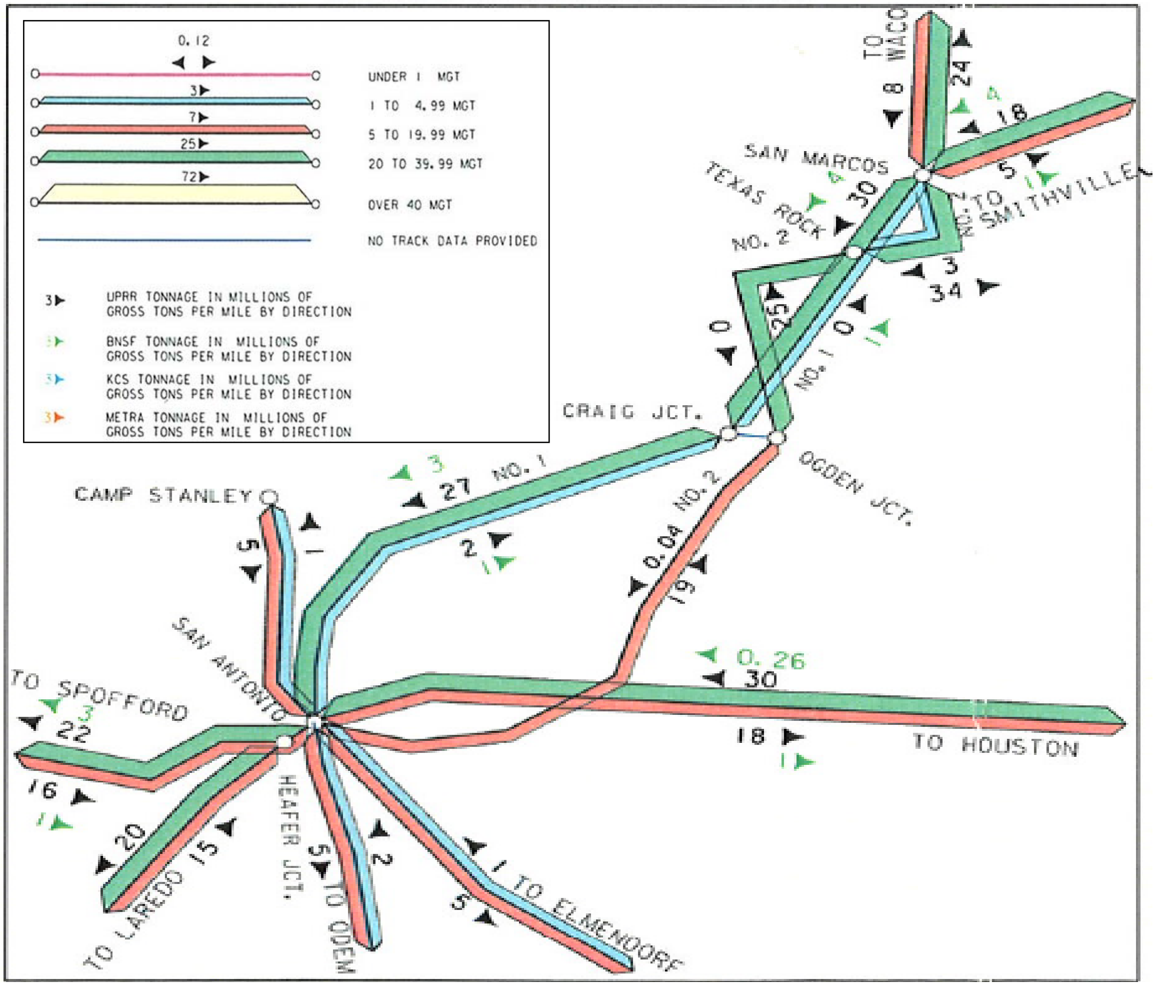


Figure 3-34: 2004 San Antonio Area Railroad Million Gross Tons[2]

Rail Freight Movements for San Antonio, the State, and the Country

Much like the truck movements described in Table 3-3, rail freight movements are also growing. Table 3-9 illustrates that the region will continue to export a great deal of commodities through the year 2025. The table describes each movement type that would either originate or end in the San Antonio District. For instance, internal to internal movements occur within the District while all other movements (internal to external; external to internal) occur either between the San Antonio District and other Texas counties or between the San Antonio District and the rest of the US and Mexico. Modest increases are projected to occur via rail freight internal to the region, but overall, the most significant increases are between San Antonio and the US and Mexico. More than 29 million additional tons will be exported to other Texas counties and more than 800,000 additional tons will be exported to other states and Mexico by 2025. Approximately 17 million additional tons will be imported from other US states and Mexico to the San Antonio region. The challenge will be to efficiently

[2] Tonnage Chart for Year 2004, San Antonio – Union Pacific Railroad, March 1, 2005

transport this additional tonnage and determine how the State may plan for the additional infrastructure to accommodate such needs.

Annual Rail Tons				
Origin	**Termination**	**2004**	**2025**	**Percent Change**
Internal to Internal				
San Antonio District	San Antonio District	399,413	773,309	94%
Internal to External				
San Antonio District	Other Texas Counties	21,610,002	50,164,131	132%
San Antonio District	Western US	156,724	360,184	130%
San Antonio District	Northern US	156,724	360,184	130%
San Antonio District	Eastern US	208,966	480,245	130%
San Antonio District	Mexico	87,069	200,102	130%
External to Internal				
Other Texas Counties	San Antonio District	1,445,618	3,322,322	130%
Western US	San Antonio District	3,310,935	7,609,195	130%
Northern US	San Antonio District	3,310,935	7,609,195	130%
Eastern US	San Antonio District	4,414,581	10,145,594	130%
Mexico	San Antonio District	1,839,409	4,227,331	130%
Total		**36,940,376**	**85,251,791**	**131%**

*Source: Statewide Analysis Model based on 2004 Surface Transportation Board Waybill Data

Table 3-9: Rail Freight Movements

Rail Freight Movements within the State

Unlike truck freight, rail movements are somewhat limited in their ability to deliver door to door service. Intermodal centers, rail yards, and ports of entry (both land and water) are the primary locations in which rail freight can be either sent or received. Figure 3-35 illustrates the origin and destinations for freight rail movements occurring in 2004. Houston, Dallas/Forth Worth, Laredo, and Brownsville handled the largest movements. Figure 3-36 shows other locations such as El Paso, the Texas Gulf Port cities, and parts of East Texas beginning to emerge as major origins or destinations in future years. Accommodating these and other locations with freight rail service will be critical to the future of Texas in terms of economic growth and also providing options to shift truck cargo to rail cars.

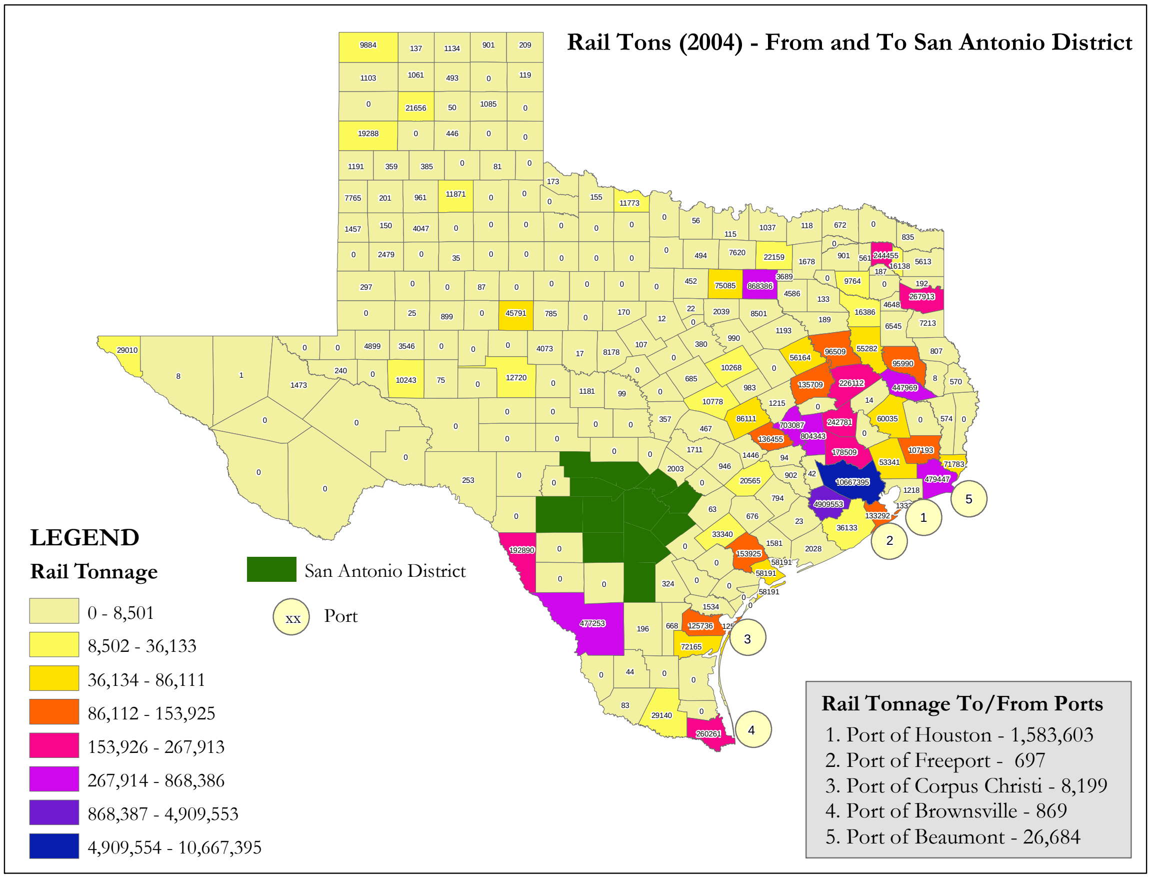


Figure 3-35: 2004 Rail Freight Movements

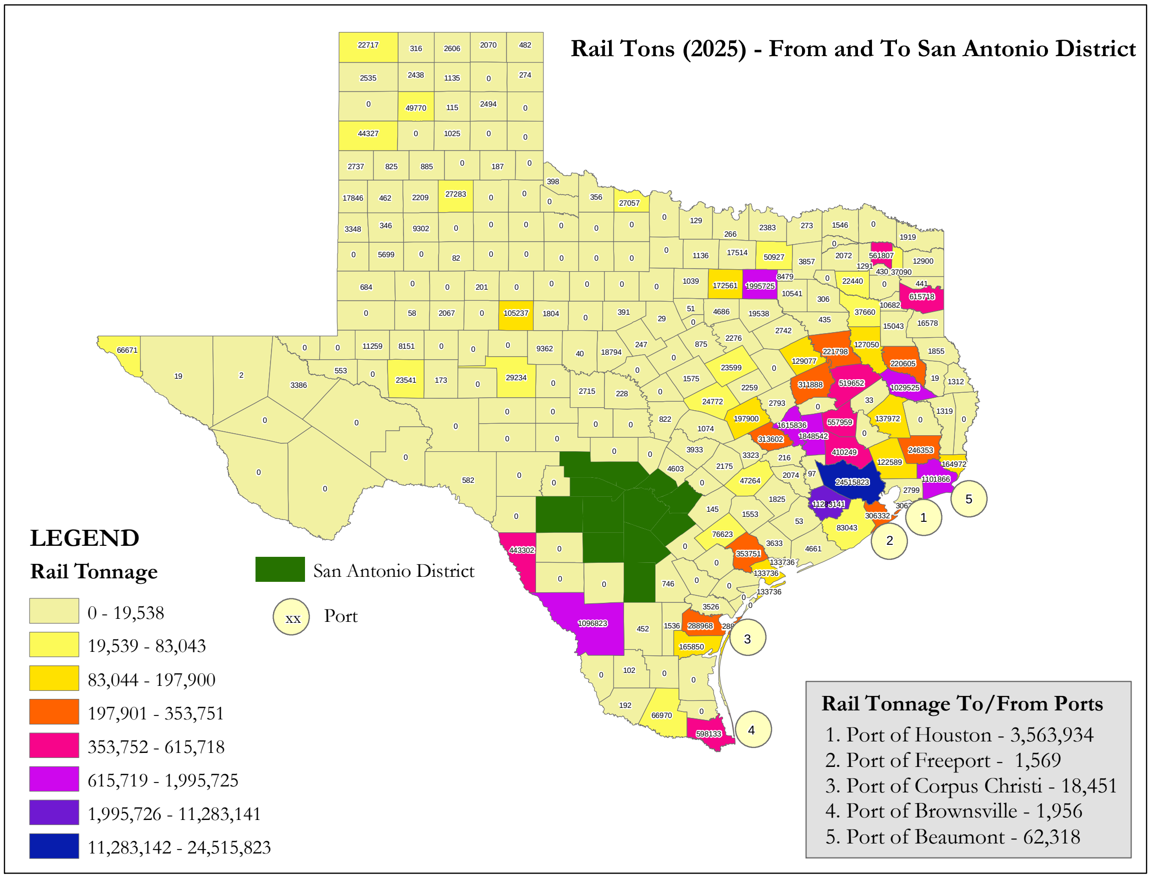


Figure 3-36: 2025 Rail Freight Movements

Rail Freight Movements Outside of the State

Rail freight is most effective when carrying long haul cargo. The cost effectiveness of utilizing rail to transport cargo over long distances has led to the continued growth of tonnage movement between the San Antonio District and locations outside of the state. Figure 3-37 illustrates that major rail freight movements are currently occurring from Louisiana, Oklahoma, and more moderately to Mexico, New Mexico, and the Texas Gulf Ports. Figure 3-38 demonstrates that by the year 2025 major movements to New Mexico, Mexico and Oklahoma are predicted to occur. These new growth opportunities may require strategic planning and infrastructure improvements in order to capitalize on these emerging markets.

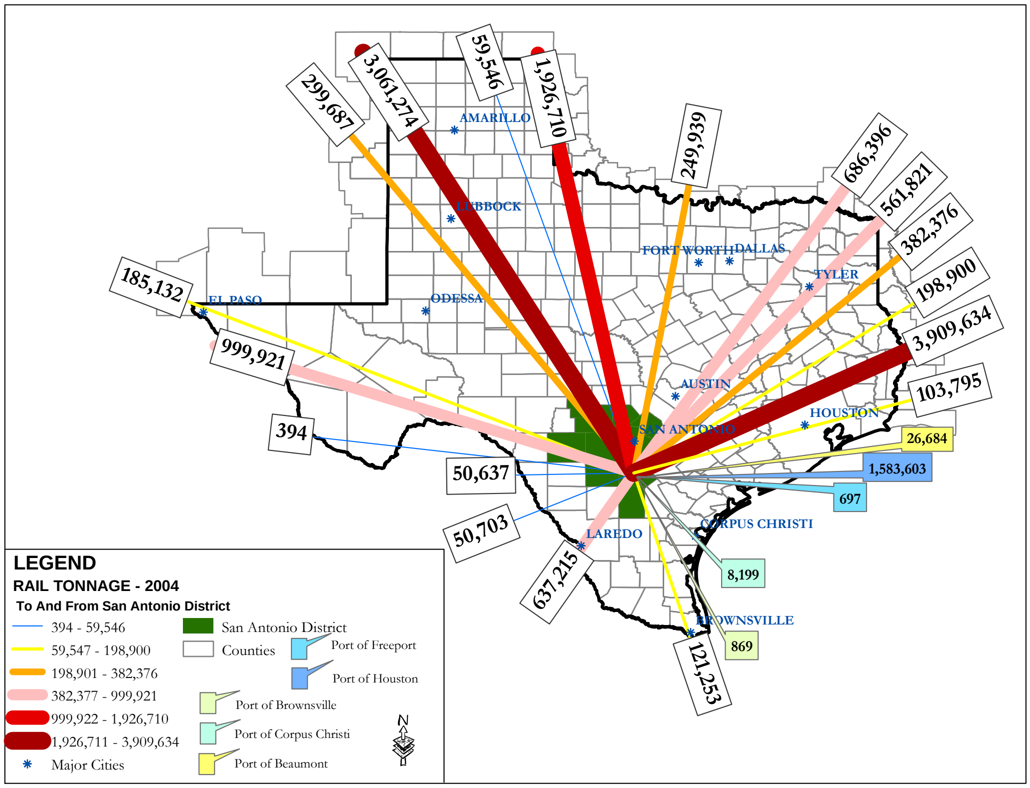


Figure 3-37: 2004 Freight Rail Outside of Texas to and from San Antonio

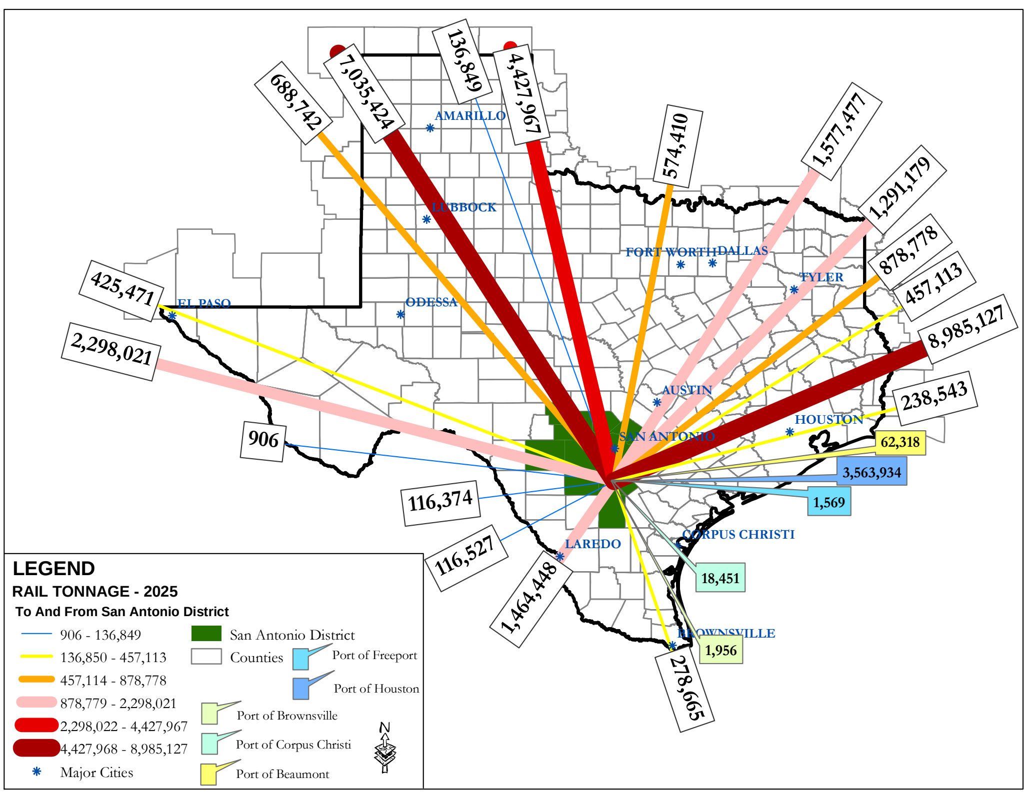


Figure 3-38: 2025 Freight Rail Outside of Texas to and from San Antonio

The overall rail tonnage movement from and to the San Antonio region was summarized by dividing the area within the state into specific areas of different distances from San Antonio as well as separate regions of Texas. The area inside of Texas was broken into radii's of 50, 100, 300, and over 300 miles from the San Antonio region. The regions outside of the state were identified as Western US, Northern US, Eastern US, and Mexico. The model determined rail tonnage distribution for each area. Figure 3-39 shows the distribution of rail tonnage for each region.

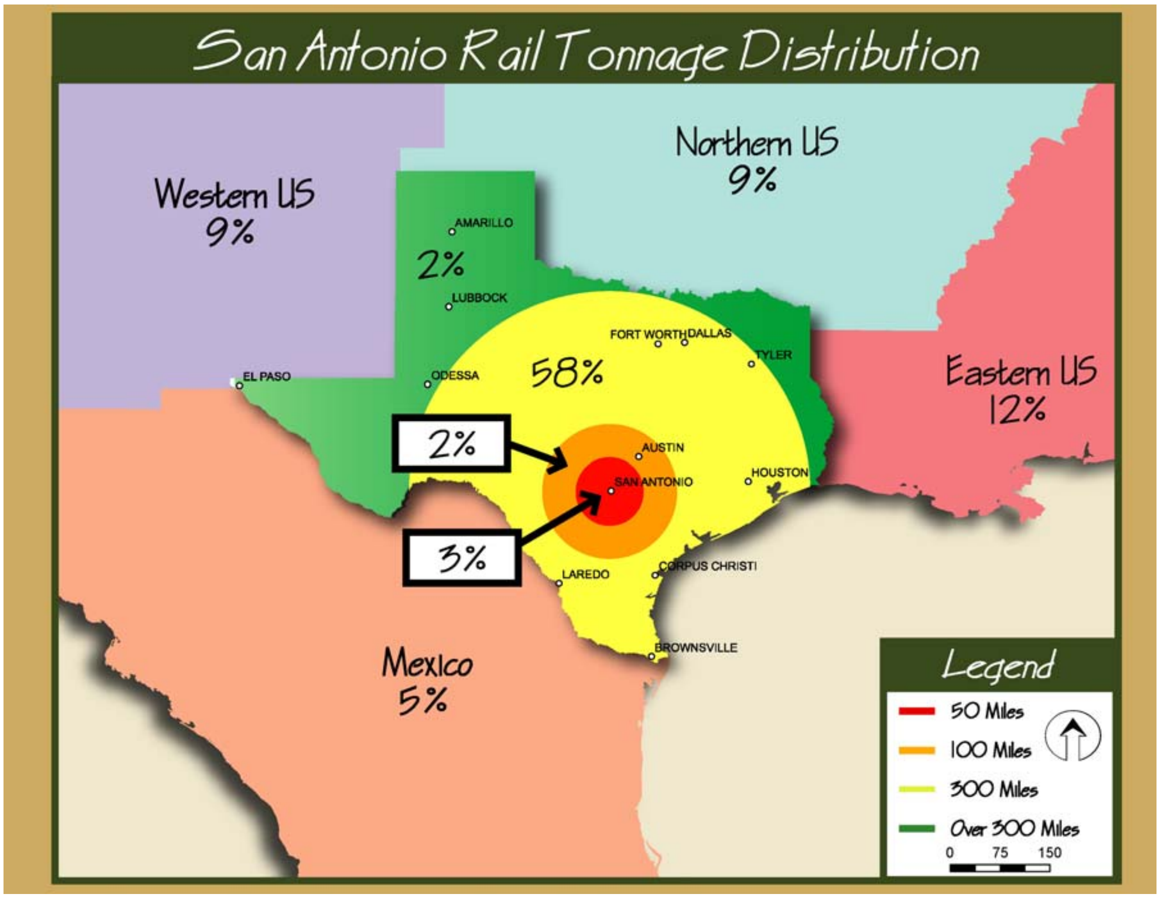


Figure 3-39: 2025 Rail Tonnage Distribution for San Antonio Region

The analysis showed that three percent of rail tonnage is projected to stay within the San Antonio region while 58 percent is projected to travel between 100 and 300 miles from the area. Based on projections, approximately 63 percent of rail freight traffic travels within 300 miles of the San Antonio region. A projected two percent of the rail freight is distributed to an area within Texas outside of the 300 mile radius. The remaining percentages are split between Mexico (five percent), Western US (nine percent), Northern US (nine percent), and Eastern US (12 percent).

Freight Rail Commodity Trends

Unlike truck freight growth trends, rail freight growth depends largely on the type of commodity being shipped. Table 3-10 shows a comparison between 2004 and 2025 rail commodities. The raw materials growth of over 20 million tons clearly dominates all other commodity tonnage increases. The commodity with the largest percent increase was building materials. Secondary products are projected to result in the second highest increase by tonnage. Secondary rail commodities include hazardous materials and products that are transferred at intermodal facilities which include containerized or packaged products. Based on the STB data, the amount of hazardous material transported by rail in 2004 was approximately 1.4 million tons, while the projected 2025 tonnage was 3.2 million tons. Chemical/petroleum was projected to result in the lowest percentage of growth.

Commodity	Rail Tonnage		
	2004	2025	Percent Increase
Raw Materials	14,416,557	34,975,874	143%
Secondary	10,343,305	22,506,473	118%
Building Materials	2,835,741	8,249,419	191%
Chemical/ Petroleum	2,947,232	5,096,650	73%
Wood	1,512,326	3,660,682	142%
Machinery	1,288,863	3,059,718	137%
Food	1,331,043	2,816,055	112%
Agriculture	1,363,421	2,720,273	100%
Textiles	901,888	2,166,649	140%
Total	**36,940,376**	**85,251,791**	**131%**

Table 3-10: Rail Freight Commodity Growth

Figures 3-40, 3-41 and 3-42 display the commodities being moved by rail within the San Antonio region for 2004 and 2025. Figure 3-43 provides a correlation of similar information on a national level for the year 2000.

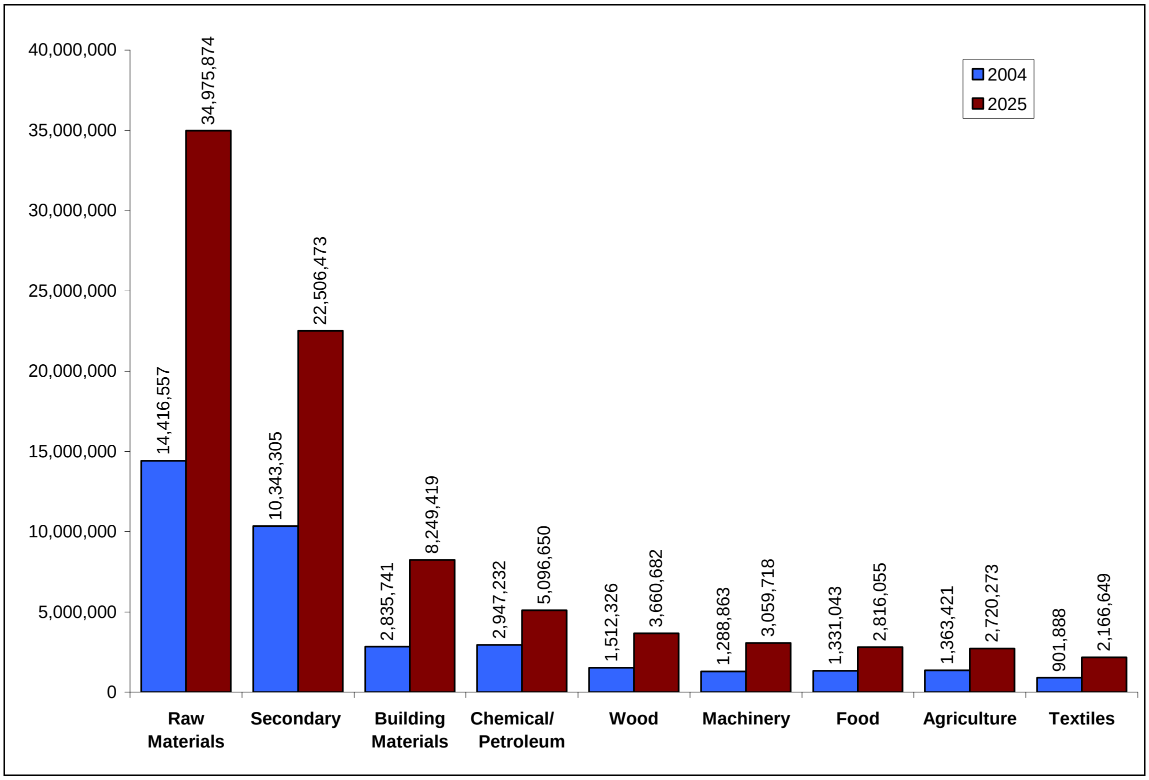


Figure 3-40: Freight tonnage by commodity – San Antonio Area

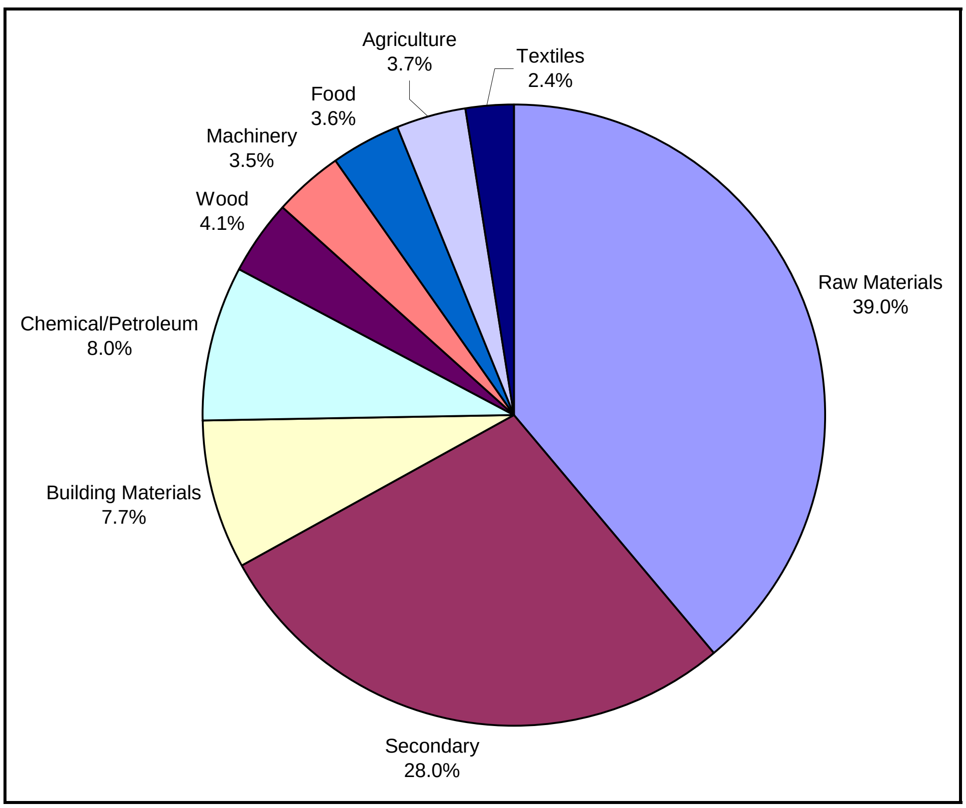


Figure 3-41: Percentage of freight rail by commodity (2004)

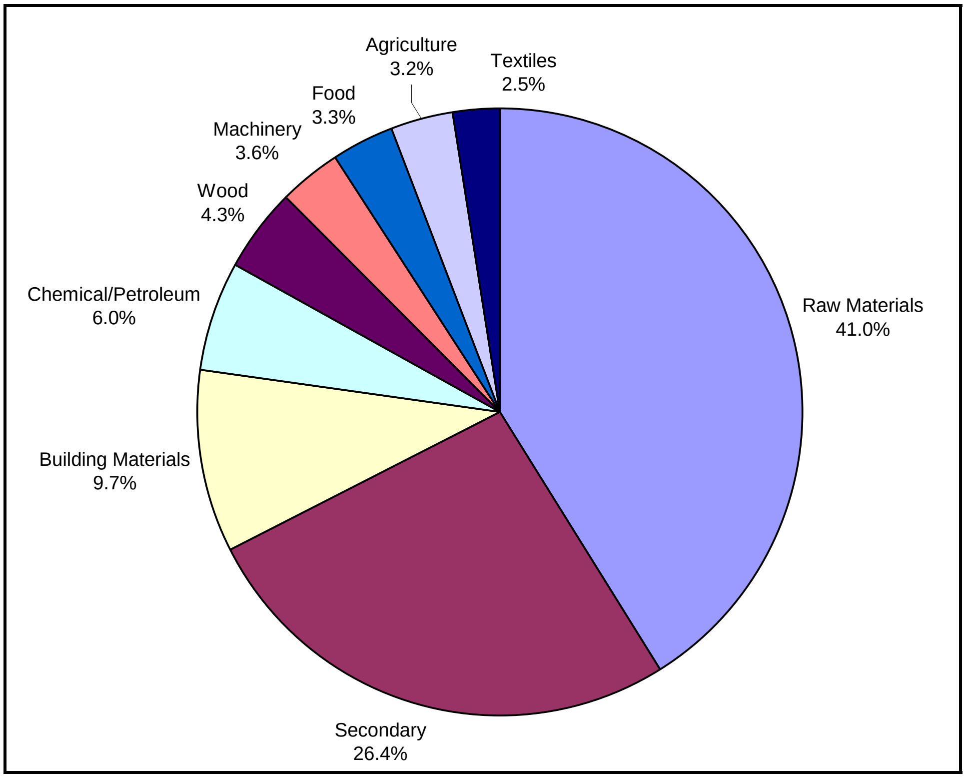


Figure 3-42: Percentage of freight rail by commodity (2025)

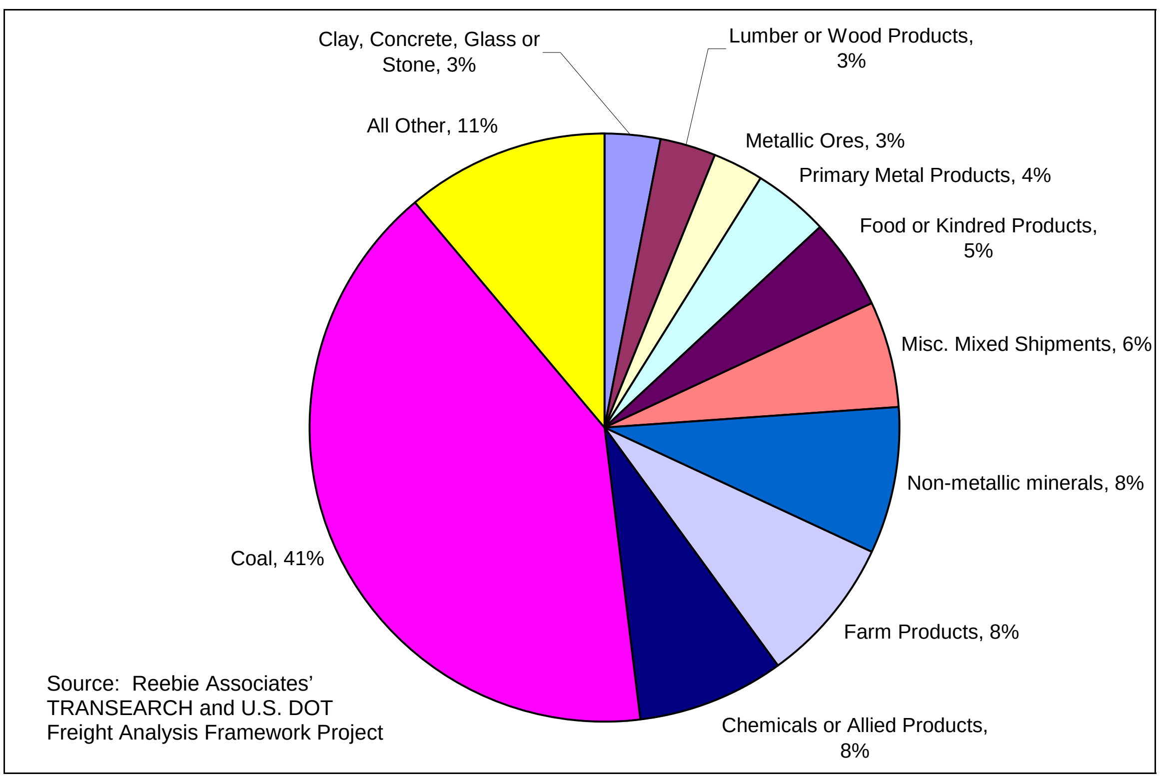


Figure 3-43: Freight tonnage by commodity – National (2000)

The challenge to accommodate the forecasted growth in freight rail will include planning for new or expanded rail facilities that can capitalize on the growth markets. If planned properly, the facilities may provide the ability to shift the truck cargo burden to rail cars. The percentage of growth is one way to analyze data; however, examining the percentage that each commodity has on the market is equally important.

Analyzing the trends in commodity movements can aid in further understanding the trip generation and distribution of rail freight movements. In general, railways are best suited to hauling large, heavy, low-value loads that are not overly time-sensitive over distances greater than 300 to 400 miles. The largest products being moved by rail in the region (in terms of tonnage) are raw materials, secondary materials, and building materials.

While growth occurs for all the commodity types analyzed, the transportation of raw material and secondary products are predominate for the region.

Rail Freight Findings Summary

- Freight tonnage moved by rail is forecasted to more than double by 2025;
- Raw materials constitute a majority of the freight rail tonnage being shipped within Texas, in 2004 and as forecasted in 2025; and,
- Proportionally, more rail shipments are forecasted to originate from within the region in the future.

Rail and Truck Freight Comparison

Table 3-11 provides a comparison of truck and rail tonnages within the region. The increase between 1998 and 2025 for truck tons represents a 127 percent increase compared to a rail tonnage increase of 131 percent between 2004 and 2025. The predicted increases of rail and truck tonnages are substantial and may need to be addressed through additional infrastructure improvements and/or enhancements. Figure 3-44 charts the overall tonnage and growth.

Year	Truck	Rail
1998 (Truck), 2004 (Rail)	81,508,046	36,940,376
2025	184,980,677	85,251,791
Percent Increase	127%	131%

Table 3-11: Rail and Truck Tons Comparison

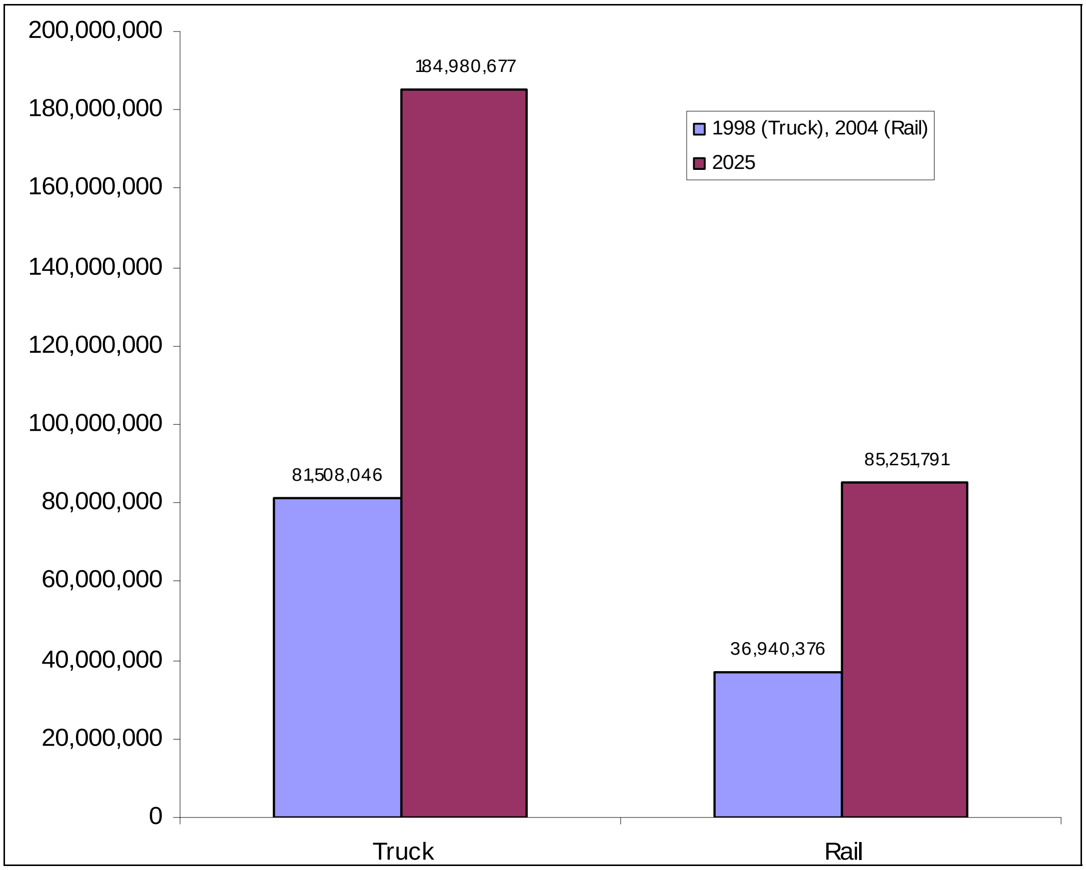


Figure 3-44: Total Rail / Truck Tons

Combined Truck and Rail Tons				
Origin	**Termination**	**1998/2004**	**2025**	**Percent Change**
Internal to Internal				
San Antonio District	San Antonio District	2,954,621	6,166,520	109%
Internal to External				
San Antonio District	Other Texas Counties	42,033,410	100,465,633	139%
San Antonio District	Western US	586,972	1,558,712	166%
San Antonio District	Northern US	2,738,208	7,551,352	176%
San Antonio District	Eastern US	2,360,202	6,472,885	174%
San Antonio District	Mexico	3,959,295	10,986,854	177%
External to Internal				
Other Texas Counties	San Antonio District	42,247,917	85,014,286	101%
Western US	San Antonio District	3,724,837	8,677,048	133%
Northern US	San Antonio District	5,794,346	14,016,313	142%
Eastern US	San Antonio District	6,484,089	15,484,858	139%
Mexico	San Antonio District	5,564,524	13,838,007	149%
Total		**118,448,422**	**270,232,468**	**128%**

*Source: Statewide Analysis Model based on 1998 Reebie Transearch Data, Wharton Economic Forecasting Associates, Latin American Trade Transportation Study and 2004 Surface Transportation Board Waybill Data

Table 3-12: Combined Rail and Truck Tons

While the total combined tons shipped by both truck and rail are projected to increase by 128 percent by 2025, there could be a bigger increase of freight shipped out of the San Antonio District (146 percent increase) than freight shipped into the District (115 percent increase) and shipments internal to the District (109 percent increase). Table 3-12 illustrates that the largest projected increase of freight tons is represented by shipments from the San Antonio District to other Texas counties (139 percent). It becomes clear that most of the freight shipping requirements within the San Antonio District are supported by trucks. This is basically due to the various industries, industrial centers and intermodal facilities within the District, specifically in the city of San Antonio. The projected internal tons shipped by truck within the District for 2025 is 5,393,211 tons (Table 3-3) while the projected internal rail shipments will be 773,309 tons (Table 3-9). This shows that trucks will be shipping approximately seven times more tonnage within the San Antonio District than trains. For the projected freight shipments out of the San Antonio District by 2025, trucks will be hauling 46 percent more tons than rail; however, for shipments into the District, truck shipments will be approximately three times more than rail.

San Antonio Region Summary

With congestion levels in San Antonio on the rise and the expected growth of commodity movements throughout the state, a comprehensive plan to accommodate such growth is needed. To our benefit a regional vision is already taking place. TTC-35 could provide some much needed relief for the region. Through the creation of truck only lanes and a higher speed freight rail corridor, not only would existing freight movement corridors experience a reduction in congestion, but economic benefits may result from increased freight movement efficiencies.

A diverse approach is needed to address infrastructure needs rather than one single improvement, such as TTC-35. The regional vision of planned roadway improvements has been developed through the 2030 Metropolitan Thoroughfare Plan by the San Antonio-Bexar County MPO. Additional improvements that were analyzed included the regional benefit of roadway-railroad grade separations/closures and the shift of commodities from truck transport to rail. The shift of truck cargo to rail cars could be expedited with additional rail routes that follow a preferred alignment, as determined through a public involvement process, which includes the major freight carriers.

The potential roadway capacity improvements, as identified in the 2030 MTP, and the resulting benefit both regionally and locally were determined. Each of the roadway capacity improvements were compared to the no-build scenario. The improvements that were analyzed included the following scenarios:

- No-build;
- Planned roadway capacity improvements;

- Planned roadway capacity improvements with a 15 percent cargo shift from truck to rail;
- Grade separations/closures;
- Grade separations/closures with 15 percent shift from truck to rail.

The total daily delay and gas savings when all of the alternatives are incorporated is projected to be approximately 367,000 hours and 35,000 gallons of gas per day for the San Antonio region when compared to a no-build scenario. These savings translate to approximately $7,000,000 per day. It was shown that the greatest benefits resulted from the 2030 MTP planned improvements. However, grade separations/closures and shifting 15 percent of cargo from trucks to rail resulted in minimal changes that showed the majority of the benefit in Bexar County.

The movement of trucks into and out of the Port Authority of San Antonio, UP intermodal facilities, airports and industrial districts should be evaluated as focused study areas. As the majority of truck movement occurs on the state highway system, an adequate arterial and collector system would be required to accommodate sufficient access to the state system. Operational and geometric improvements to these areas would improve truck movement for the region by providing more efficient access to the state highway system. Infrastructure improvements and alternatives to address the future freight movement projected for the region are discussed in section 7 of this report.

SECTION 4: EXISTING RAIL NETWORK

There are five major rail lines in the San Antonio region: the Del Rio/Glidden Subdivision, the Austin Subdivision ML 1, the Austin Subdivision ML 2, the Corpus Christi Subdivision, and the Laredo Subdivision. With the exception of the Austin Subdivision ML 1 and the Laredo Subdivision, the rail lines were constructed by independent railroad companies. The relationships and interchange experienced today between railroad companies were virtually non-existent between competing railroads in the early 1900's, meaning each railroad company had independent rail yards, maintenance facilities, and passenger stations.

With the merger of the UP and the Missouri Pacific Railroad, and subsequently the integration of the Missouri – Kansas & Texas Railroad Company in 1986, railroad operations between previously independent operators started to take on a new perspective. UP's acquisition of the Southern Pacific Railroad in 1996 combined the last of the independent operations within the region.

Figure 4-1 shows the overall layout of the San Antonio rail network.

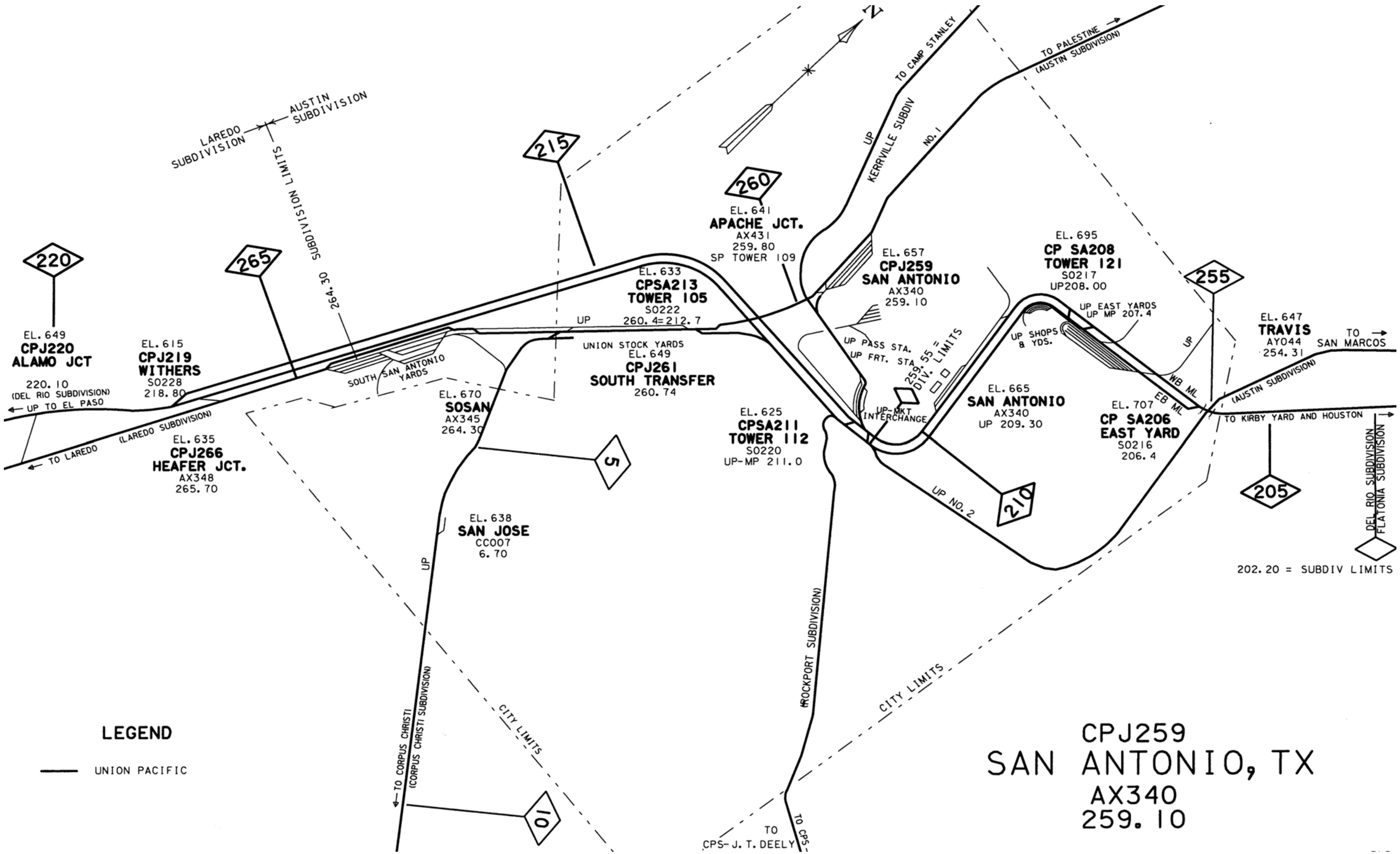


Figure 4-1: San Antonio Rail Network

Today, there are over 420 miles of mainline railroad tracks in the San Antonio region, including approximately 895 at-grade highway-rail crossings along the railroad mainlines. There are also three active rail yards in the region. Kirby Yard (located near Randolph Air Force Base) serves as a crew change point for east-west trains. Also located at Kirby Yard is an in-line fueling facility and an auto unloading facility. This auto unloading facility handles the majority of domestic automobiles destined for the San Antonio and Rio Grande River Valley regions of Texas. Figures 4-2 and 4-3 show the track charts for Kirby Yard and the auto unloading facility respectively, while Photo 4-1 shows the in-line fueling facility.

Photo 4-1: Kirby Yard in-line fueling facility

East Yard is located east of IH-35 just north of Pine Street. New Braunfels Avenue crosses over the top of East Yard about mid-yard. Although now abandoned, there was a rail spur that went from East Yard to Fort Sam Houston, crossing IH-35 in the process. The rail bridge spanning IH-35 still exists today, however its removal is planned. East Yard is used primarily as a staging area to serve UP's approximately 350 San Antonio region customer base. East Yard also serves as an intermodal facility, with approximately 15,000 lifts annually. Figure 4-4 shows the track charts for East Yard, while photos 4-2 and 4-3 show views of the yard itself.

Photo 4-2: View East, East Yard

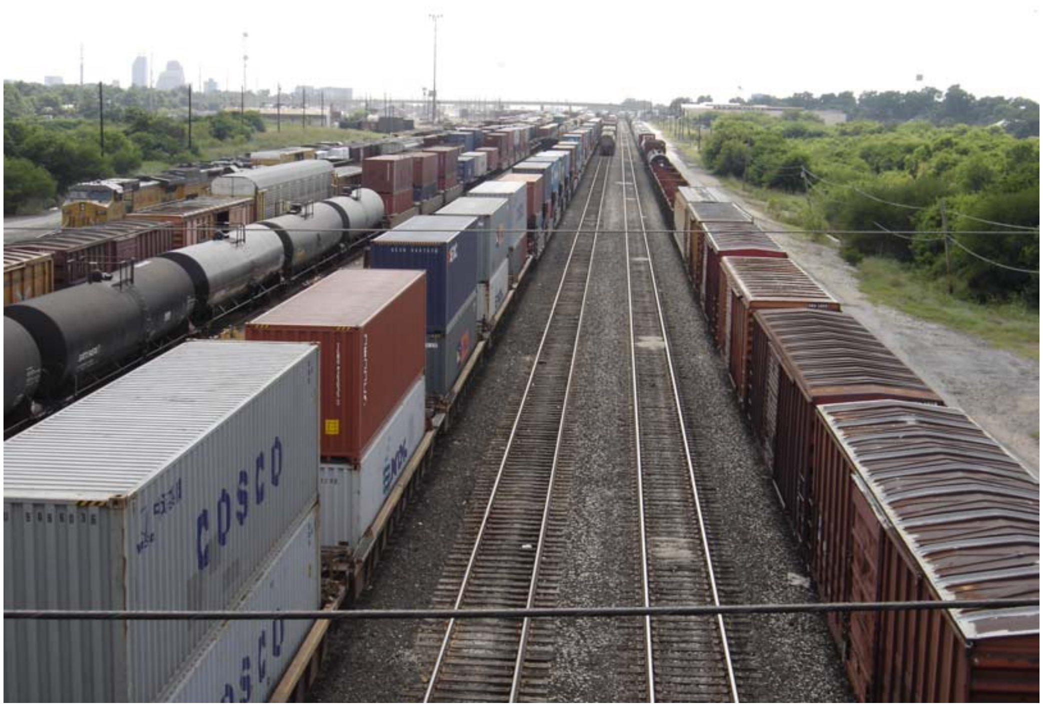


Photo 4-3: View West, East Yard

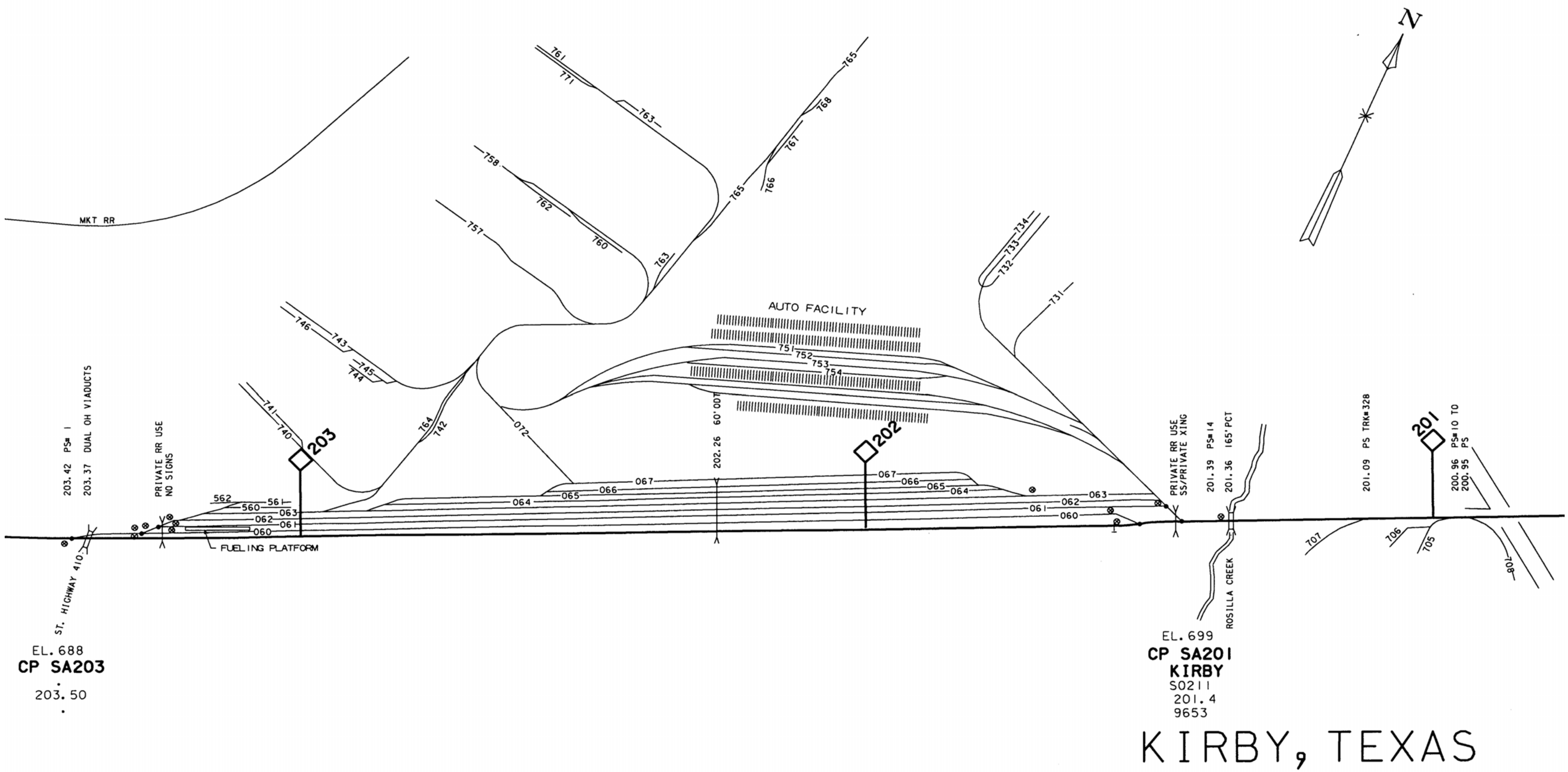


Figure 4-2: Kirby Yard

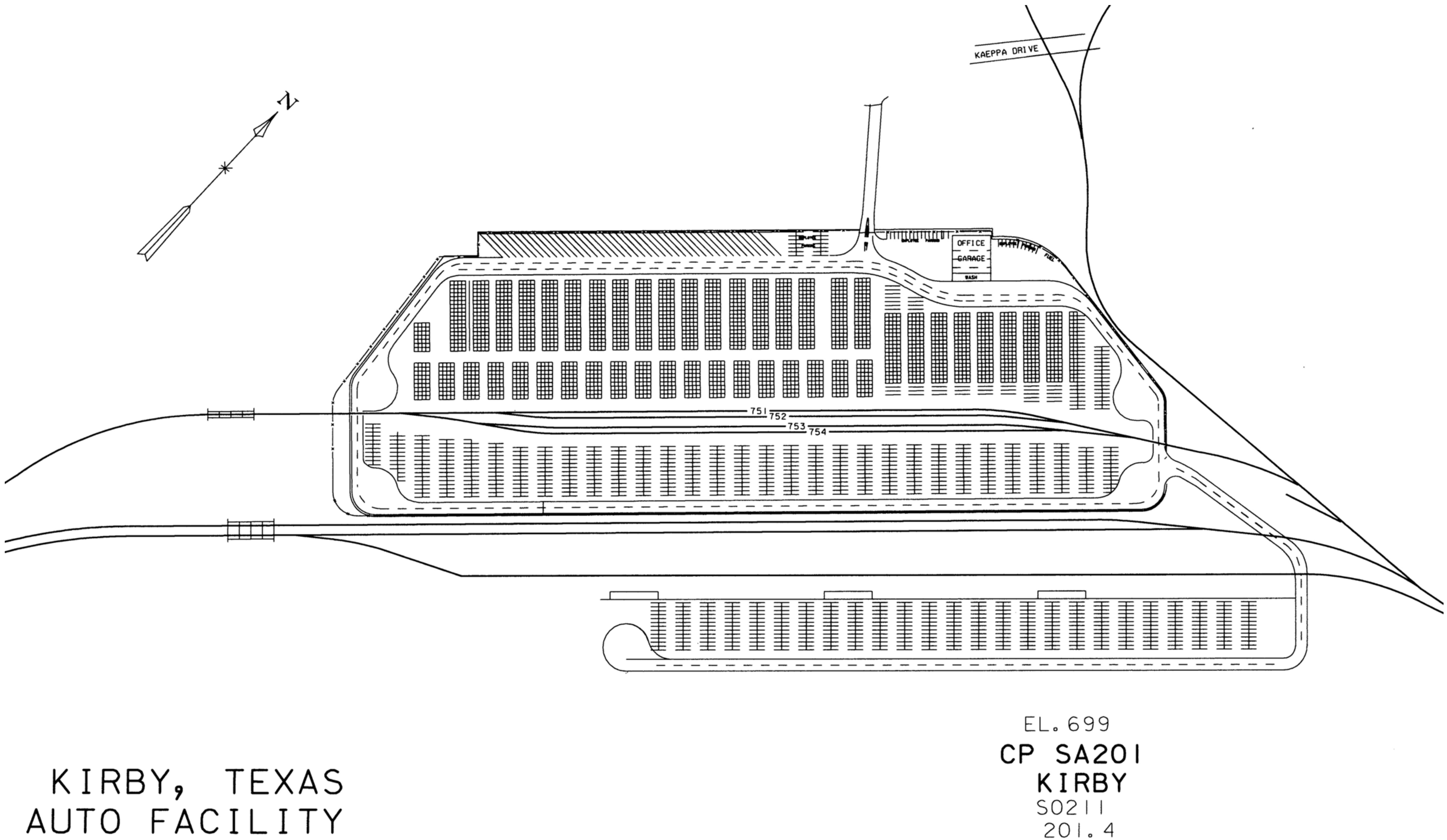


Figure 4-3: Kirby Auto Facility

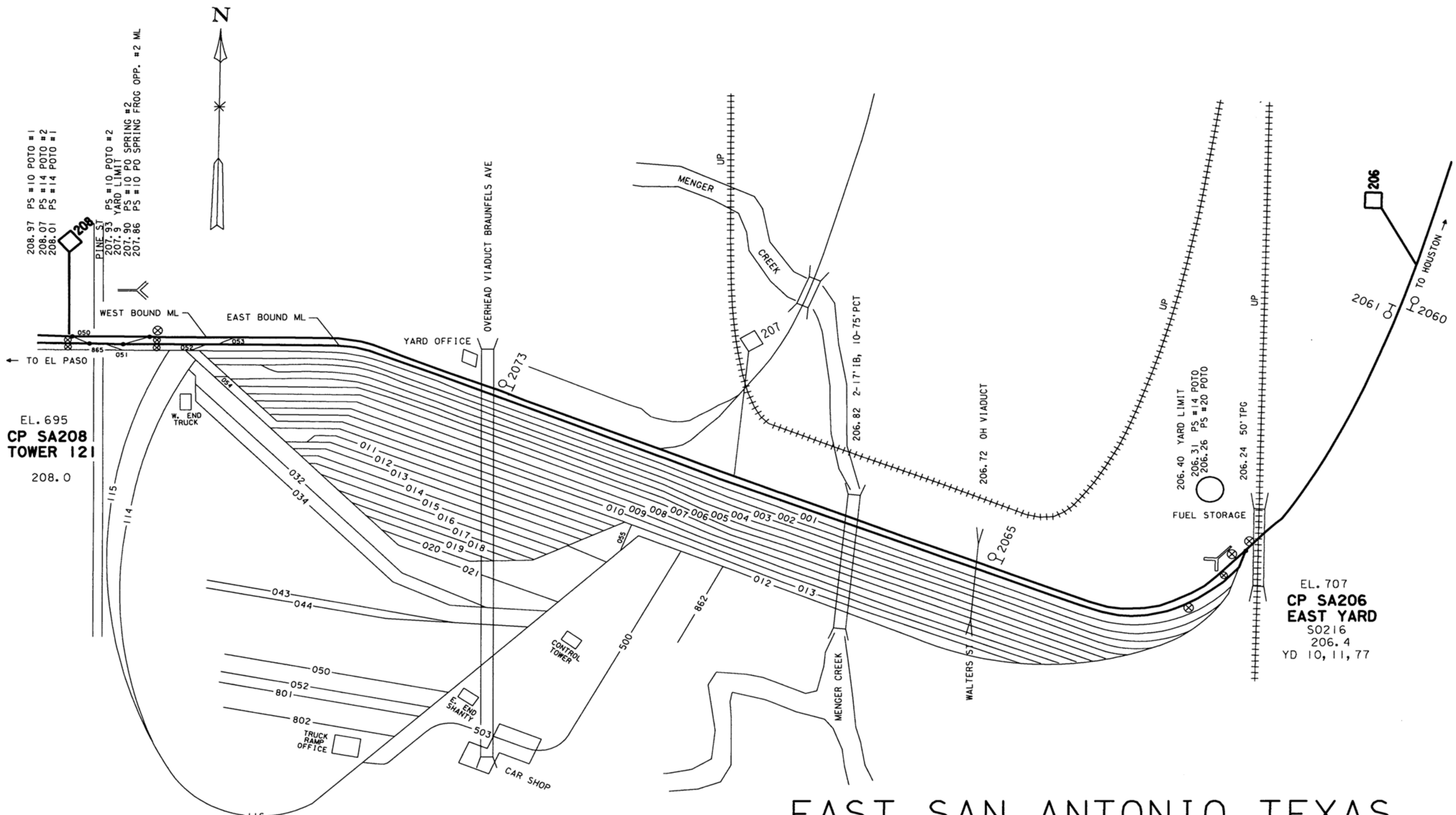


Figure 4-4: East Yard

The largest of the San Antonio rail yards is located in the southwestern region of San Antonio, near the Port Authority of San Antonio (formerly known as Kelly USA, and Kelly Air Force Base). SoSan Yard serves as the hub for all International traffic, both coming from the Ports of Los Angeles and Long Beach as well as Mexico. Nearly 70% of the trains coming into or leaving the San Antonio area are “worked” at SoSan Yard. SoSan Yard also serves as the focal point for train make-up to support the Toyota plant’s train operations. As a result, UP has recently undertaken yard expansion activities to increase capacity for Toyota as well as International traffic. Figure 4-5 shows the track chart for SoSan Yard, while Photo 4-4 is a view of the east end of SoSan Yard.

Photo 4-4: East End of SoSan Yard (view looking West)

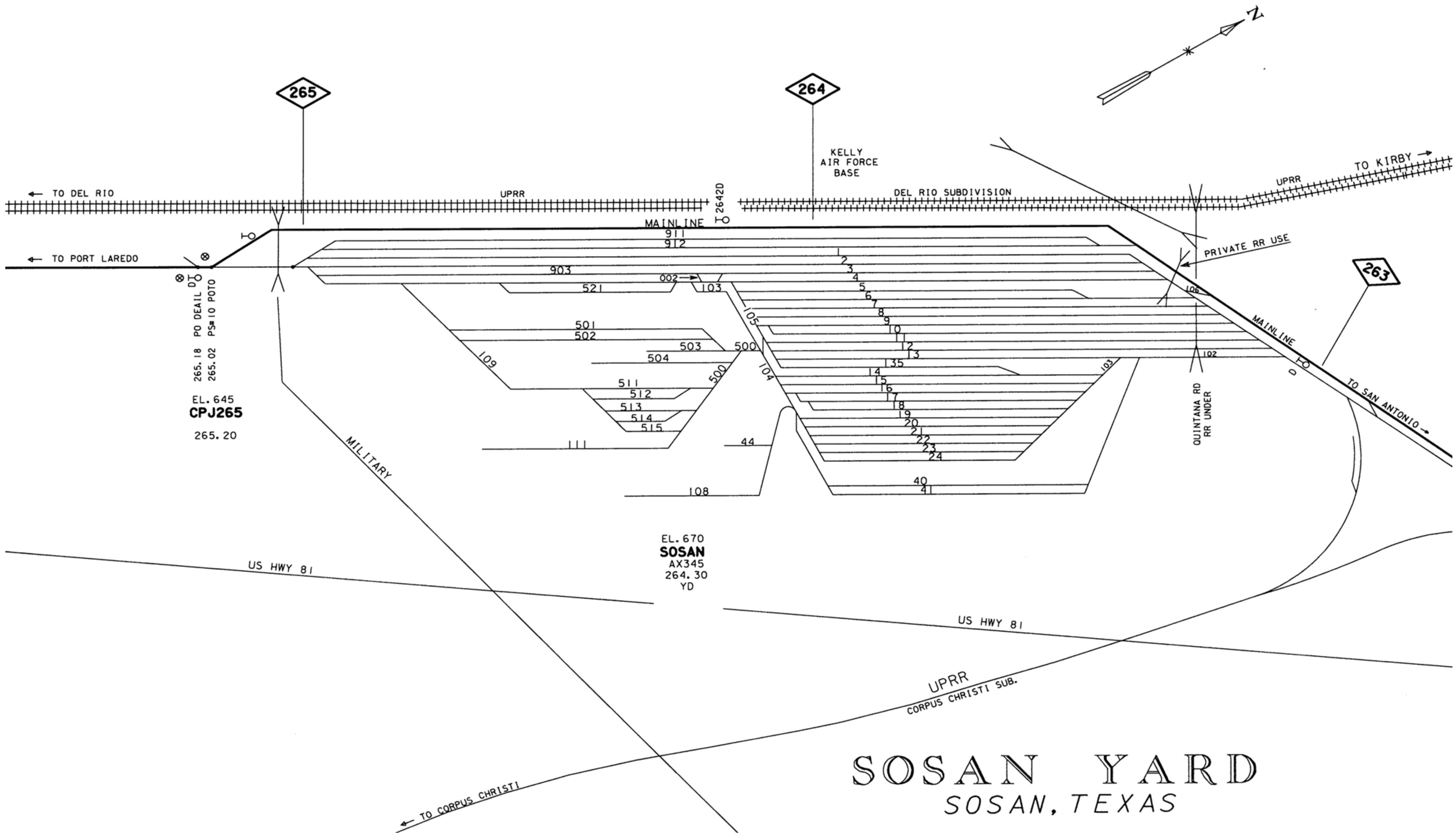


Figure 4-5: SoSan Yard

Lastly, in July 2006, UP unveiled plans to invest over $90 million in Southwest Bexar County to develop a new state-of-the-art intermodal facility. The following text was provided by UP:

> *The 300-acre rail port will serve as an economic development and job growth catalyst for the area. The new terminal will ship and receive containers and trailers with household goods and other items supporting retailers and distribution centers, as well as auto parts for the new Toyota plant in San Antonio.*
>
> *"Union Pacific is pleased to make a significant investment in Bexar County as we expect intermodal volumes to experience significant growth in the area," said John Kaiser, Vice President and General Manager of Union Pacific's Intermodal Business.*
>
> *The railroad's intermodal volume has been experiencing substantial growth in recent years, which is a reflection of the many consumer goods, electronics, toys and clothing that are being shipped from Asia via intermodal services.*
>
> *"This is a major investment in Bexar County," said Bexar County Judge Nelson Wolff. "The terminal will further solidify the County's position as an international hub for trade and commerce."*
>
> *The new terminal will support future growth by processing over 100,000 trailers and containers per year. Intermodal trains are an environmentally friendly option of transporting consumer goods compared to long haul trucks. Trains are three times more fuel efficient and produce one-third less emissions than trucks without the wear and tear on taxpayer financed roads and highways.*
>
> *Directly creating as many as 200 jobs, the new facility is expected to result in improved, more efficient freight movement and increased safety in the area. Some of the benefits will include the reduction of more than 80,000 trucks per year within the San Antonio city limits, and the reduction of truck traffic on I-10 between San Antonio and Houston. At the same time, train traffic will be more fluid as additional rail capacity is developed.*[1]

[1] UP press release dated July 20, 2006

The following text, figures, and tables depict and summarize the physical characteristics of the regions rail lines.

UP Austin Subdivision Mainline (ML) 1

The Austin Subdivision ML 1 originates in Hearne, Texas, and passes through Taylor, Georgetown, Round Rock, and Austin before it crosses the Hayes County – Comal County line just north of San Marcos at railroad milepost (MP) 216.86. From San Antonio to Austin it generally parallels Interstate 35 and also parallels the Austin Subdivision ML 2 between San Marcos and San Antonio. The main tracks cross the Comal County – Bexar County line at railroad MP 241.79. The subdivision ends at MP 260.40 with the tracks continuing southward as the Laredo Subdivision. The tracks were originally constructed in 1881 by the International & Great Northern Railroad.

Austin Subdivision ML 1 (See Table 4-1)

Total Subdivision Tracks	43.54 miles
Total track in Comal County	24.93 miles
Total track in Bexar County	18.61 miles

Austin No. 1 Subdivision				
Track Type	**Milepost Start**	**Milepost End**	**Length (Miles)**	**Yard or Siding Name**
Main	216.86	260.40	43.54	
Yard	227.06	227.27	0.21	New Braunfels
Yard	230.49	231.82	1.33	Western RR Co.
Yard	233.44	235.13	1.69	Corbyn
Yard	235.89	236.98	1.09	Ogden
Yard	259.00	260.40	1.40	Apache Jct.
Double	216.86	250.00	33.14	
Siding	220.91	223.14	2.23	Goodwin
Siding	227.90	228.61	0.71	Landas Park
Siding	239.32	241.11	1.79	Bracken
Siding	250.55	252.12	1.57	North Loop
Siding	253.38	254.26	0.88	Adams

Table 4-1: Austin ML 1 Track Type Summary Table

A universal crossover connects both the Austin ML 1 and Austin ML 2 at MP 219.0 and MP 220.7 respectively. The Austin ML 1 crosses the Austin ML 2 at MP 227.5 in the middle of New Braunfels, Texas. The main tracks serve several rock quarries in the San Marcos/New Braunfels area. At MP 236.0 and MP 237.5, a pair of crossovers again connects ML 1 and the ML 2 Subdivisions.

Single main tracks pass through New Braunfels, Garden Ridge, Schertz, Selma, Bracken, and San Antonio, Texas. At MP 251, the main tracks are directly southeast and adjacent to the San Antonio International Airport. The main tracks used to cross the Kerrville Subdivision at Apache Junction, railroad MP 259.87. There now exists a current main-to-main connection north of Apache Junction. The

UP has completed the Comal Street Bypass, a connection off of the Kerrville to the Austin Subdivision ML1 at the north end of San Fernando Yard. This capital improvement re-routed train traffic that used to travel down Comal Street and cross the mainline at-grade. Formerly, the connection was achieved via forward and reverse moves through the area, with switching onto one track or the other via operations through San Fernando Yard (Figure 4-6, Photo 4-5, and Photo 4-6). Completion of this connection allows for rock trains coming off the Kerrville Subdivision to occupy the main without having to first cross the Austin ML 1 track, make a reverse move into San Fernando Yard, then switch onto the main. The former operation restricted the number of rock cars in the train consist to 50 or fewer cars while blocking at-grade crossings near the Bexar County Jail throughout the train movement process.

The installation of this direct connection takes the rock train traffic off the rail line that runs down the middle of Comal Street, reduces at-grade crossing delays to vehicular traffic in the area, reduces the need for additional switching into and out of San Fernando Yard, and allows the railroad to increase their operating efficiency by increasing the number of rock cars that can be moved at one time.

Major bridge crossings on the Austin Subdivision ML 1 include a 496 foot long structure over the Guadalupe River, a 357 foot long structure over Cibolo Creek (Bexar County Line), a 272 foot long structure over Salado Creek, a 253 foot long structure over Olmos Creek, a 241 foot long structure over San Pedro Creek, and a 244 foot long structure over Apache Creek. A complete listing of Austin Subdivision ML 1 structures can be found in Appendix B. Figure 4-7 depicts the layout and grade crossing protection locations for the Austin Subdivision ML 1 and ML 2.

Photo 4-5: View south at north end San Fernando yard limit

Photo 4-6: View South, San Fernando Yard

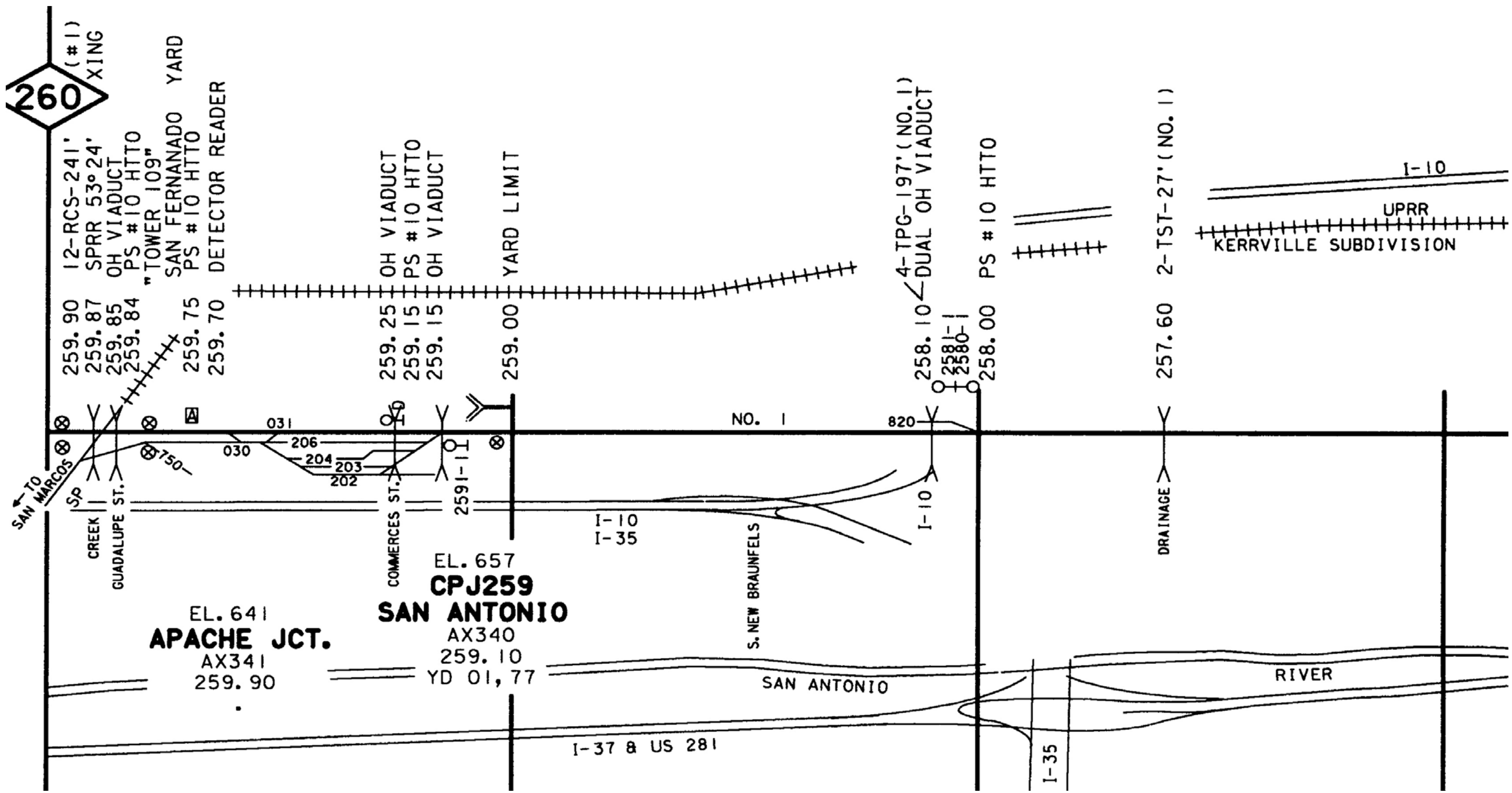


Figure 4-6: San Fernando Yard area

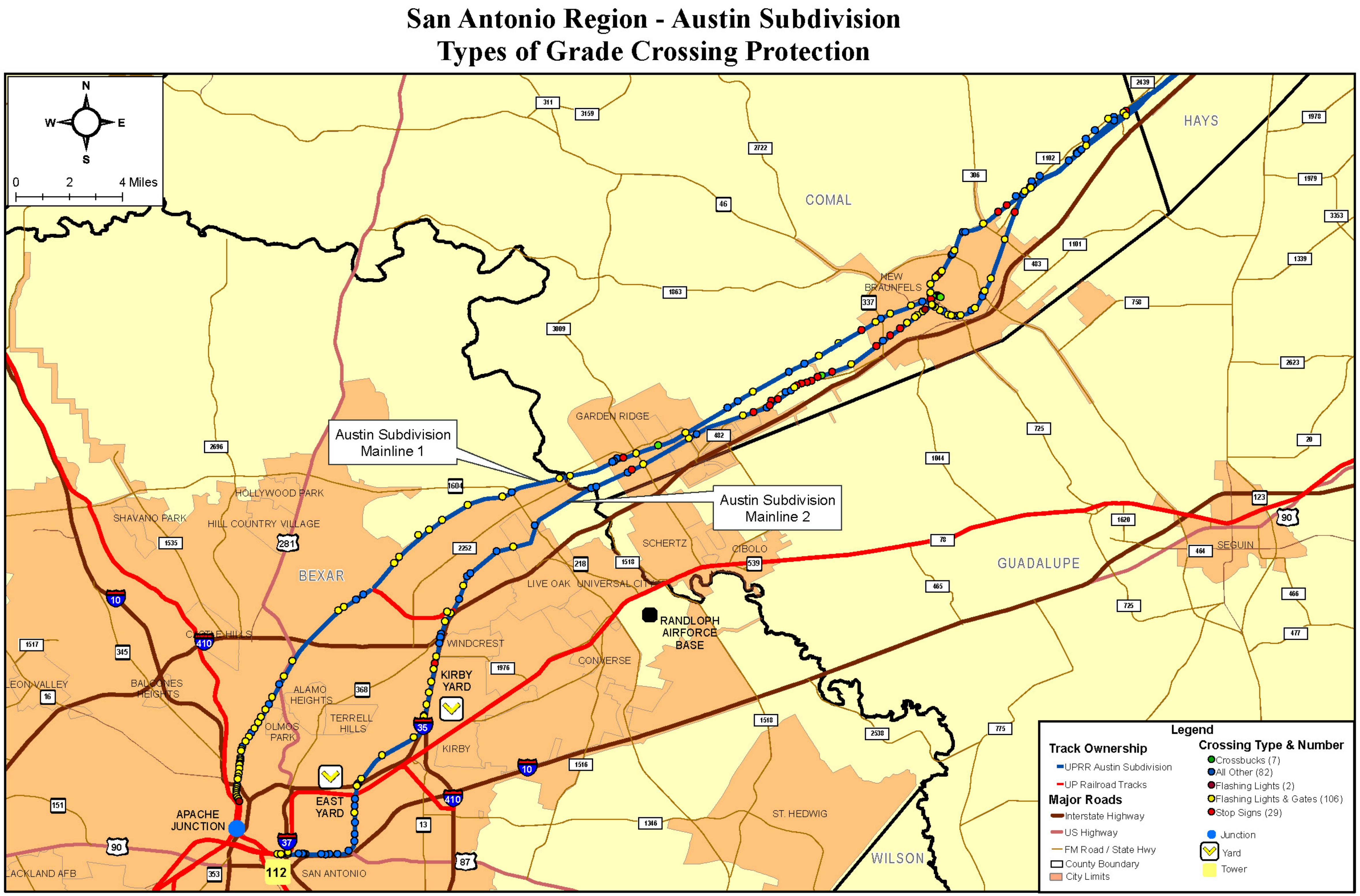


Figure 4-7: Austin Subdivision ML 1 and ML 2

UP Austin Subdivision ML 2

The Austin Subdivision ML 2 begins in San Marcos at the termination of the Lockhart Subdivision. It crosses the Hays County – Comal County line at railroad MP 216.55 and generally parallels Austin Subdivision ML 1 and IH 35 between San Antonio and Austin. The main tracks cross the Comal County – Bexar County line at railroad MP 240.12. The subdivision ends where it joins the Del Rio Subdivision at a location known as Tower 112, or railroad MP 260.40. The tracks were originally constructed by the Missouri, Kansas & Texas Railway Company of Texas in 1900.

Austin Subdivision ML 2 (See Table 4-2)
Total Subdivision Tracks 43.85 miles
Total track in Comal County 23.57 miles
Total track in Bexar County 20.28 miles

Austin No. 2 Subdivision				
Track Type	**Milepost Start**	**Milepost End**	**Length (Miles)**	**Yard or Siding Name**
Main	216.55	260.40	43.85	
Yard	217.35	217.62	0.27	Hunter
Yard	251.06	251.71	0.65	Remount Auto Facility
Yard	253.53	254.24	0.71	Travis
Yard	255.74	256.15	0.41	
Double	216.55	250.00	33.45	
Siding	218.81	220.83	2.02	Jude
Siding	226.56	226.74	0.18	New Braunfels
Siding	248.22	248.98	0.76	Fratt
Siding	250.32	250.85	0.53	Remount
Siding	259.47	259.97	0.50	Tower

Table 4-2: Austin ML 2 Track Type Summary Table

A universal crossover connects both the Austin ML 2 and Austin ML 1 at railroad MPs 219.03 and 220.62. The Austin ML 2 crosses Austin ML 1 at MP 226.89 in New Braunfels, Texas. The main tracks serve rock quarries between San Marcos and New Braunfels. At MPs 235.90 and 237.08, a pair of crossovers again connects ML 2 and ML 1. Single main tracks pass through New Braunfels, Garden Ridge, Schertz, Selma, Bracken, and San Antonio, Texas.

Major bridge crossings include a 241 foot structure over York Creek, a 600 foot structure over the Guadalupe River, a 205 foot structure over the Comal River, a 265 foot structure over Cibolo Creek, and a 242 foot structure over Salado Creek. A complete listing of Austin Subdivision ML 2 structures can be found in Appendix B. Figure 4-7 depicts the layout and grade crossing protection locations for the Austin Subdivision ML 1 and ML 2.

UP Kerrville Subdivision

The Kerrville Subdivision begins at Tower 112. MP 0.00 of the Kerrville Subdivision corresponds to approximately MP 211.10 of the Del Rio Subdivision. The Kerrville Subdivision ends at railroad MP 15.00, which corresponds to the beginning of the Camp Stanley Industrial Lead. It is located entirely in Bexar County. The tracks were originally constructed by the San Antonio and Aransas Railway Company in 1890.

Kerrville Subdivision (See Table 4-3)
Total Subdivision Tracks 15.00 miles
Total track in Bexar County 15.00 miles

Kerrville Subdivision				
Track Type	**Milepost Start**	**Milepost End**	**Length (Miles)**	**Yard or Siding Name**
Main	0.00	15.00	15.00	
Yard	0.00	1.60	1.60	Yoakum Bend
Yard	12.89	13.33	0.44	

Table 4-3: Kerrville Subdivision Track Type Summary Table

The single main track becomes the Kerrville Subdivision as it passes through Tower 112 and ends at Loop 1604 (MP 15.00), where it continues as the Camp Stanley Industrial Lead Subdivision. As shown in Photo 4-7, the single main tracks had crossed the Austin Subdivision at Apache Junction, Kerrville Subdivision MP 1.61. This crossing had been removed in August, 2006, during which time UP officially began re-routing traffic across a newly constructed connection between the Kerrville Subdivision and the Austin Subdivision ML 1 track located just north of Morales Street. This connection removes tracks that previously traversed down the middle of Comal Street near the Bexar County jail.

Previously, the connection was achieved via forward and reverse moves through the area, with switching onto one track or the other via operations through San Fernando Yard.

The single main track passes through San Antonio, Texas. Major bridge crossings include a 104 foot structure over San Pedro Creek and a 116 foot structure over Olmos Creek. A complete listing of the Kerrville Subdivision structures can be found in Appendix B. Figure 4-8 depicts the layout and grade crossing protection locations for the Kerrville Subdivision.

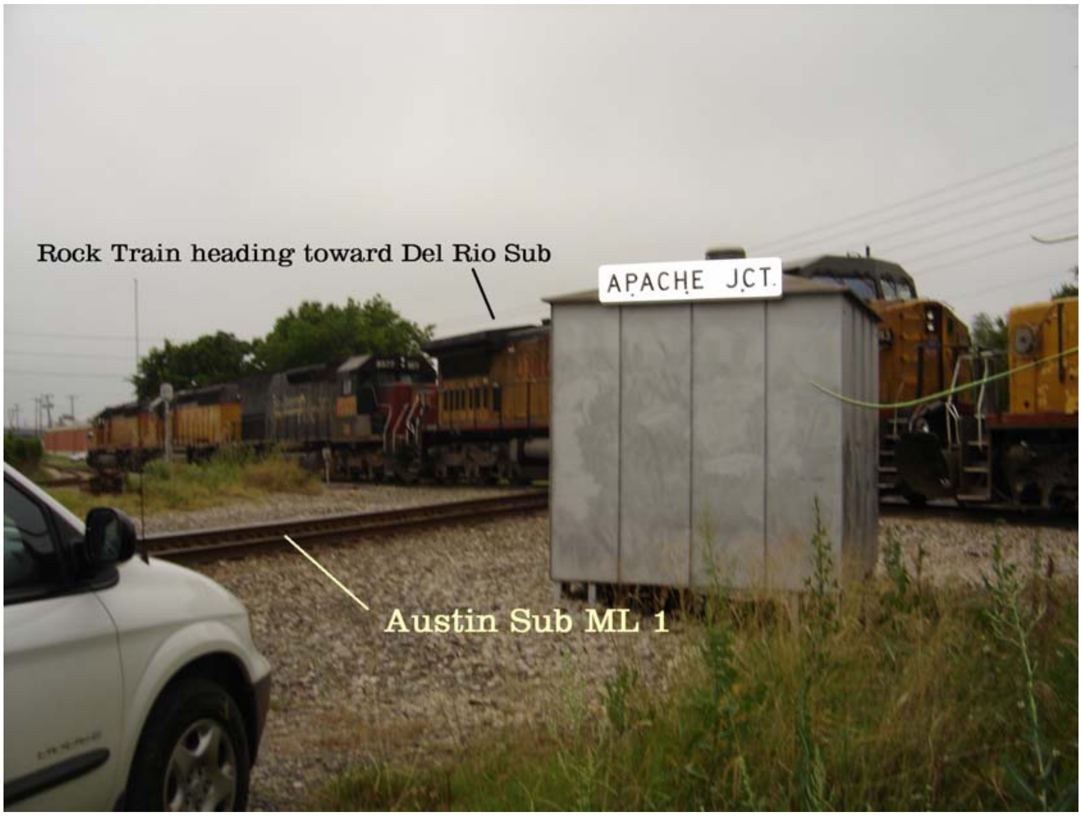


Photo 4-7: Apache Junction

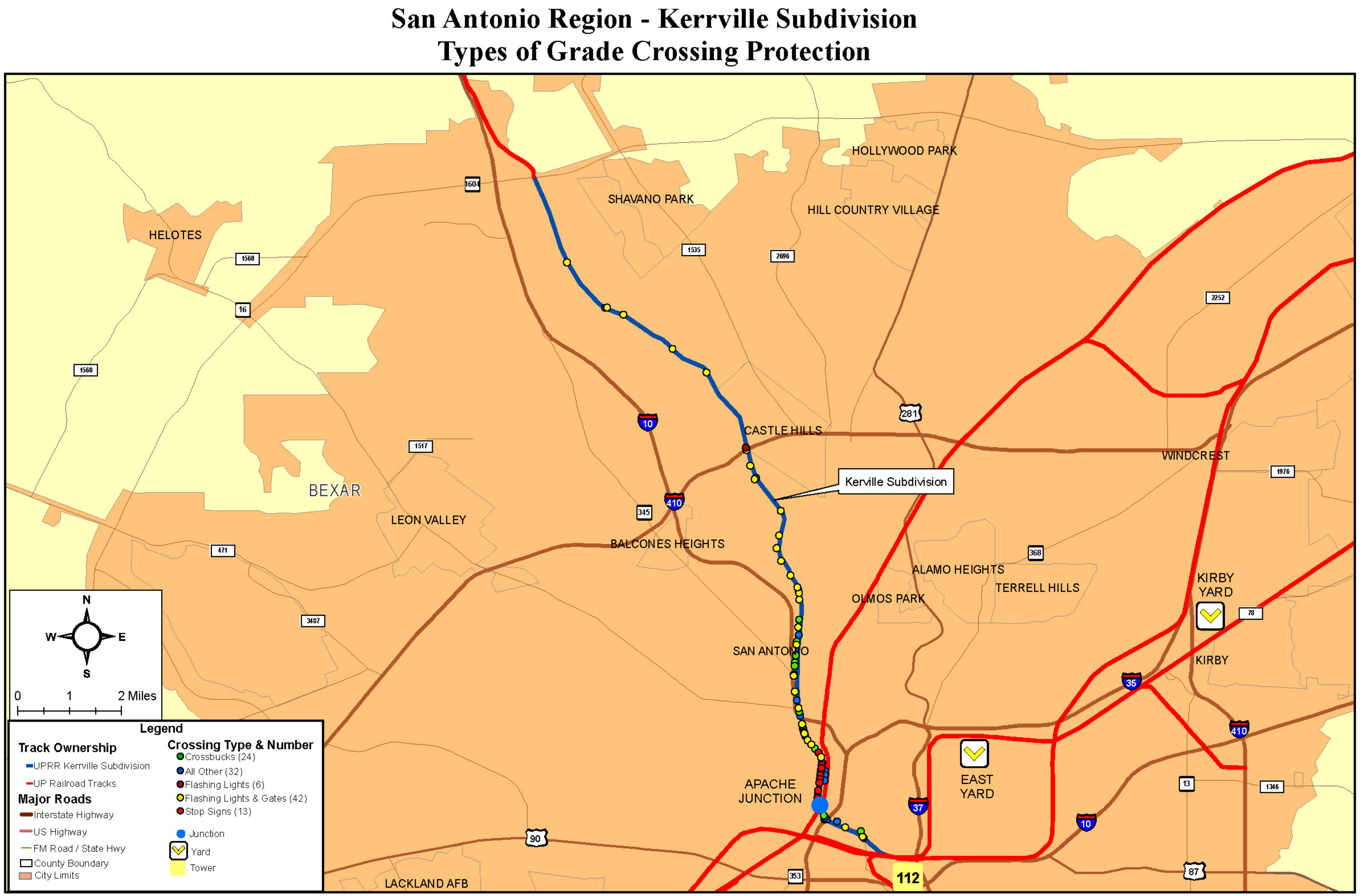


Figure 4-8: Kerrville Subdivision

UP Camp Stanley Industrial Lead

The Camp Stanley Industrial Lead Subdivision is located in Bexar County and begins at railroad MP 15.00 (Loop 1604), ending at railroad MP 22.54; however between MP 20.05 and 22.54 the tracks are washed out, so the effective “end of track” is located at railroad MP 19.05. The tracks were originally constructed in 1890 by the San Antonio and Aransas Pass Railway Company, and currently the Alamo Gulf Coast Railroad has a lease agreement with UP for this track.

Camp Stanley Industrial Lead (See Table 4-4)
Total Subdivision Tracks 7.54 miles
Total track in Bexar County 7.54 miles

Camp Stanley Industrial Lead				
Track Type	**Milepost Start**	**Milepost End**	**Length (Miles)**	**Yard or Siding Name**
Main	15.00	19.05	4.15	
Yard	17.15	17.90	0.75	

Table 3-4: Camp Stanley Industrial Lead Track Type Summary Table

Loop 1604 (at railroad MP 15.00) is the dividing line between the Camp Stanley Industrial Lead and the Kerrville Subdivision. The single main track of the Camp Stanley Industrial Lead runs north of Loop 1604 and generally parallels US 87. The track passes through Mission North Burial Park and terminates just southwest of the Camp Stanley Military Reservation.

There is one major bridge crossing which is a 180 foot structure spanning Leona Creek. A complete listing of the Camp Stanley Industrial Lead structures can be found in Appendix B.

Figure 4-9 depicts the layout and grade crossing protection locations for the Camp Stanley Industrial Lead.

The Alamo Gulf Coast and the UP submitted abandonment proceedings with the Surface Transportation Board in January, 2007, which would effectively abandon the track from Beckman, approximately MP 15.00, to the end of the track at MP 19.05.

San Antonio Region - Camp Stanley Industrial Lead
Types of Grade Crossing Protection

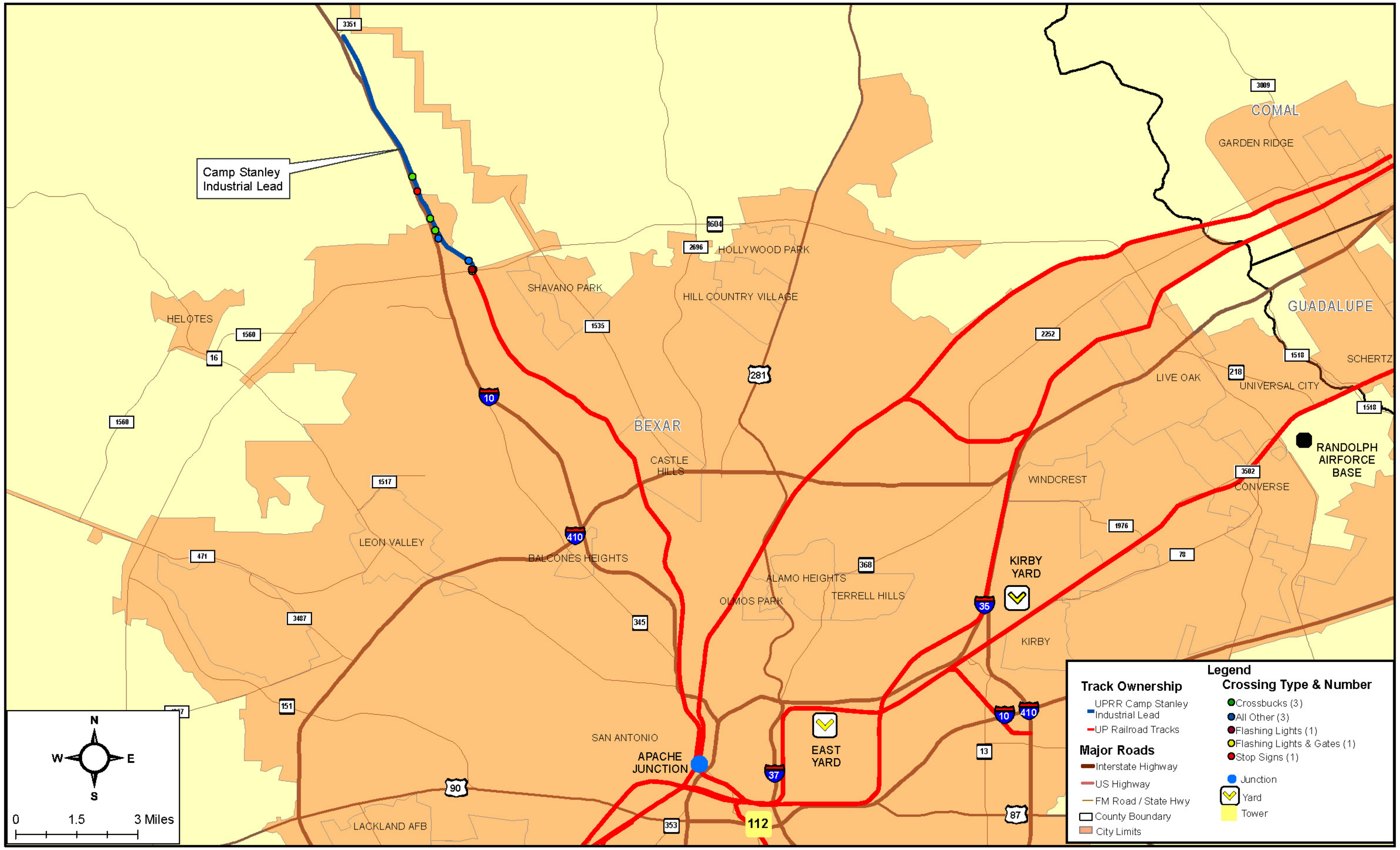


Figure 4-9: Camp Stanley Industrial Lead

UP Corpus Christi Subdivision

The beginning of the Corpus Christi Subdivision is in South San Antonio (SoSan) Yard at railroad MP 3.10. It crosses the Bexar County – Atascosa County line at railroad MP 21.55 and the Atascosa County – Live Oak County line at railroad MP 62.03, eventually terminating in Corpus Christi. The tracks were originally constructed by the San Antonio, Uvalde & Gulf Railroad in 1914.

Corpus Christi Subdivision (See Table 4-5)
Total Subdivision Tracks 58.89 miles
Total track in Bexar County 18.41 miles
Total track in Atascosa County 40.48 miles

Corpus Christi Subdivision				
Track Type	**Milepost Start**	**Milepost End**	**Length (Miles)**	**Yard or Siding Name**
Main	3.10	62.03	58.93	
Yard	3.10	4.70	1.60	Sosan
Yard	52.87	53.61	0.74	San Miguel
Siding	19.95	20.66	0.71	Lehr
Siding	31.76	33.54	1.78	Pleasanton
Siding	33.75	34.02	0.27	
Siding	55.16	56.83	1.67	Campbellton

Table 4-5: Corpus Christi Subdivision Track Type Summary Table

The single main track starts just east of the former Kelly Air Force Base in SoSan Yard. It is generally parallel to US 281 and IH 37. The single main track passes through San Antonio and Pleasanton, Texas.

Major bridge crossings include a 392 foot structure over the Medina River, a 104 foot structure over Palo Blanco Creek, a 108 foot structure over Glavan Creek, a 476 foot structure over the Atascosa River, a 165 foot structure over Live Oak Creek, a 706 foot structure over the Atascosa River, and a 140 foot structure over Lipan Creek. A complete listing of the Corpus Christi Subdivision structures can be found in Appendix B.

Figure 4-10 depicts the layout and grade crossing protection locations for the Corpus Christi Subdivision.

San Antonio Region - Corpus Christi Subdivision
Types of Grade Crossing Protection

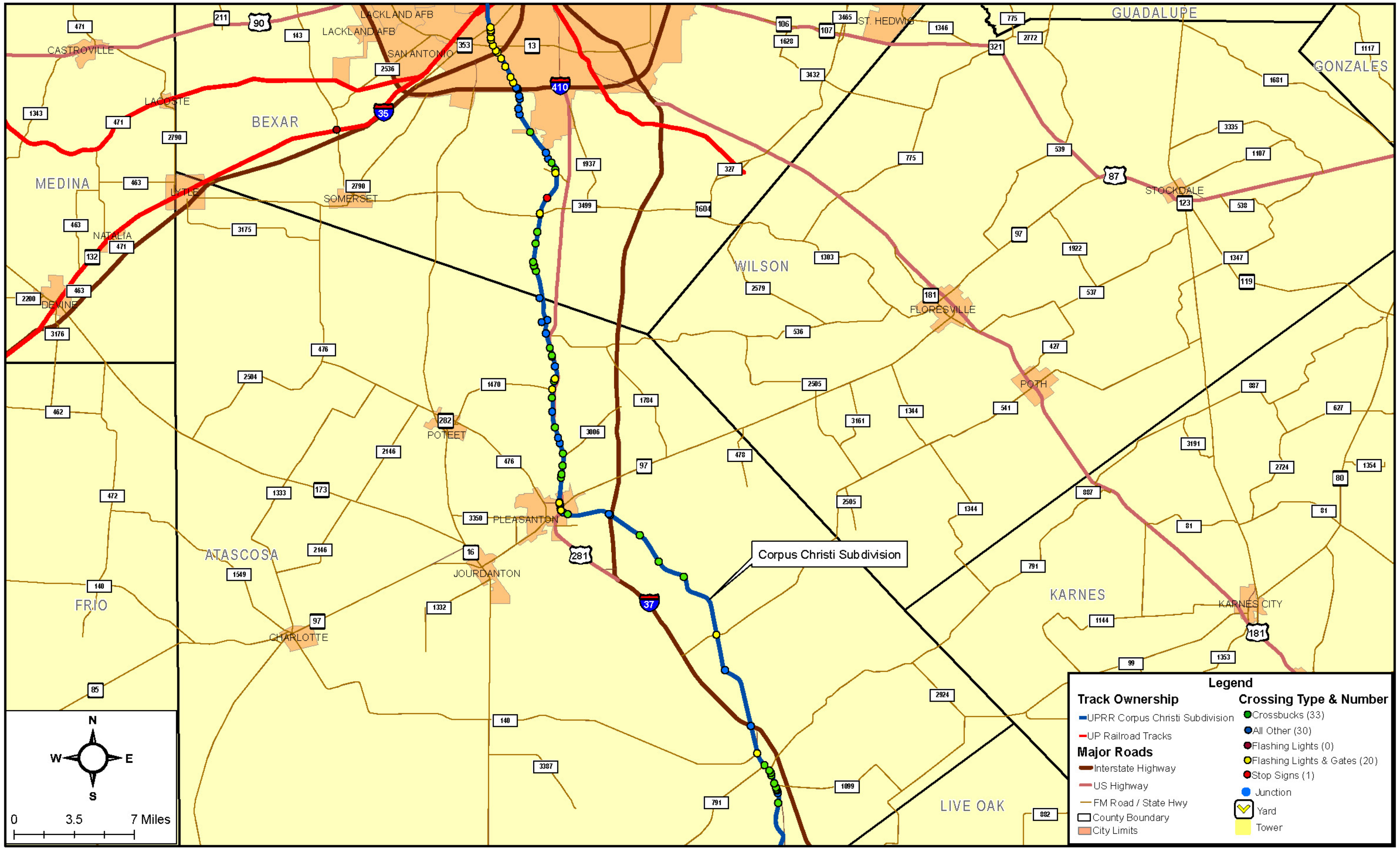


Figure 4-10: Corpus Christi Subdivision

UP Del Rio Subdivision

The Del Rio Subdivision is one leg of UP's Trans-Continental route which runs from Los Angeles, California to Houston, Texas. The beginning of the Del Rio Subdivision is in Bexar County at the east end of Kirby Yard, railroad MP 201.40, which also corresponds to the terminus of the Glidden Subdivision. It crosses the Bexar County – Medina County line at railroad MP 233.34, the Medina County – Uvalde County line at MP 276.03, and the Uvalde County – Kinney County line at MP 321.17, eventually terminating as the Del Rio Subdivision in Del Rio, Texas; where it becomes the Sanderson Subdivision. The tracks were originally constructed by the Galveston, Harrisburg & San Antonio Railway.

Del Rio Subdivision (See Table 4-6)

Total Subdivision Tracks	119.77 miles
Total track in Bexar County	31.94 miles
Total track in Medina County	42.69 miles
Total track in Uvalde County	45.14 miles

Del Rio Subdivision				
Track Type	**Milepost Start**	**Milepost End**	**Length (Miles)**	**Yard or Siding Name**
Main	201.40	321.17	119.77	
Yard	201.40	203.40	2.00	Un-named (Kirby)
Yard	204.47			HTTO Salado
Yard	206.40	207.90	1.50	East Yard
Yard	212.54	220.82	8.28	San Antonio
Double	206.26	218.84	12.58	No. 2
Siding	223.60	225.32	1.72	Macdona
Siding	234.19	235.88	1.69	Lacoste
Siding	247.39	249.10	1.71	Dunlay
Siding	259.56	261.36	1.80	Hondo
Siding	269.87	271.58	1.71	Seco
Siding	277.69	279.42	1.73	Sabinal
Siding	288.92	290.64	1.72	Knippa
Siding	300.71	300.96	0.25	
Siding	301.42	303.12	1.70	Uvalde
Siding	303.19	303.36	0.17	
Siding	314.10	315.99	1.89	Obi
Siding	319.42	319.82	0.40	Cline

Table 4-6: Del Rio Subdivision Track Type Summary Table

The single main track begins at the east end of Kirby Yard where the Glidden Subdivision ends. A second main track begins at railroad MP 206.64 and ends at railroad MP 218.84. A universal crossover connects track No. 1 to track No. 2 at MPs 207.93, 208.07, 211.02, and 211.19. There is a connection track at approximately MP 211.14 that connects the Camp Stanley Lead Subdivision to the Del Rio Subdivision. At MP 211.02, there is a connection track that connects the Del Rio Subdivision to the Austin Subdivision ML 2 track. The Austin Subdivision ML 1 track crosses the Del Rio Subdivision at MP 212.67. At MP 218.74, there is a connection track that connects the ML 2 track to the Laredo Subdivision just prior to the end of the 2nd mainline at MP 218.84. At MP 220.14, the single main track connects to the Laredo Subdivision.

The Del Rio Subdivision passes through Converse, Kirby, San Antonio, Lacoste, Hondo, Sabinal, and Uvalde, Texas. As it leaves San Antonio, the Del Rio Subdivision runs between the former Kelly Air Force Base and Lackland Air Force Base.

Major bridge crossings include:

- 278 foot structure over Alazon Creek,
- 254 foot structure over Leon Creek,
- 630 foot structure over the Medina River,
- 285 foot structure over Pole Cat Creek,
- 189 foot structure over Chicon Creek,
- 140 foot structure over Francisco Creek,
- 424 foot structure over the Hondo River,
- 136 foot structure over Parker Creek,
- 507 foot structure over the Seco River,
- 180 foot structure over Live Oak Creek
- 269 foot structure over the Blanco River,
- 150 foot structure over Dinner Creek,
- 730 foot structure over the East Frio River,
- 598 foot structure over the West Frio River,
- 463 foot structure over the Leona River,
- 1533 foot structure over the Nueces River,
- 510 foot structure (Koenig Bridge) over the Nueces River, and a
- 126 foot and a 188 foot structure over Turkey Creek.

A complete listing of the Del Rio Subdivision structures can be found in Appendix B.

Figure 4-11 depicts the layout and grade crossing protection locations for the Del Rio Subdivision.

San Antonio Region - Del Rio Subdivision
Types of Grade Crossing Protection

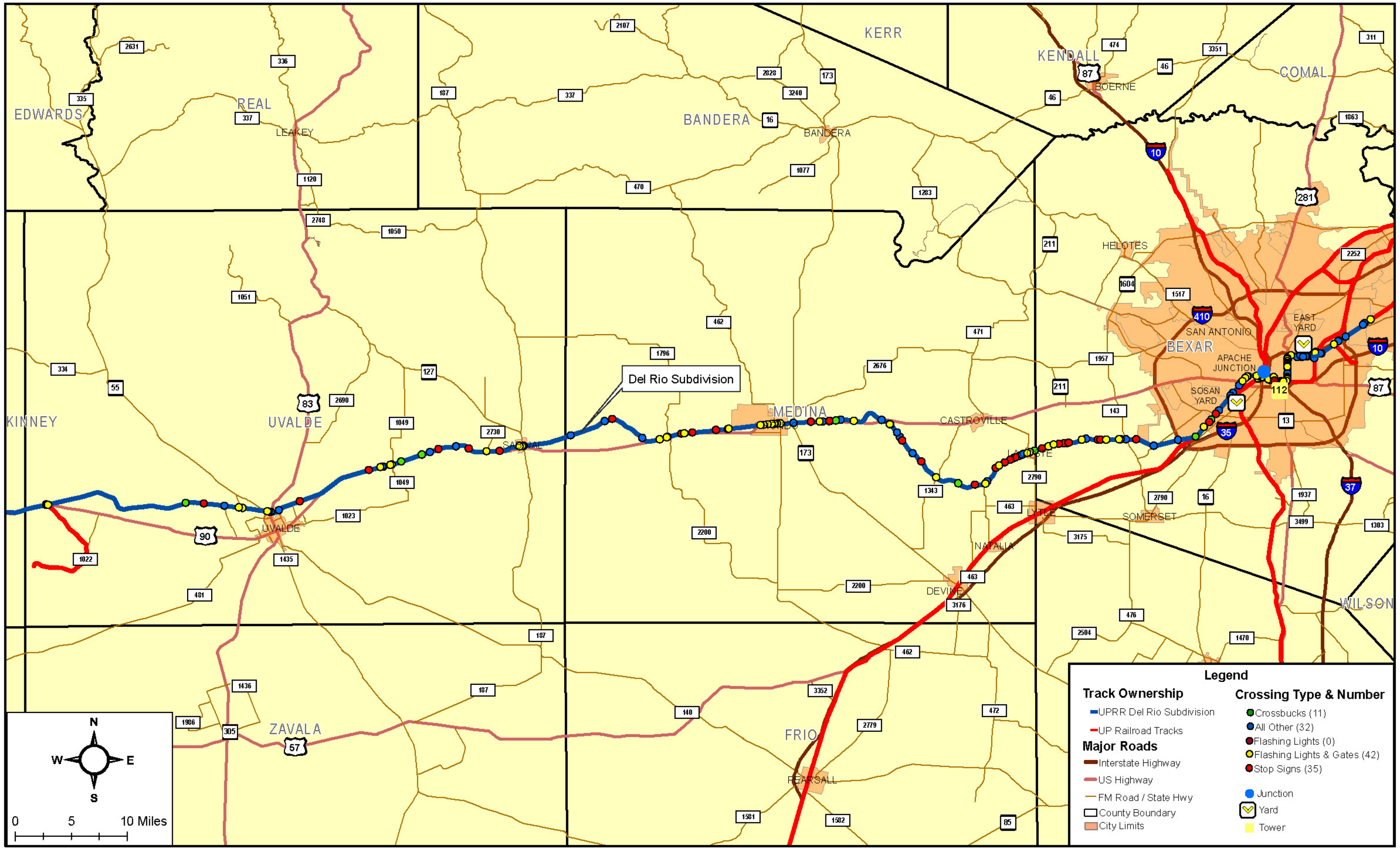


Figure 4-11: Del Rio Subdivision

UP Glidden Subdivision

The Glidden Subdivision is one leg of UP's Trans-Continental route which runs from Los Angeles, California to Houston, Texas. Beginning at Harrisburg Junction in Houston, the Glidden Subdivision enters into the study area at the Caldwell County – Guadalupe County line at railroad MP 156.54. It crosses the Guadalupe County – Bexar County line at railroad MP 193.12, and ends at the east end of Kirby Yard at MP 201.40 where it becomes the Del Rio Subdivision. The tracks were originally constructed by the Galveston, Harrisburg, & San Antonio Railway in 1877.

Glidden Subdivision (See Table 4-7)
Total Subdivision Tracks 44.86 miles
Total track in Guadalupe County 36.58 miles
Total track in Bexar County 8.28 miles

Glidden Subdivision				
Track Type	**Milepost Start**	**Milepost End**	**Length (Miles)**	**Yard or Siding Name**
Main	156.54	201.40	44.86	
Siding	162.96	164.68	1.72	Kingsbury
Siding	173.92	174.32	0.40	Seguin
Siding	175.58	177.34	1.76	Nolte
Siding	187.11	189.14	2.03	Cibolo
Siding	194.33	196.06	1.73	Randolph
Siding	196.40	196.94	0.54	Converse

Table 4-7: Del Rio Subdivision Track Type Summary Table

Within the study area, the Glidden Subdivision single main track begins approximately half way between Luling and Seguin, and ends at the east end of Kirby Yard (near Randolph Air Force Base) where it continues as the Del Rio Subdivision. The single main track generally runs parallel to US 90 between Luling and Seguin. Between Seguin and Schertz, the single main tracks are generally parallel with Texas Highway 78.

Major bridge crossings include:

- 892 foot structure over the San Marcos River,
- 268 foot structure over E. Mill Creek,
- 194 foot structure over W. Mills Creek,
- 217 foot structure over Geronimo Creek,
- 1100 foot structure over the Guadalupe River,
- 100 foot and a 135 foot structure over Young's Creek,
- 240 foot structure over E. Santa Clara Creek,
- 135 foot and a 240 foot structure over Santa Clara Creek,
- 210 foot structure over Town Creek, and a
- 434 foot structure over Cibolo Creek.

A complete listing of the Glidden Subdivision structures can be found in Appendix B. Figure 4-12 depicts the layout and grade crossing protection locations for the Glidden Subdivision.

San Antonio Region - Glidden Subdivision
Types of Grade Crossing Protection

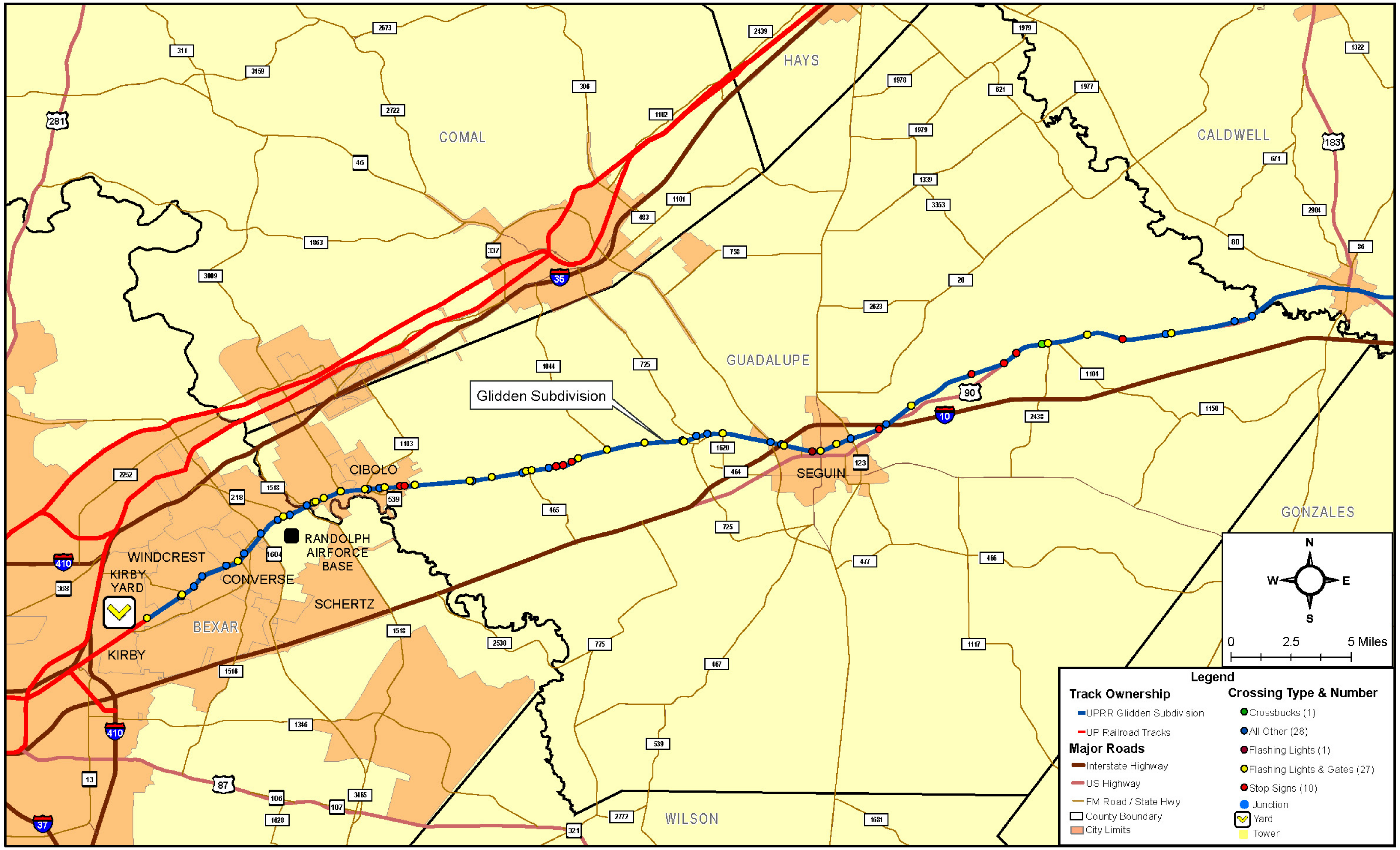


Figure 4-12: Glidden Subdivision

UP Laredo Subdivision

The Laredo Subdivision begins at railroad MP 260.40, which is the terminus of the Austin Subdivision ML 2. It crosses the Bexar County – Atascosa County line at MP 281.30, the Atascosa County – Medina County line at MP 282.69, the Medina County – Frio County line at MP 296.46, and the Frio County – La Salle County line at MP 331.08, terminating at the US/Mexico border in Laredo, Texas. The tracks were originally constructed by the International & Great Northern Railroad in 1882.

Laredo Subdivision (See Table 4-8)

Total Subdivision Tracks	70.68 miles
Total track in Bexar County	20.90 miles
Total track in Atascosa County	1.39 miles
Total track in Medina County	13.77 miles
Total track in Frio County	34.62 miles

Laredo Subdivision				
Track Type	**Milepost Start**	**Milepost End**	**Length (Miles)**	**Yard or Siding Name**
Main	260.40	331.08	70.68	
Yard	260.40	265.70	5.30	Sosan
Yard	312.48	313.10	0.62	Pearsall
Siding	277.80	279.31	1.51	Atascosa
Siding	295.08	296.89	1.81	Yarbrough
Siding	317.14	318.60	1.46	Melon
Siding	320.97	321.54	0.57	Derby

Table 4-8: Laredo Subdivision Track Type Summary Table

A connection track connects the Laredo Subdivision to the Del Rio Subdivision at MP 265.78, Heafer Junction, and again at MP 267.72. The Del Rio Subdivision crosses the Laredo Subdivision at MP 260.50. MP 262.06 marks the beginning of the main tracks of the Corpus Christi Subdivision.

The single main tracks begin in San Antonio at Tower 105, at the terminus of the Austin Subdivision (Photo 4-8). It runs south of the former Kelly Air Force Base and passes through Lytle, Natalia, Devine, Pearsall, and Dilley, Texas en route to Laredo.

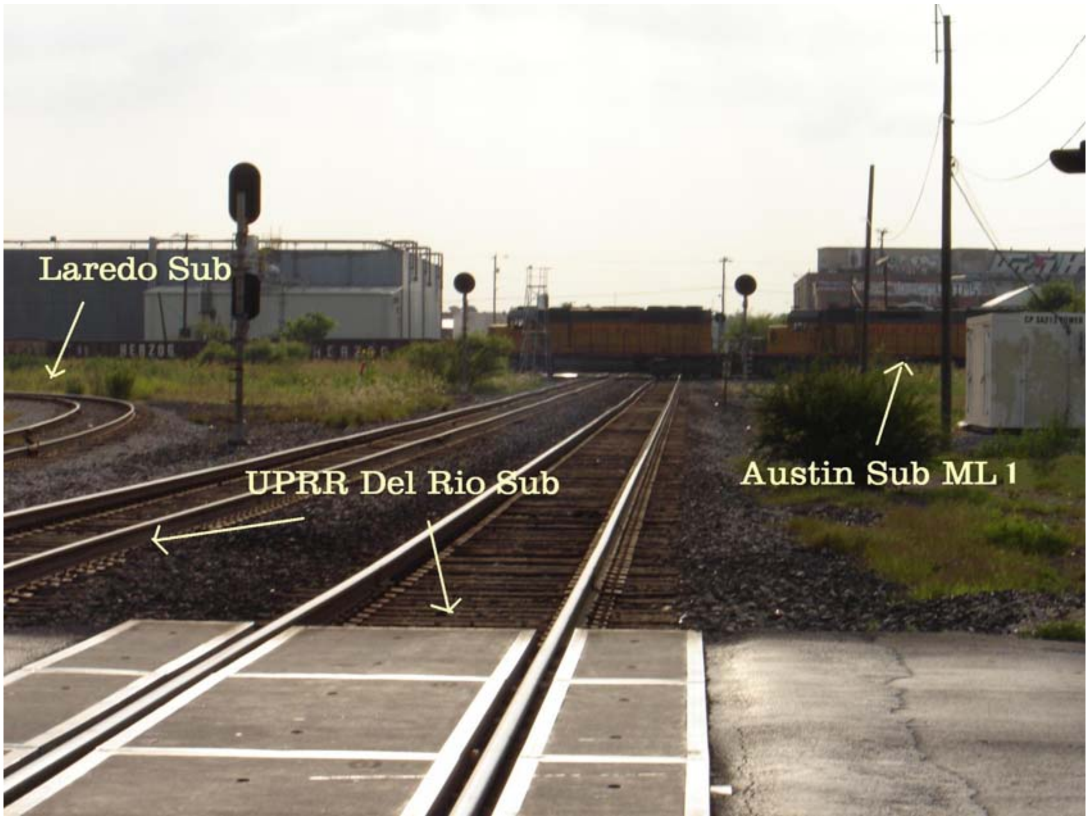


Photo 4-8: Tower 105. View West, Del Rio/Austin ML 1/Laredo Sub crossing

Major bridge crossings include:

- 308 foot structure over Leon Creek,
- 190 foot structure over Medio Creek,
- 400 foot structure over the Medina River,
- 157 foot structure over Elm Creek,
- 117 foot structure over North Prong Creek,
- 144 foot structure over the West Prong Atascosa River,
- 200 foot structure over Ft. Ewell Creek,
- 323 foot structure over Chacon Creek,
- 219 foot structure over Burnt Boot Creek,
- 233 foot structure over San Francisco Perez Creek,
- 109 foot structure over Moore Hallow Creek,
- 2077 foot structure over the Frio River, and a
- 112 foot structure over Martin Branch Creek.

A complete listing of the Laredo Subdivision structures can be found in Appendix B. Figure 4-13 depicts the layout and grade crossing protection locations for the Laredo Subdivision.

San Antonio Region - Laredo Subdivision
Types of Grade Crossing Protection

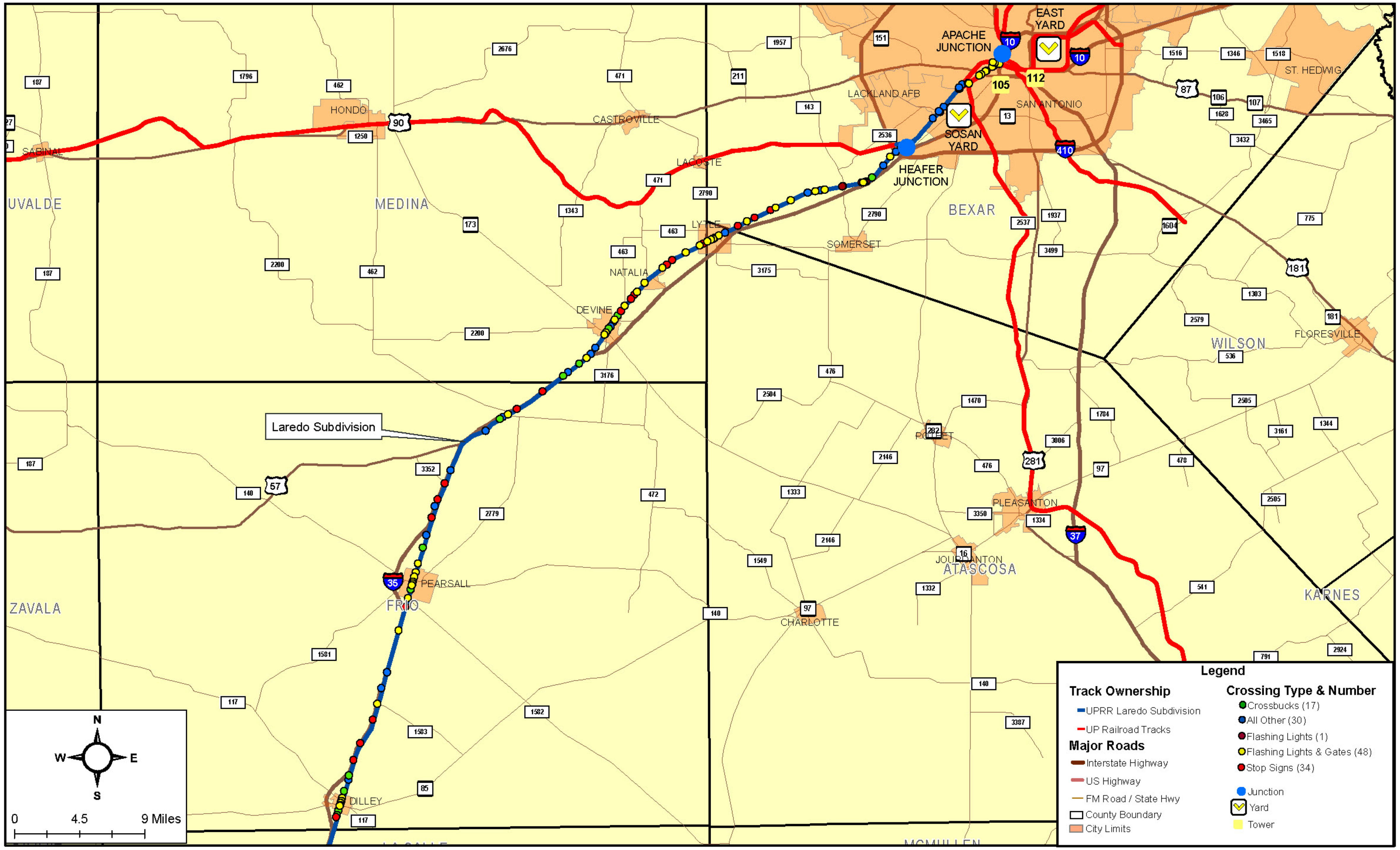


Figure 4-13 : Laredo Subdivision

UP Rockport Subdivision

The Rockport Subdivision begins at MP 0.19 and ends at MP 11.00. It is located in Bexar County, between San Antonio and Elmendorf. The tracks were originally constructed by the San Antonio & Aransas Pass Railway in 1885.

Rockport Subdivision (See Table 4-9)
Total Subdivision Tracks 11.19 miles
Total track in Bexar County 11.19 miles

Rockport Subdivision				
Track Type	**Milepost Start**	**Milepost End**	**Length (Miles)**	**Yard or Siding Name**
Main	0.00	11.00	11.00	

Table 4-9: Rockport Subdivision Track Type Summary Table

The single main tracks become the Rockport Subdivision as it passes through Tower 112—where the Kerrville Subdivision ends—and it ends as it approaches Coal Plant Junction, where it continues as the Rockport Industrial Lead.

The single main tracks pass through San Antonio, Texas. Major bridge crossings include a 193 foot structure over the San Antonio River and a 202 foot structure over Salado Creek. A complete listing of the Rockport Subdivision structures can be found in Appendix B. Figure 4-14 depicts the layout and grade crossing protection locations for the Rockport Subdivision.

San Antonio Region - Rockport Subdivision
Types of Grade Crossing Protection

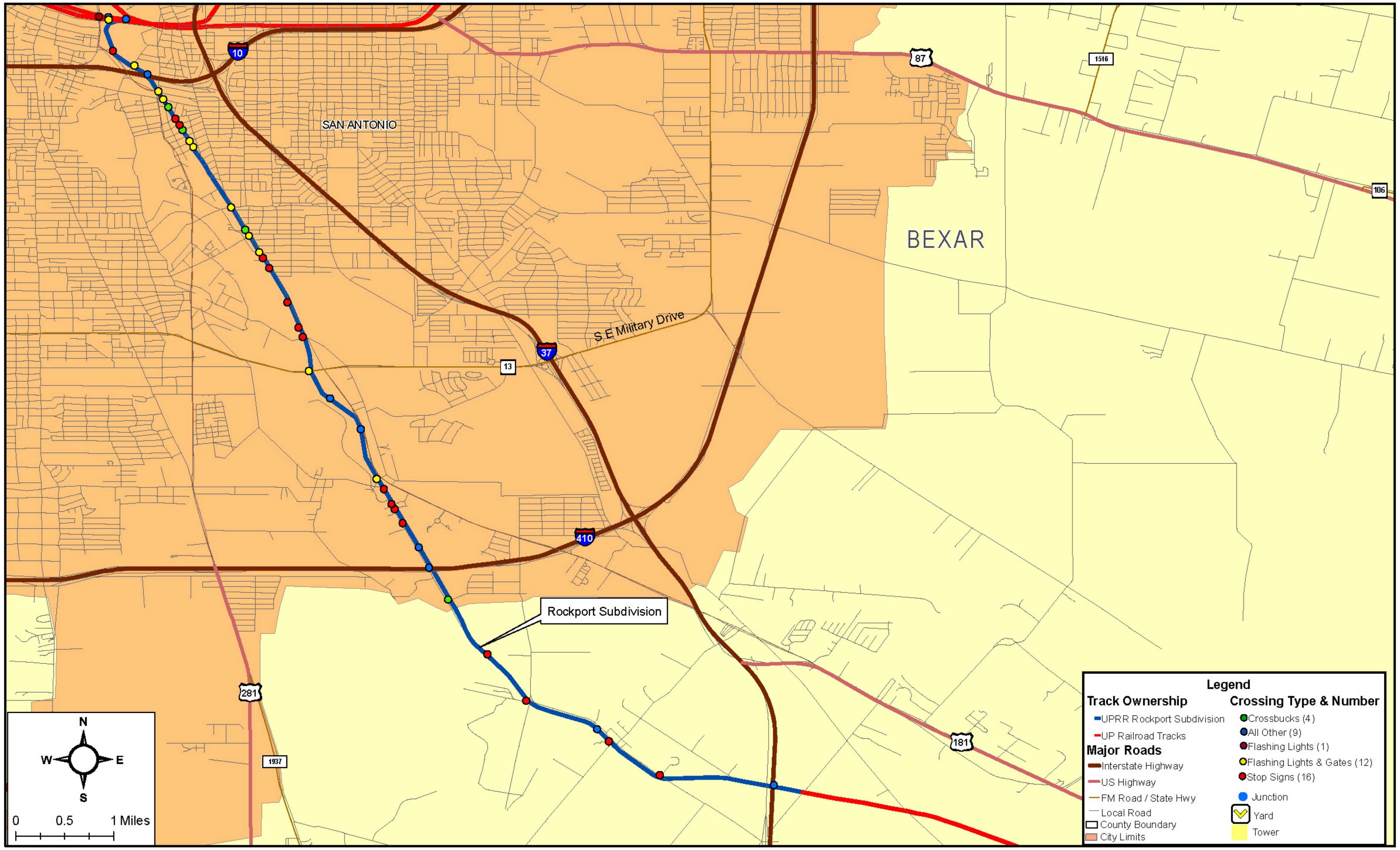


Figure 4-14 : Rockport Subdivision

UP Rockport Industrial Lead

The Rockport Industrial Lead Subdivision begins at MP 11.00 of the Rockport Subdivision and ends at MP 16.10. It is located in Bexar County, in Elmendorf, Texas. The tracks were originally constructed by the San Antonio & Aransas Pass Railway in 1885.

Rockport Industrial Lead (See Table 4-10)
Total Subdivision Tracks 5.10 miles
Total track in Bexar County 5.10 miles

Rockport Industrial Lead Subdivision				
Track Type	**Milepost Start**	**Milepost End**	**Length (Miles)**	**Yard or Siding Name**
Main	11.00	16.10	5.10	
Siding	15.64	15.94	0.30	

Table 4-10: Rockport Industrial Lead Track Type Summary Table

The single main tracks become the Rockport Industrial Lead as it passes through Coal Plant Junction, where the Rockport Subdivision ends.

There are no major bridge crossings in the Rockport Industrial Lead.

Figure 4-15 depicts the layout and grade crossing protection locations for the Rockport Industrial Lead.

San Antonio Region - Rockport Industrial Lead Subdivision
Types of Grade Crossing Protection

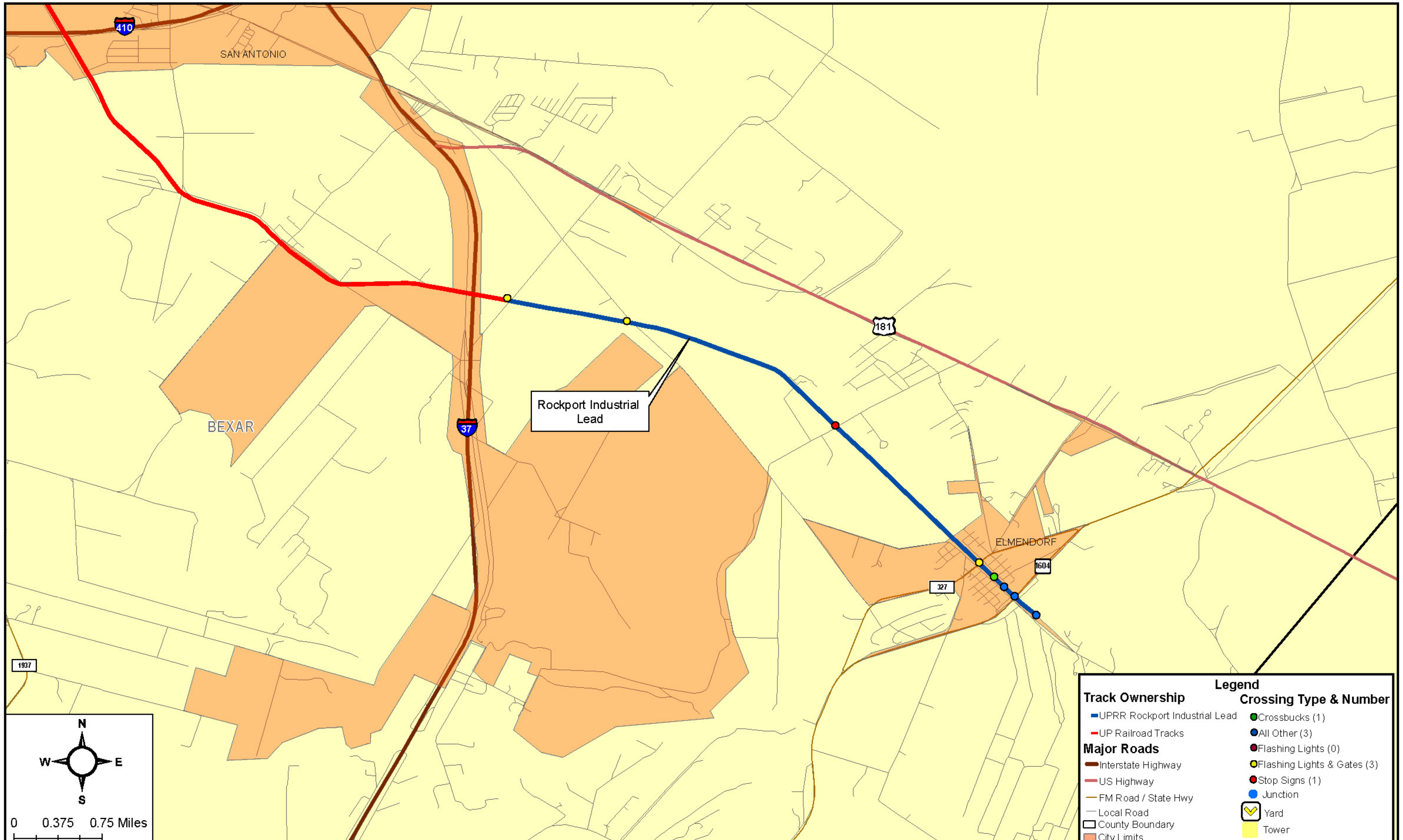


Figure 4-15: Rockport Industrial Lead

SECTION 5: ESTABLISHMENT OF A FREIGHT RAIL BASE CASE OPERATIONS MODEL

To fully encompass the movement of freight by rail within the San Antonio region, the breadth of the study area needs to be expanded considerably, incorporating locations where freight movement enters or exits the general rail network from different rail lines. For San Antonio, this network has been expanded to encompass UP's San Antonio Service Unit, as shown in Figure 5-1, and portions of UP's Fort Worth Service Unit comprising the overall study area rail network. Information for train movements for this region, shown in Figure 5-2, was provided by UP for the purpose of conducting an operational analyses utilizing Rail Traffic Controller™ (RTC) software.

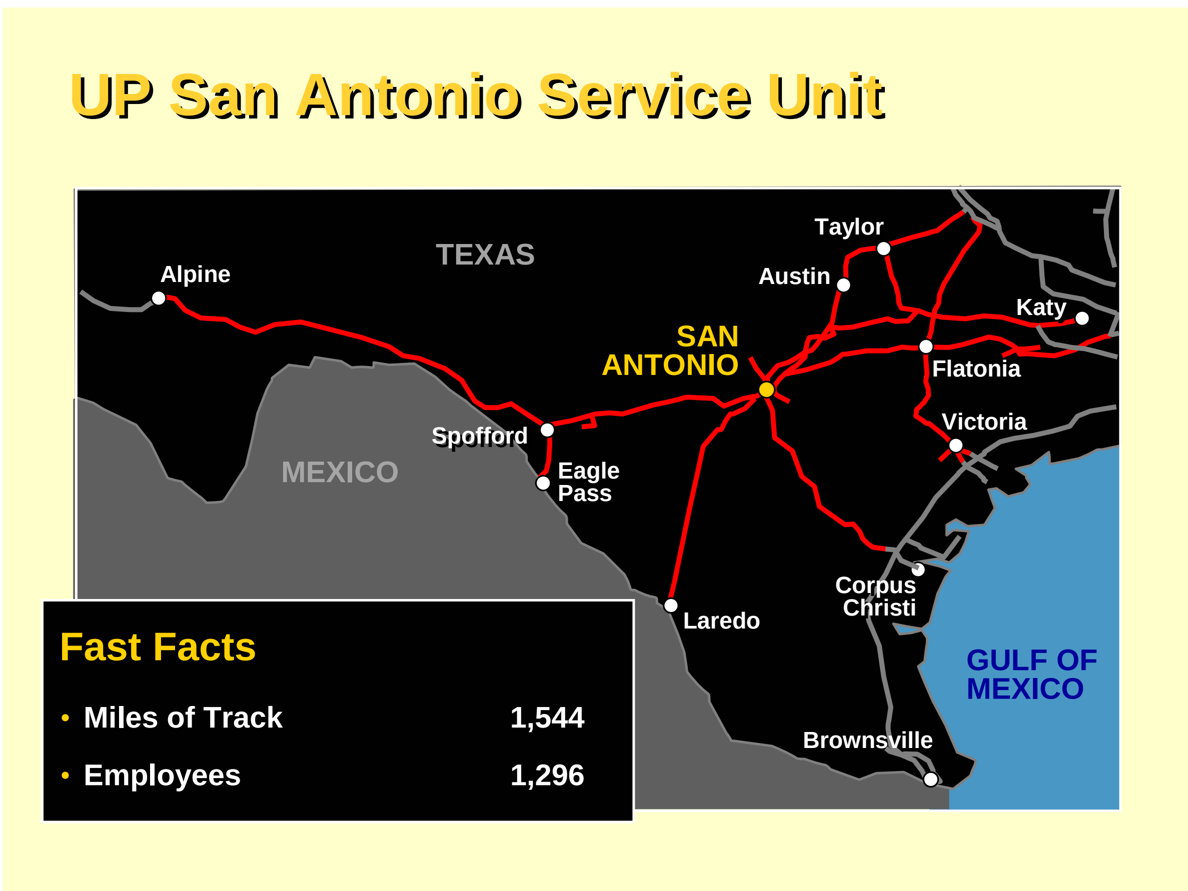


Figure 5-1: UP San Antonio Service Unit

This section summarizes the results of the base case RTC simulation.

The base case simulates current UP train operations through the study area, and includes BNSF trackage rights trains on UP rail lines between Hearne and San Antonio. This network includes four alternative routes that trains currently utilize between Waco/Hearne and San Antonio:

- Via Taylor, Austin, and San Marcos (Austin Subdivision);
- Via Taylor, Smithville, and San Marcos (Waco, Lockhart and Austin Subdivisions);
- Via West Point, Smithville, and San Marcos (Giddings, Smithville, Lockhart and Austin Subdivisions); and,
- Via West Point, Flatonia, and Luling (Giddings, Cuero, and Glidden Subdivisions).

At the suggestion of UP, the RTC network (Figure 5-2) was extended south and west of San Antonio to capture train movements approaching the San Antonio area. The Waco Subdivision was extended north to Temple and Waco so that BNSF trains would be included for the entire length of the line segment. These additions incorporate train movements on each line that might subsequently impact movements in the primary San Antonio analysis area.

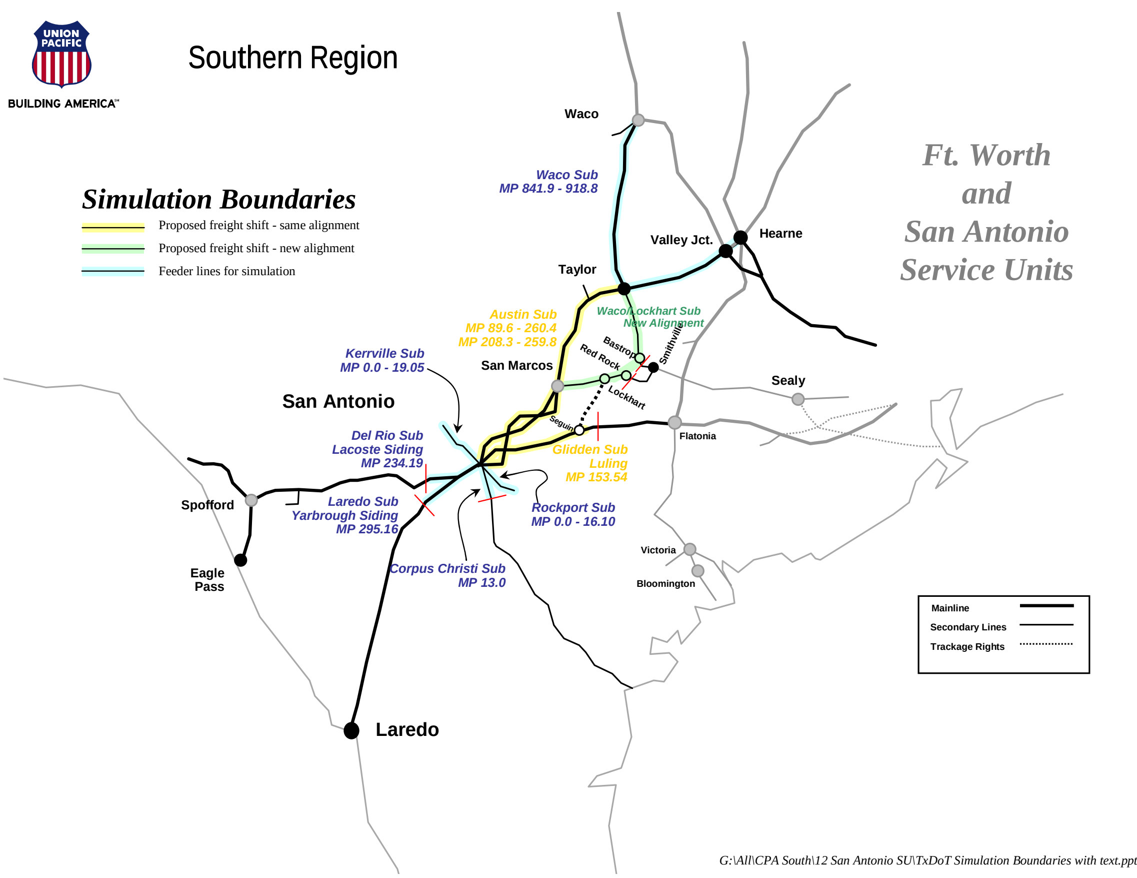


Figure 5-2: Courtesy UP – July 11, 2004

Figure 5-3 shows the base case rail lines as they appear on the RTC computer screen, labeled with associated railroad MPs. The RTC diagram "folds" the lines internally to make best use of the computer screen space, and as such may not be displayed geographically correct. Mainline, siding, yard, and selected industrial tracks were coded into RTC with attributes that impact train operations, including allowable operating speed, distance, grade, switch type, signal system, and other features.

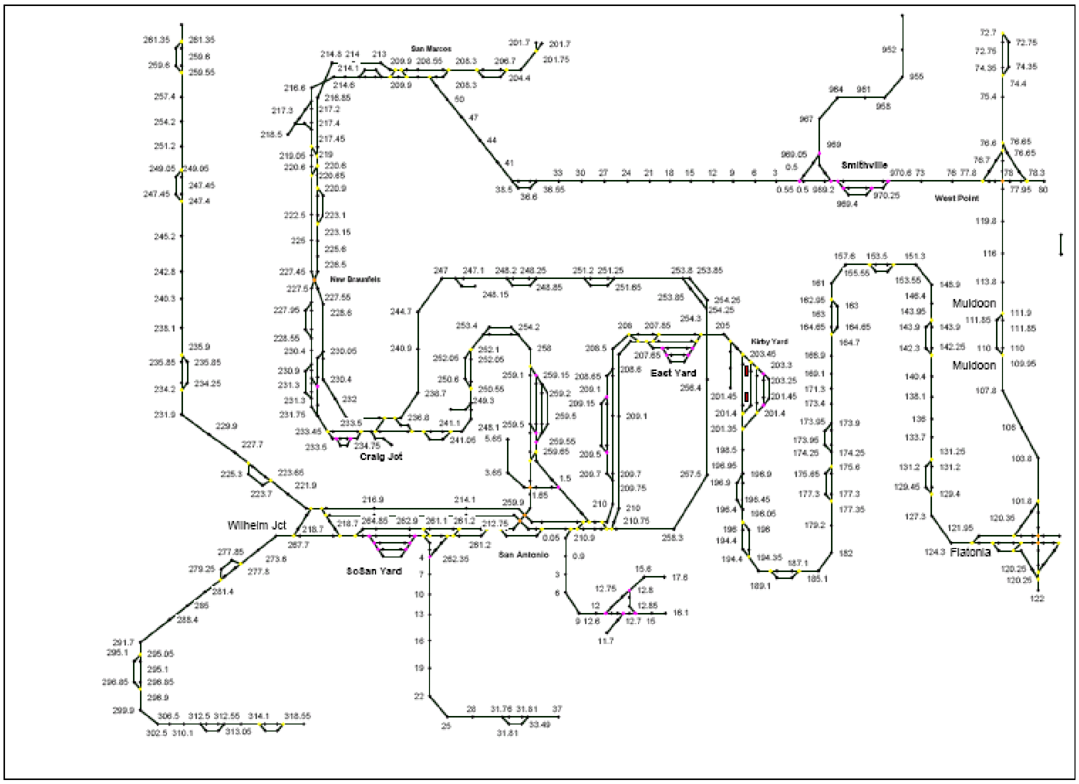


Figure 5-3: RTC Base Case Network
(RTC Case SA 11)

The entire network is predominately single track with sidings. Double track exists only in two relatively short areas:

- From Heafer Junction to East Yard, on the original Southern Pacific line through San Antonio, for a distance of approximately 13 miles; and,
- From San Marcos to Craig Junction, where the parallel former Missouri Pacific and Missouri-Kansas-Texas lines have been configured as double track for a distance of approximately 27 miles.

Existing rail traffic movement on the Austin Subdivision between San Marcos and Valley Junction (near Hearne) is heaviest in the north and eastbound directions. Many of the counterpart trains headed south and westbound use the Giddings, Smithville, and Lockhart Subdivisions between Valley Junction and San Marcos.

These directional flows help to minimize occurrences of trains meeting when traveling in opposite directions on each route.

Two subsequent enhancements were made to the base case to incorporate track improvements planned by UP within the next few years and track and yard additions to accommodate Toyota train operations. Figure 5-4 shows a screen capture of the enhanced base case for the combined track improvements and Toyota scenario.

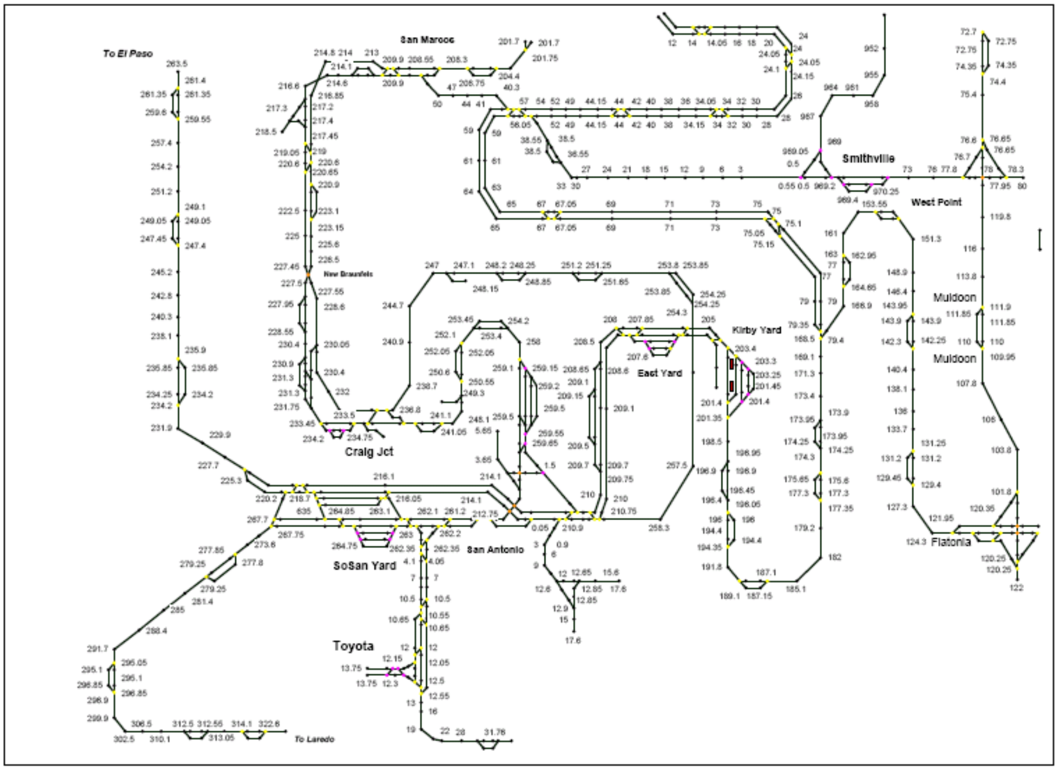


Figure 5-4: Base Case Network with Toyota Facility and UP Track Improvements (RTC Case SA 12X)

Base Case Methodology

UP provided two independent sets of train movement records representing 30-day periods of operations. The initial data was dated October/November 2003, while the updated information was dated February 2005. The records included train symbol or identification, scheduled and actual operating times at key reporting locations, and data on the consist, or make-up, of each train (such as the number of engines, horsepower, train tonnage, and train length).

Records were provided for both UP and BNSF trains. Upon review of the UP data, a series of schedules for the trains was created that synthesized the actual operations into typical patterns for the simulation. The train schedules developed for the simulation include train identification and type, priority, number and type of engines, tonnage and length, initial departure location and times, dwell times at subsequent locations, and ultimate destination.

For trains that did not run daily, the number of trains observed during the 30-day period was translated to the average number of trains per week for the purpose of constructing the RTC train files. Trains that ran only a few days per week were given different operating days for each week in order to simulate the randomness of the actual operations.

When the simulation is run, RTC "dispatches" each train over the network using a logic that simulates the decision making process of railroad dispatchers. The program resolves train "conflicts", or meeting and passing situations, for a prescribed number of days and weeks selected by the RTC analyst. The simulated operations reflect the consist (train makeup) of each train and its relative priority regarding movement. RTC output includes statistical results of train operations and the ability to follow trains visually on the computer screen as they move over the track network. It also provides various measures to analyze track occupancy and the location of conflicting moves to be resolved.

Each RTC simulation is performed over a period representative of four weeks of train traffic. RTC's randomization feature was used to reflect the operating variations for each train that were observed from the data provided by UP. With the random feature enabled, each train is dispatched at a random time within a "time window" specified in the train schedule that reflects the actual variations in operating times, rather than starting each train at a single scheduled time each day. This feature creates differing operating results each day[1], emulating the actual experience observed in the UP train data.

This analysis was conducted with the objective of measuring through-train operations. The train schedules developed did not include every nuance of train movement, such as light engine moves between engine terminals and freight yards, or detailed switching operations at on-line industrial locations. The analysis also did not introduce unplanned or occasional events, such as track closures due to operating emergencies or necessary maintenance activities. RTC is capable of including these events in the simulation process, and a representative series of such events may be included in any future more detailed simulation efforts.

Base Case Findings

RTC produces summary reports for each simulation exercise, in addition to detailed reports on the movement of each train. For this preliminary analysis, the summary reports fairly represent the results of the simulation. The summary data include the

[1] The RTC randomization feature changes the initial departure times, but does not change the train consist (train make-up consisting of engines and rail cars) to reflect shorter or longer trains. Adjusting train consists would require creating a separate schedule for each day that the each train is operated. The train schedules were entered using the most typical consists reported in the UP train data sheets.

following performance measures for each of three groups of trains (passenger, expedited freight, and other freight):

- Average Speed - This measure includes dwell time at stations, yards, and en route work locations;
- Meet-Pass Delay Percentage - The percentage of delay time incurred by trains that was required for trains to meet and pass on single track; and,
- Delay Minutes per 100 Train Miles - Total delay to all trains for all reasons.

In subsequent RTC simulations of alternative networks, the same measures will be reported for the same trains, with some trains operating over the alternative trackage. This will enable comparison of the simulated “current” results with the simulated results of improved rail networks in which some trains will be shifted to new or improved alignments.

The base case was simulated for a four week period of train operations and was modeled two additional times with a unique “random seed number” that produces a different set of starting times for each train. Results were comparable for each simulation, and an average of 83 trains operated daily in the base case network.

The greatest number of dispatching conflicts occurs between San Antonio and Control Point (CP) Adams on the Austin Subdivision ML 1, and on the Kerrville Subdivision between Tower 112 and Apache Junction. However, as discussed in Sections 3 and 7, the Kerrville Subdivision to Austin Subdivision connection was upgraded by UP in August, 2006. The highest measurements of delay were found on the Austin Subdivision north of Round Rock, and at locations along the Smithville and Lockhart Subdivisions. Significant delay was identified east of Kirby Yard and at Tower 112.

A future addition to the base case may include proposed traffic from a new limestone quarry that Vulcan Construction Materials has proposed to open in Quihi, Texas. Quihi is about 39 miles west of San Antonio and is approximately seven miles north of Dunlay in Medina County.

The Southwest Gulf Railroad Company (SGR) would operate the seven mile line from the quarry to Dunlay. The new line is intended to be accessed from the Del Rio Subdivision near MP 250. UP would then transport the cars to markets in the Houston area, as well as other markets in the Southeast, Gulf Coast, and the Rio Grande Valley regions of Texas. This project is awaiting approval of the Surface Transportation Board and it is unknown when an approval may be granted.

Impact of Near Term Improvements

UP is upgrading portions of their rail network in the region. These upgrades, as shown in Figures 5-5 through 5-7, are planned and in some cases completed improvements that will be implemented by UP. The UP improvements to the current network were incorporated into the original network to adequately test the validity of identified improvements. Improvements currently underway to accommodate train service to the new Toyota facility were also incorporated into the base case network.

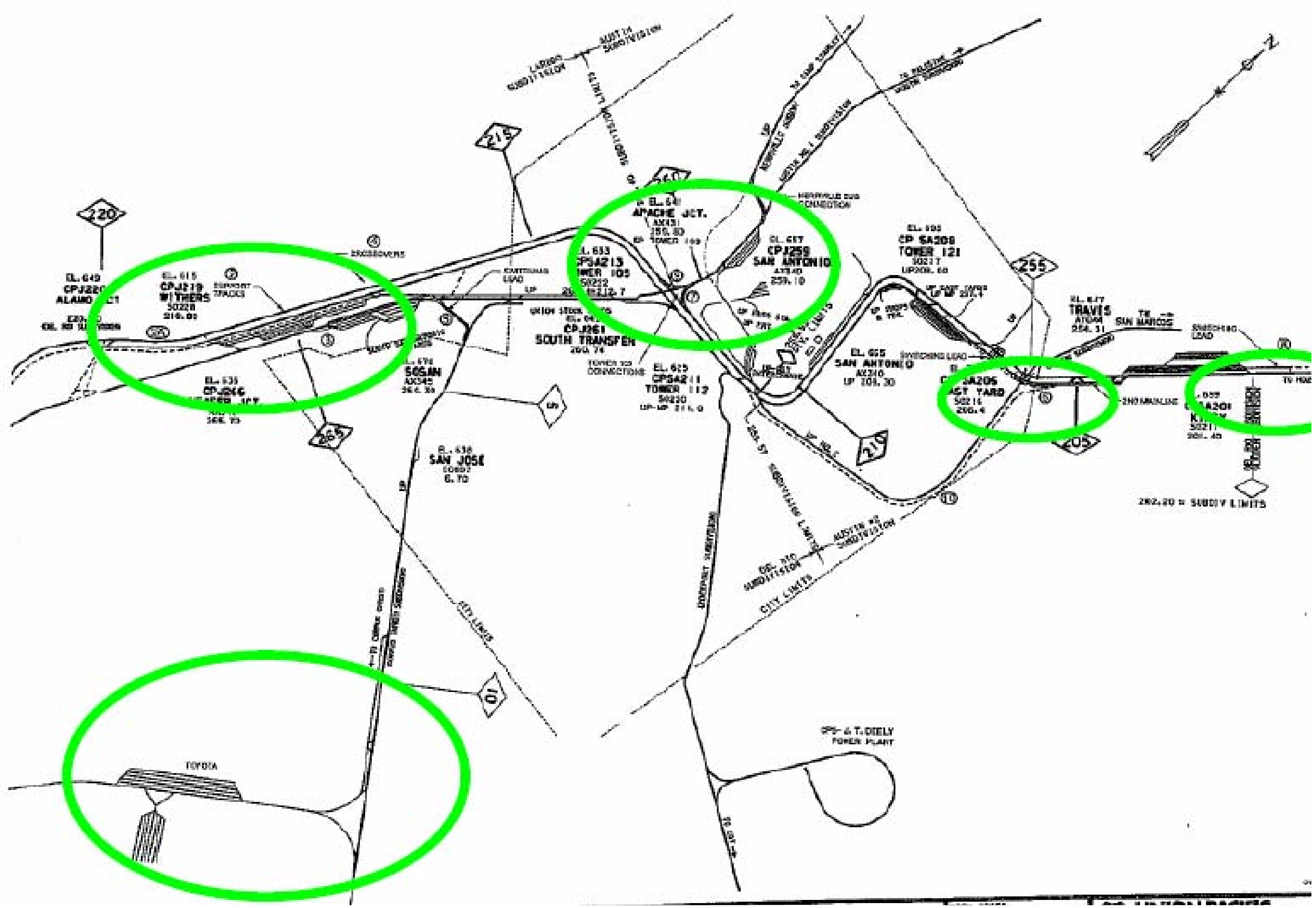


Figure 5-5: UP Planned Infrastructure Improvements

1. Construct a second mainline from Alamo Junction to Withers Junction on the Del Rio Subdivision (south/west of SoSan yard)
2. Increase the capacity of SoSan yard to accommodate anticipated auto carrier traffic from the Toyota plant, including constructing a switching lead on the Corpus Christi Subdivision
3. Constructing a second mainline on the Del Rio Subdivision between East and Kirby yards, do be done in two phases
4. Constructing a 9000' siding to the Corpus Christi Subdivision near the switch/lead track that will lead into Toyota.
5. Install a connector from the Austin Subdivision to the Kerrville Subdivision

Maintenance Programs

Additionally, UP intends to renew portions of their infrastructure which may contribute significantly toward improved train operations throughout the area. Figures 5-6 and 5-7 graphically depict the approximate locations, type of improvement, and estimated collective costs for these improvements.

The “New Rail” referenced in the figures consists of new tracks (rail) along an existing corridor, while the “SH Rail” consists of replacing existing tracks with second-hand (used) rail. The “Curve Rail” improvements consist of replacing rail in curved sections of an existing alignment and “Wood Ties” references replacing wood track ties in an existing alignment.

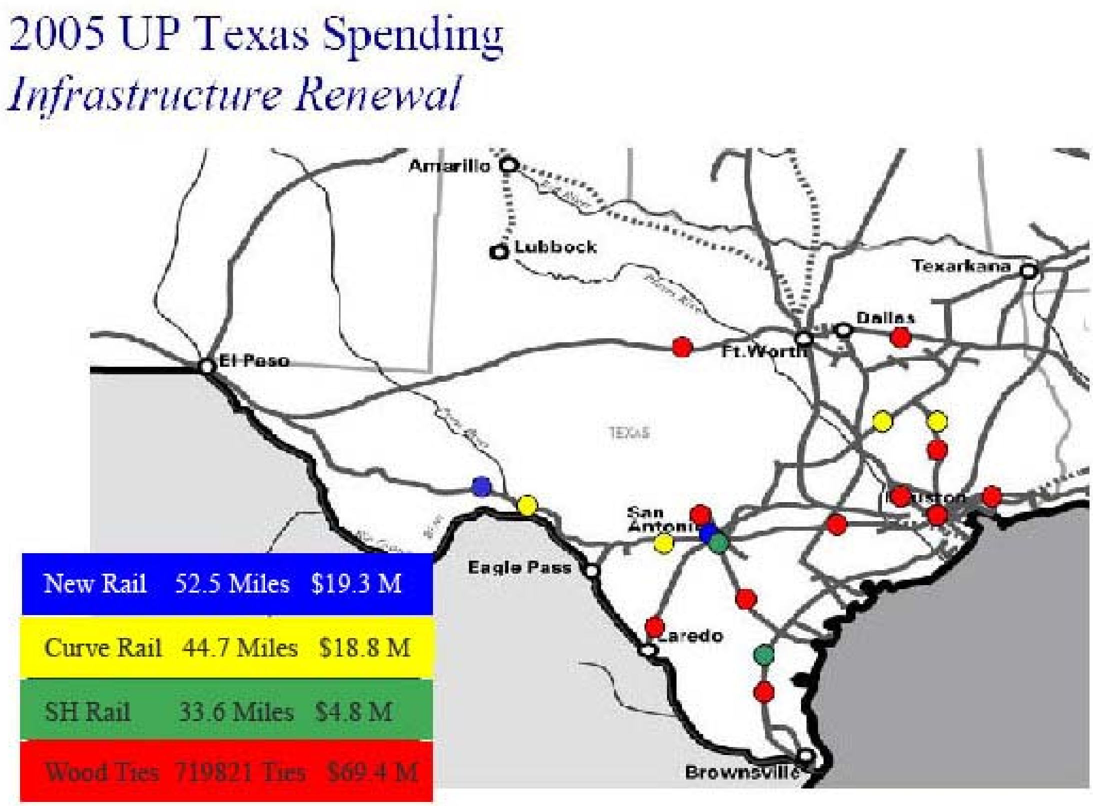


Figure 5-6: 2005 Infrastructure Renewal Projects
(Source: UP)

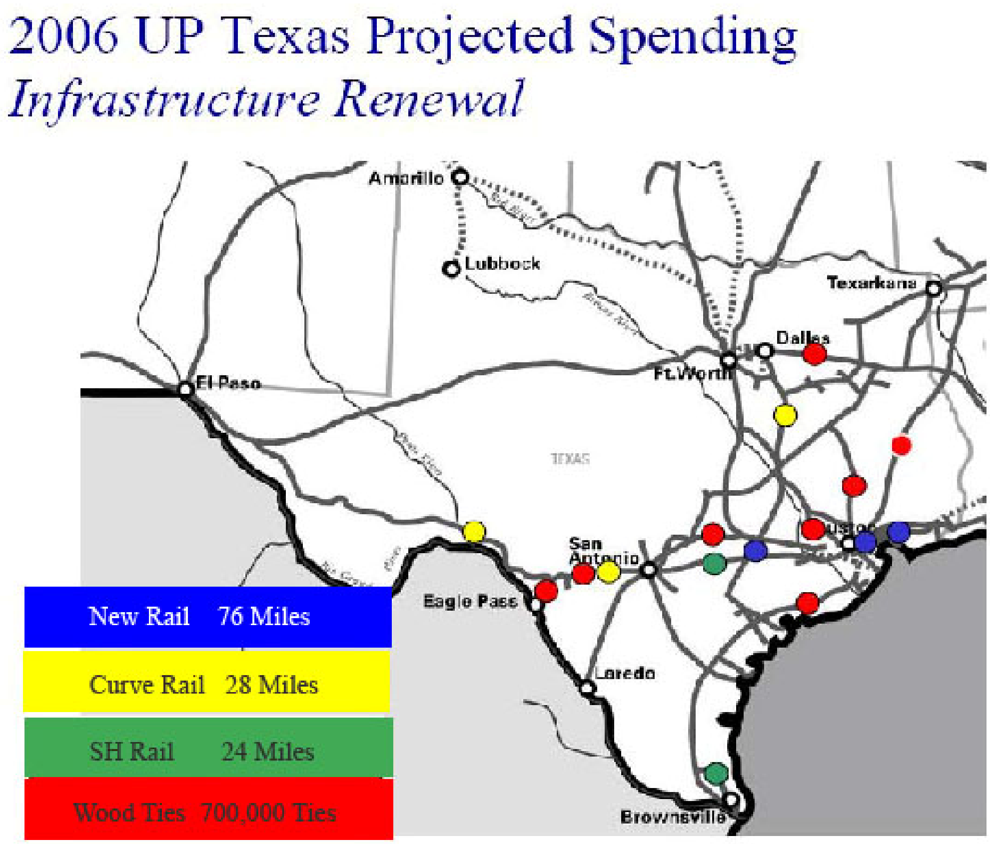


Figure 5-7: 2006 Infrastructure Renewal Projects
(Source: UP)

Base Case Simulation Results

The simulations discussed in the following pages were run with RTC software version 2.70 L2C, which was the current version as of September, 2005. The following cases were simulated in the RTC model to establish the final base case to be used in all further analysis:

SA11 - This case represents current track and operations. The network extends from Hearne and Flatonia on the north and east, to Hondo and Melon on the south and west.

SA12X - This case incorporates various track improvements in the San Antonio area that will be implemented by UP as previously discussed, likely to be completed within the next two years. These improvements, necessitated primarily by the new Toyota assembly plant, include:

- Extension of double track approximately one mile east of East Yard;
- Construction of a new connection between the Kerrville Sub and the Austin Subdivision at Apache Junction;

- Provision of additional yard tracks adjacent to SoSan Yard, and improved connections between the Del Rio and Laredo Subdivisions at SoSan; and,
- Double track from SoSan to the new Toyota plant on the Corpus Christi Subdivision.

Train files in this case are the same as Case SA11 (i.e. no additional train traffic was added for the Toyota assembly plant).

SA12 - The track network for this case is identical to SA12X, and represents the planned UP improvements assumed to be in place in the immediate future to accommodate anticipated Toyota traffic.

Train files for this case were modified to include eight daily auto trains to and from the Toyota plant. One daily round trip would operate from the Del Rio Subdivision, two round trips from the Austin Subdivision, and one round trip from the Glidden Subdivision. Trains were assumed to operate directly to and from the Toyota facility.

Table 5-1 shows the comparisons of results from the RTC cases for the three base cases established.

	SA 11 (Original Base Case)	SA 12X (Case SA 11 + UP Improvements)	SA 12 (Case SA 12X + Toyota Trains)
Number of Trains	2,665	2,665	2,890
Train Miles	326,186	326,158	358,817
Average Speed (All Trains)	26.351	26.454	26.058
Auto	32.709	32.743	30.129
Intermodal	34.072	32.671	31.468
Manifest	24.341	24.774	24.117
Z Premium	31.343	31.939	31.366
Delay Minutes Per 100 TM	31.94	32.0	36.7
Delay Ratio	14.0%	13.9%	15.9%
Fuel Consumption (gal)	2,800,095	2,806,352	3,055,146

Table 5-1: RTC modeling results comparison

Average velocity of all trains remains similar through all three cases, but the addition of the Toyota trains results in lowering of speeds for the faster auto and intermodal services. While the number of trains and train miles increases in SA12 and the near term improvements provide for flow of trains to and from the Toyota plant, the addition of the eight daily trains to or from Toyota causes increased congestion on the portions of the network outside the San Antonio area, and contributes to an increase in both delay minutes per 100 train miles, and an increase in the delay ratio (total hours of delay compared to total operating hours including delay and scheduled dwell). These results show the need for the UP planned improvements, which are necessitated by the Toyota assembly plant construction. Without these improvements, the existing network would be constrained by the added traffic from Toyota.

The construction of the Toyota plant was conditional upon the railroad making the improvements which are included in the above modeling cases (SA12X and SA12). Since the addition of the Toyota plant and the provision of track improvements in the vicinity are fairly certain, subsequent comparisons of infrastructure improvements and alternatives will use base case SA12 as the basis for measuring the impacts of the additional improvements.

In summary, within the greater San Antonio area, train delays are generally encountered throughout the region; mostly caused by congestion resulting from too many trains. Particular areas noted are:

- Delays to trains entering, leaving, or passing by East Yard and Kirby Yard are often caused by other trains slowing to enter the yard tracks directly from the main lines. Neither East nor Kirby Yards have long approach tracks off the main line, so trains tend to stack up when there are multiple trains in the area;
- Delays to trains on single track segments. These occur on all routes into/out of San Antonio: Del Rio, Laredo, Austin Subdivision ML 1 south of Craig Jct, and Glidden east of Kirby. While there are long periods of time with few trains on any one of these routes, there are other times when trains become bunched up and the delays occur;
- There are delays in the San Marcos-Hunter area with the number of rock trains to/from Hunter; and,
- Occasional delays at rail grade crossings at Tower 105 and the ML 1/ML 2 crossing at New Braunfels.

In terms of which trains get delays, the delays to rock trains appear to be predominate. This is to be expected because they are programmed with a lower priority. However, delays occur to all classes of trains, including those with the highest priority, on the single track segments. Even premium intermodal trains have to meet on single track, attributing to the delay.

The following improvements to the San Antonio rail network have been completed by UP:

- Improved connections between the Laredo and Del Rio Subdivisions and SoSan Yard improvements to accommodate rail traffic to and from the new Toyota facility
- The addition of a second track on the Del Rio Subdivision from MP 206.4 (East Yard) to MP 205.0 and MP 205.0 to 203.4 towards Kirby Yard

Improvements intended to accommodate train service into and out of the new Toyota facility were incorporated into the base case network creating a network model which will ultimately be used as the basis of comparison when testing the validity of identified improvements.

The SA12X case, shown in Table 5-2, includes the existing rail network plus the projects UP has completed or will soon complete. The case was modeled with existing trains and did not include the anticipated eight daily Toyota trains.

	Passenger	Expedited	Freight	All Trains
Trains Operated	80	646	1941	2667
Train Miles	10,240	126,105	190,240	326,584
Total Run Time	16:16:39	160:17:42	339:12:03	516:22:26
Delay Time	3:53	18:08:51	53:14:16	72:03:01
Delay Percent	1.0%	11.4%	15.8%	14.0%
Delay/100 TM	2.28	20.98	40.57	31.80
Average Speed	25.557	32.689	23.348	26.324

Table 5-2: SA12X Case

The SA12 base case, which includes the anticipated daily Toyota train traffic, and will serve as the new basis of comparison for the planning cases discussed in Section 7, is shown in Table 5-3 below.

	Passenger	Expedited	Freight	All Trains
Trains Operated	80	841	1,940	2,861
Train Miles	10,240	156,456	190,138	356,833
Total Run Time	16:16:59	208:03:43	350:21:47	575:18:30
Delay Time	4:13	27:21:34	65:02:59	93:04:46
Delay Percent	1.1%	13.4%	18.6%	16.2%
Delay/100 TM	2.47	25.68	49.32	37.61
Average Speed	25.536	31.318	22.577	25.823

Table 5-3: SA12 Base Case

Four planning cases, representing a total of eight improvements and/or relocations to the existing infrastructure, were investigated with the ultimate goal of improving train mobility and efficiency, and addressing the areas of greatest congestion within the network. Three additional planning cases, representing a potential San Antonio bypass, an Austin bypass from Seguin to Taylor, and a combined San Antonio and Austin bypass, were also evaluated.

As a result, the planning case improvements primarily address large terminals, such as SoSan, East and Kirby Yards, and bottlenecked locations such as double track to single mainline tracks. In general, the seven planning cases (discussed in Section 7) consisted of:

- Upgrades to the UP's Waco and Lockhart Subdivisions,

- A possible Austin bypass route from Taylor to Seguin,
- Upgrades to the UP's Glidden and Del Rio and Laredo Subdivisions,
- Upgrades to the UP's Austin ML 2 Subdivision in the area of East Yard to Tower 112,
- A possible San Antonio bypass
- Upgrades to the Corpus Christi Subdivision
- A possible combined San Antonio and Austin bypass from Macdona to Taylor

SECTION 6: FREIGHT RAIL AND RAIL/ROADWAY INTERFACE SAFETY ISSUES

The State of Texas has traditionally taken the lead regarding safety issues associated with the freight rail/roadway interface. The first toll-free call in program for the public to notify of highway-rail crossing incidents was establish by Texas in 1983 with the calls directed to the State's Emergency Management Center (EMC). Enacted by the Texas State Legislature in 1983, the Railroad Crossing Safety Information Act became part of the Texas Transportation Code in 1995, and established a State-wide toll-free telephone network intended to report malfunctions of the safety devices at highway-rail grade crossings. Telephone numbers were mounted onto the sides of the railroads grade crossing equipment cabinets near the at-grade crossing that contained the name of the roadway, the railroad subdivision name, and the approximate milepost of the crossing. Upon receipt of a call, the EMC operator would relay the information provided by the caller to the respective railroad. Even though only at-grade crossings with active warning devices contain the contact information, the Texas system handles over 1200 calls monthly with information provided at public and private at-grade crossings.[1]

In 2001, after many system upgrades, the Texas call center operations were transferred to the Texas Department of Public Safety. This program, based on the success experienced in Texas, has been adopted by most Class I freight railroad companies and other states throughout the United States. The number of fatalities in the U.S. has steadily declined since from 615 fatalities in 1994 to 368 in 2004, with the incident rate per million train miles decreasing from 7.6 to 3.9 during the same time period.[2]

During the timeframe from January 2000 through December 2005, the 12-county study area experienced 128 highway-rail at-grade crossing accidents, in which there were 14 fatalities and 78 injuries. In comparison, during this same period of time, the entire State of Texas experienced 1,974 highway-rail incidents in which there were 213 fatalities and 775 reported injuries.[3] Statistically, the 12-county San Antonio region accounts for approximately 6.5 percent of all the highway-rail accidents and 6.6 percent of all the fatalities and 10.1 percent of all the injuries that occurred at highway-rail accidents within the State. As would be expected, over 80 percent of the reported grade crossing incidents and nearly 80 percent of the fatalities occurred at public at-grade crossings. Incidentally, within the study area over 95 percent of the grade crossings contained a train approach warning system.

Table 6-1 depicts the number of public at-grade crossings, sorted by type of warning device, for the United States, Texas, and the San Antonio region.

[1] Federal Railroad Administration – *Pilot Program for Emergency Notification Systems at Highway-Rail Grade Crossings,* May, 2006
[2] *ibid*
[3] Federal Railroad Administration, 2000 – 2005 highway-rail at-grade crossing safety statistics.

Number of Public At-Grade Crossings by Warning Device					
United States		Texas		San Antonio Region (1)	
2003		2003		2005	
Crossbucks (passive)	68,834	Crossbucks (passive)	5,244	Crossbucks (passive)	107
Lights only (active)	25,656	Lights only (active)	1,362	Lights only (active)	326
Gates (active)	36,410	Gates (active)	3,728	Gates (active)	320
Stop Signs	9,905	Stop Signs	270	Stop Signs	131
Special Warning	3,209	Special Warning	93	Special Warning	9
Hwy. Traffic Signal	1,269	Hwy. Traffic Signal	74	Hwy. Traffic Signal	2
Other (passive & active)	618	Other (passive & active)	7	Other (passive & active)	0
Unknown	4,843	Unknown	458	Unknown	0
Source: Federal Railroad Administration				*Source: TxDOT*	
(1) Mainline tracks only					

Table 6-1: Number of Public At-Grade Crossings

Highway-Rail Incidents

Figure 6-1 illustrates the number of highway-rail incidents, including injuries and fatalities, in the state of Texas, by county, from 2000 to 2005. Highway-rail incidents include accidents associated with traffic at highway-rail interfaces, and do not include accidents due to trespassing on railroad property.

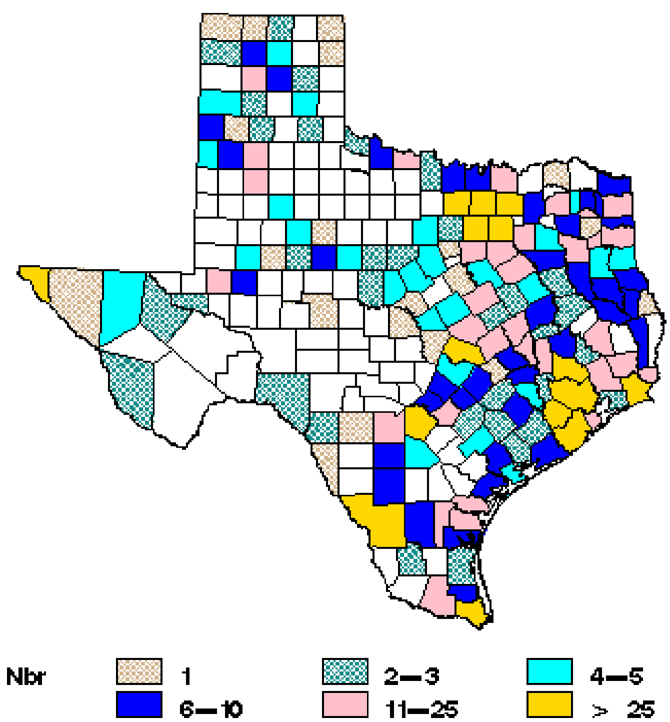


Figure 6-1: Highway-rail incidents in Texas, 2000-2005

In reviewing the investigation logs reported to the Federal Railroad Administration (FRA) for highway-rail incidents within the San Antonio region, the average train speeds were approximately 35 mph while the average vehicle speeds were approximately 20 mph. The average vehicle damage per incident is approximately $12,000.

Tables 6-2 and 6-3 depict, by county within the region, the number of highway-rail incidents annually from 2000 to 2005. The 'Cnt' value displays the number of accidents, while the 'Kld' and 'Inj' values display the number of people killed and injured in those accidents, respectively.

2000 – 2005 Totals	Totals			At Public Crossing						At Private Crossing					
				Motor Vehicle			Other			Motor Vehicle			Other		
	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj
ATASCOSA	5	-	8	4	-	8	-	-	-	1	-	-	-	-	-
BEXAR	73	7	35	68	4	34	2	1	1	3	2	-	-	-	-
COMAL	9	-	14	7	-	11	-	-	-	2	-	3	-	-	-
FRIO	8	3	6	7	3	6	-	-	-	1	-	-	-	-	-
GUADALUPE	16	-	8	14	-	5	-	-	-	2	-	3	-	-	-
MEDINA	16	4	6	14	2	3	-	-	-	2	2	3	-	-	-
UVALDE	1	-	1	-	-	-	-	-	-	1	-	1	-	-	-
Totals	**128**	**14**	**78**	**114**	**9**	**67**	**2**	**1**	**1**	**12**	**4**	**10**	**0**	**0**	**-**

Table 6-2: Highway-Rail Accidents in the San Antonio Region, 2000-2005 (Source: FRA)

County	2000 Totals			2001 Totals			2002 Totals			2003 Totals			2004 Totals			2005 Totals		
	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj	Cnt	Kld	Inj
ATASCOSA	2	-	4	1	-	-	1	-	3	1	-	-	-	-	-	-	-	
BEXAR	13	2	7	13	-	4	14	1	5	12	1	14	7	1	2	14	2	3
COMAL	3	-	6	1	-	-	-	-	-	-	-	-	1	-	1	4	-	7
FRIO	-	-	-	2	1	3	1	2	-	2	-	1	1	-	1	2	-	1
GUADALUPE	3	-	2	2	-	2	3	-	1	3	-	1	4	-	1	1	-	1
MEDINA	1	-	1	2	-	-	1	-	-	3	3	-	4	-	1	5	1	4
UVALDE	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Totals	**23**	**2**	**21**	**21**	**1**	**9**	**20**	**3**	**9**	**21**	**4**	**16**	**17**	**1**	**6**	**26**	**3**	**16**

Table 6-3: Highway-Rail Accidents in the San Antonio Region, 2000-2005 (Source: FRA)

Derailments

There were also over 220 derailments within the region from 2000 through 2005[4]. Data provided by the railroads to the FRA shows the accumulative cost of equipment and infrastructure damage was over $21 million dollars. Table 6-4 provides a yearly summary of the derailment damage statistics for the region.

[4] Federal Railroad Administration safety statistics

Year	Instances	Total Equipment & Track Damage	Average per Occurrence	Ave Train Speed (mph)	Total Locomotives Derailed	Total Cars Derailed	Total Killed	Total Injured
2005	43	$2,296,536	$53,408	10	3	90	1	7
2004	43	$10,680,954	$248,394	11	9	169	5	12
2003	36	$1,639,340	$45,537	8	5	69	0	4
2002	42	$2,186,384	$52,057	8	8	102	1	2
2001	46	$3,290,311	$71,529	11	7	135	1	7
2000	19	$1,153,070	$60,688	16	0	49	0	6
Total	**229**	**$21,246,595**	**$531,612**	**10.67**	**32**	**614**	**8**	**38**

Table 6-4 – Derailment Incidents in the San Antonio Region (source: FRA)

Trespasser Incidents

Lastly, according to records obtained from the FRA, trespasser incidents within Bexar County between 2000 and 2005, which incidentally experienced the highest number of incidents within the region boundaries, are listed in Tables 6-5 through 6-8. Trespasser incidents consist of deaths and injuries caused by pedestrians trespassing on to railroad property, and do not include accidents associated with traffic at highway-rail interfaces.

Railroad	TOTAL		Incidents per Year						% Change Over Time					
	Incidents	% of Total	2000	2001	2002	2003	2004	2005	2000 to 2001	2001 to 2002	2002 to 2003	2003 to 2004	2004 to 2005	2000 to 2005
UPRR	61	98.4%	8	14	12	9	8	10	75%	-14%	-25%	-11%	25%	25%
Amtrack	1	1.6%	0	1	0	0	0	0	100%	-100%	0%	0%	0%	0%
Total	**62**	**100%**	**8**	**15**	**12**	**9**	**8**	**10**	**88%**	**-20%**	**-25%**	**-11%**	**25%**	**25%**

Table 6-5: Trespasser Incidents in Bexar County by Railroad, 2000-2005 (Source: FRA)

Age of Trespasser	TOTAL		Incidents per Year						% Change Over Time					
	Incidents	% of Total	2000	2001	2002	2003	2004	2005	2000 to 2001	2001 to 2002	2002 to 2003	2003 to 2004	2004 to 2005	2000 to 2005
16-20	12	19.4%	2	3	2	4	1	0	50.0%	-33.3%	100%	-75.0%	-100%	-100%
21-25	5	8.1%	2	1	1	0	1	0	-50.0%	0%	-100%	100%	-100%	-100%
26-30	12	19.4%	1	3	3	2	1	2	200%	0%	-33%	-50.0%	100%	100%
31-35	6	9.7%	0	1	3	0	0	2	100%	200%	-100%	0%	200%	200%
36-40	11	17.7%	1	3	1	2	3	1	200%	-66.7%	100%	50.0%	-67%	0%
41-45	4	6.5%	1	0	1	1	1	0	-100%	100%	0%	0.0%	-100%	-100%
46-50	5	8.1%	0	2	0	0	1	2	200%	-100%	0%	100%	100%	200%
51-55	2	3.2%	1	1	0	0	0	0	0%	-100%	0%	0%	0%	-100%
56-60	2	3.2%	0	0	0	0	0	2	0%	0%	0%	0%	200%	200%
61-65	1	1.6%	0	0	0	0	0	1	0%	0%	0%	0%	100%	100%
66-70	0	0.0%	0	0	0	0	0	0	0%	0%	0%	0%	0%	0%
71-75	1	1.6%	0	0	1	0	0	0	0%	100%	-100%	0%	0%	0%
Not Given	1	1.6%	0	1	0	0	0	0	100%	-100%	0%	0%	0%	0%
Total	**62**	**100%**	**8**	**15**	**12**	**9**	**8**	**10**	**87.5%**	**-20.0%**	**-25.0%**	**-11.1%**	**25.0%**	**25.0%**

Table 6-6: Trespasser Incidents in Bexar County by Age of Trespasser, 2000-2005 (source: FRA)

Event	TOTAL		Incidents per Year						% Change Over Time					
	Incidents	% of Total	2000	2001	2002	2003	2004	2005	2000 to 2001	2001 to 2002	2002 to 2003	2003 to 2004	2004 to 2005	2000 to 2005
Struck by on-track equipment	44	71.0%	5	10	9	5	7	8	100%	-10.0%	-44.4%	40.0%	14.3%	60.0%
Lost balance	12	19.4%	3	4	3	1	0	1	33.3%	-25.0%	-66.7%	-100%	100%	-67%
Pushed/shoved from	2	3.2%	0	0	0	2	0	0	0%	0%	200%	-100%	0%	0%
Climatic condition, exposure to env. heat	1	1.6%	0	0	0	0	0	1	0%	0%	0%	0%	100%	100%
Struck against object	1	1.6%	0	0	0	1	0	0	0%	0%	100%	-100%	0%	0%
Caught, crushed, pinched, other	1	1.6%	0	0	0	0	1	0	0%	0%	0%	100%	-100%	0%
Slipped, fell, stumbled, other	1	1.6%	0	1	0	0	0	0	100%	-100%	0%	0%	0%	0%
TOTAL	**62**	**100%**	**8**	**15**	**12**	**9**	**8**	**10**	**87.5%**	**-20.0%**	**-25.0%**	**-11.1%**	**25.0%**	**25.0%**

Table 6-7: Trespasser Incidents in Bexar County by Event, 2000-2005
(Source: FRA)

Activity	TOTAL		Incidents per Year					
	Incidents	% of Total	2000	2001	2002	2003	2004	2005
Struck by on-track equipment	**44**	**71.0%**	**5**	**10**	**9**	**5**	**7**	**8**
Crossing over	1	1.6%			1			
Driving (Motor vehicle, forklift, etc.)	1	1.6%		1				
Getting on	1	1.6%			1			
Laying	12	19.4%	3	2	1	1	3	2
Lying down	2	3.2%					1	1
Reaching	1	1.6%		1				
Riding	1	1.6%		1				
Sitting	5	8.1%		2	1	2		
Standing	1	1.6%				1		
Walking	19	30.6%	2	3	5	1	3	5
Lost balance	**12**	**19.4%**	**3**	**4**	**3**	**1**		**1**
Climbing over/on	1	1.6%	1					
Getting off	2	3.2%		1		1		
Getting on	1	1.6%			1			
Jumping from	3	4.8%		3				
Laying	1	1.6%			1			
Riding	2	3.2%			1			1
Sitting	1	1.6%	1					
Walking	1	1.6%	1					
Other factors	**6**	**9.7%**		**1**		**3**	**1**	**1**
Jumping onto - slipped, fell, stumbled, other	1	1.6%		1				
Riding - caught, crushed, pinched, other	1	1.6%					1	
Sitting - climatic condition, exposure to env. heat	1	1.6%						1
Standing - Struck against object	1	1.6%				1		
Walking- Pushed/shoved from	2	3.2%				2		
GRAND TOTAL	**62**	**100%**	**8**	**15**	**12**	**9**	**8**	**10**

Table 6-8: Trespasser Incidents in Bexar County by Activity, 2000-2005
(Source: FRA)

According to the FRA data, Bexar County experienced 62 trespasser incidents and 42 highway-rail incidents (from Table 6-2) from 2000 to 2005, meaning that the county experienced over 100 deaths or injuries over a six year time period.

Incidents Summary

The statistics shown in the previous tables, however, only show a moderate reduction in most categories between 2000 through 2005. A combination of population increases, the number of people traveling on the roadway network, and an increase in the number of freight trains traveling through densely populated locales, increases the exposure rate of the highway/rail interface, stressing the importance of a more proactive approach to minimizing hazards associated with the movement of freight.

The partnerships developed between the State of Texas, TxDOT, Bexar County and the remaining 11 counties comprising the San Antonio region, along with the City of San Antonio and the two Class I freight railroads are working for the collective good of the freight industry and the traveling public to continue striving for no incidents, no derailments, no accidents, and ultimately no fatalities.

Hazardous Materials Movement

The amount (tonnage) of hazardous materials moved via rail and truck along selected corridors within the San Antonio region was identified for the following corridors :

- IH 10 East of IH 35
- IH 10 West of IH 35
- IH 35 North of IH 10
- IH 35 South of IH 10

The rail tonnage movement was determined based on existing Surface Transportation Board (STB) data for hazardous materials. The future rail tonnages were determined based on projected growth as calculated in the SAM.

The truck tonnage movement of hazardous materials was not specifically accounted for in the 1998 Reebie data. Therefore, it was necessary to develop a methodology to calculate existing and projected truck tonnages carrying hazardous materials for these corridors. The methodology began by determining the number of trucks on the specific corridors from existing vehicle classification counts performed by TxDOT with the San Antonio District. Future growth was determined on projections as calculated in the SAM.

A literature review was performed in order to develop a reasonable percentage of truck traffic along these corridors that would carry hazardous materials. While a range of trucks carrying hazardous cargo were found on various corridors within the country, a report of national statistics prepared for the Federal Highway Administration showed a national average of 7 percent. Data was not found that specifically mentioned the corridors for this analysis. However, the national average of 7 percent reported was in the range of percentages found through the literature review. Therefore, it was assumed that an average of 7 percent of trucks along these corridors would carry hazardous cargo.

Once the number of trucks carrying hazardous cargo was calculated, a conversion to the amount of tonnage was performed. The conversion to annual truck tons was performed using a range of occupancy. The range assumed that the cargo occupied between 50 and 100 percent of the trailers. The results of the analysis for each corridor are shown in Table 6-9.

Corridor	Annual Rail Tonnage Carrying Hazardous Materials		Average Daily Truck Volume Carrying Hazardous Materials		Annual Truck Tonnage Carrying Hazardous Materials	
	2004	2025	2004	2025	2004	2025
IH 10 East of IH 35	330,000	752,000	792	1,400	3,548,000 - 6,653,000	6,272,000 - 11,760,000
IH 10 West of IH 35	N/A	N/A	576	1,018	2,580,000 - 4,838,000	4,562,000 - 8,553,000
IH 35 North of IH 10	877,000	1,998,000	1,440	2,546	6,451,000 - 12,096,000	11,404,000 - 21,383,000
IH 35 South of IH 10	161,000	367,000	504	891	2,258,000 - 4,234,000	3,991,000 - 7,484,000

Table 6-9: Hazardous Cargo Movement within the San Antonio Region

SECTION 7: ALTERNATIVES ANALYSIS

This report is intended to provide the San Antonio region with an examination of the constraints within the region, and a list of potential solutions from which the local governing agencies may choose to analyze in greater detail or move forward towards implementation. Possible improvements include a new railroad corridor (bypass), roadway-rail grade separations and crossing closures, and improvements to the existing railroad infrastructure. Improvements to the existing rail network may provide operational benefits to the railroads and could also benefit future commuter rail operations if they were implemented in conjunction with a bypass. However, some issues of public concern (such as the movement of hazardous materials through urban areas via rail or environmental justice issues) would not be fully mediated by improvements to the existing system.

Improvements identified for analysis were based on the results of both freight rail operations modeling (RTC) and truck freight movement modeling (SAM) intended to improve freight movement efficiency. Additional improvements and/or recommendations were received from various discussions with stakeholder groups, such as the UP, the BNSF Railway Company, the Austin-San Antonio Intermunicipal Commuter Rail District, the Port Authority of San Antonio, the San Antonio Transportation Association, the San Antonio Mobility Coalition, the San Antonio Chamber of Commerce, and discussions with Mayor Hardberger and Bexar County Judge Nelson Wolff.

A variety of possible improvements from the sources previously mentioned were analyzed to determine the effects on efficiency, mobility, and safety for rail operations, as well as vehicular and pedestrian traffic in the region. This analysis included identifying the existing conditions, estimating the implementation cost and timeframe, and estimating the public and private benefits associated with the specific improvements.

The existing conditions identified for the locations of possible improvements include descriptions of property land use and estimated value, environmental constraints, traffic flow volumes for both vehicular and rail traffic, and traffic accident statistics.

The estimated implementation costs for each improvement are order of magnitude costs based on preliminary planning. The costs included in this study represent an estimate of probable costs prepared in good faith and with reasonable care. The study team has no control over the costs of construction labor, materials, or equipment, nor over competitive bidding or negotiating methods and does not make any commitment or assume any duty to assure that bids or negotiated prices will not vary from these estimates. The costs are subject to inflation, and in some cases will be calculated using current county appraisal district values for right-of-way acquisition, which may vary significantly from the eventual cost of acquiring property.

Classification levels based on estimated implementation timeframes were determined for the potential improvements and have been grouped in the following categories:

1. Level 1 Improvement - Identified near-term railroad improvements
2. Level 2 Improvement - Identified mid-range railroad improvements
3. Level 3 Improvement - All grade crossing closures and separations
4. Level 4 improvement – Identified long-range improvements such as double tracking of line segments or adding infrastructure capacity to existing line segments
5. Level 5 improvement – Identified long-range improvements such as consolidations, possible alternative routes or corridors, and major yard relocations

Anticipated public benefits include reductions in vehicular delay times at existing at-grade crossings, reductions in vehicle and locomotive fuel consumption, improvements in air quality, improvements in public safety, improvements in mobility for vehicular and freight traffic due to changes in train operations from improvements, reductions in noise and vibration from rerouting of trains, and improved freight mobility from more efficient routes.

The estimated public benefits were determined by using a grade crossing "impedance" or delay model which takes into account the volume and frequency of vehicular and train traffic at roadway-rail grade crossings, estimating the amount of time motorists are delayed by rail traffic. The model measures the anticipated public costs (burden) associated with traffic delays and calculates the extra emissions and fuel usage experienced while delayed by a train at each of the rail crossings analyzed. The cost of collisions is added to time costs, emissions, and fuel used to provide an annualized estimate of total public burden per grade crossing. Forecasts for growth in both rail and vehicular traffic will be used to provide an annualized estimate of public costs projected for a 20-year study period. Public benefit values for improvements to roadway-rail crossings (grade separating or closing) based on current traffic volumes are organized by railroad subdivision and included in Appendix G.

Potential benefits that may be realized by the railroads as a result of the identified improvements may include improved train operating efficiency (including reductions in train delays) and improved train run-times, as well as reductions in accident exposure at roadway-rail crossings.

Analysis of private benefits in addition to those shown with each planning case is beyond the scope of this study and should be examined in an independent benefit/cost analysis. The identified potential grade separations and crossing closures primarily provide benefit to the public in the form of reduced delays and improved safety, but also may provide a smaller benefit to the railroads.

Alternatives analyzed in this study consist of rail capacity improvements (possible bypass routes and improvements to existing rail corridors) as well as roadway-railroad crossing improvements (grade separations and crossing closures). Additionally, possible bypass routes were studied as part of an independent study, the results of which are discussed as follows.

Central Texas Rail Relocation

On October 16, 2006, Bexar County Judge Nelson Wolff, in his "State of the County" address given to the San Antonio Chamber of Commerce, stated:

> "*We are presently working on a San Antonio Rail Master Plan that will divert rail freight traffic out of the city center and along Highway 35 leading to Austin. This is essential for the long term safety of our citizens and continued economic development of our region."*

In support of Judge Wolff's commentary, the study team completed an independent study titled the "Central Texas Rail Relocation Study" (CTRN) of a possible alignment for relocating through-freight rail services from UP's existing Austin Subdivision. The concept provides for the relocation of through-freight rail services to a new route from Taylor to Seguin, where it would connect to a San Antonio bypass from Seguin to the southwest portion of San Antonio as shown in Figure 7-1.

The basic premise of the San Antonio bypass is to determine the feasibility of relocating through-freight trains from the San Antonio metropolitan area. A significant volume of the rail freight moving into and/or out of San Antonio does not originate or terminate there; but is only in San Antonio to be switched or classified into another train destined elsewhere, or for movement onto another mainline that traverses the San Antonio area.

The alignment of a San Antonio bypass would fall within the general footprint of the proposed TTC alignment. Figure 7-1 shows the new rail connection in the Taylor area, while the proposed TTC alignment is further west near Hutto. The connection of the possible bypass with the Corpus Christi Subdivision is also represented within the TTC alignment. This potential routing south of San Antonio is intended to complete a connection with the UP intermodal facility south and west of the city and the Laredo and Del Rio Subdivisions near Macdona.

This possible bypass would connect UP's Glidden Subdivision (east of San Antonio) with their Rockport, Corpus Christi, Laredo, and Del Rio Subdivisions (southwest of San Antonio) via a possible bypass around the southern portion of the metropolitan area. The connection with the Rockport Subdivision would require an extension of the existing line from Elmendorf towards Kenedy on the abandoned Southern Pacific right-of-way.

The maps included with this report depict possible alignments and/or facilities for illustrative purposes only to assist in general comprehension of the possible alternatives and issues discussed. These alternatives do not represent any proposed location or planned alignment for the relocation of freight rail services. These possible alternatives were necessary in order to obtain "ballpark" estimates of mileage, necessary bridge structures, highway-rail grade separations, earthwork, etc. so that order of magnitude costs could be developed for comparison purposes. Precise planned or proposed alternative alignments can only be identified during the NEPA environmental process, which is not a part of this study or report.

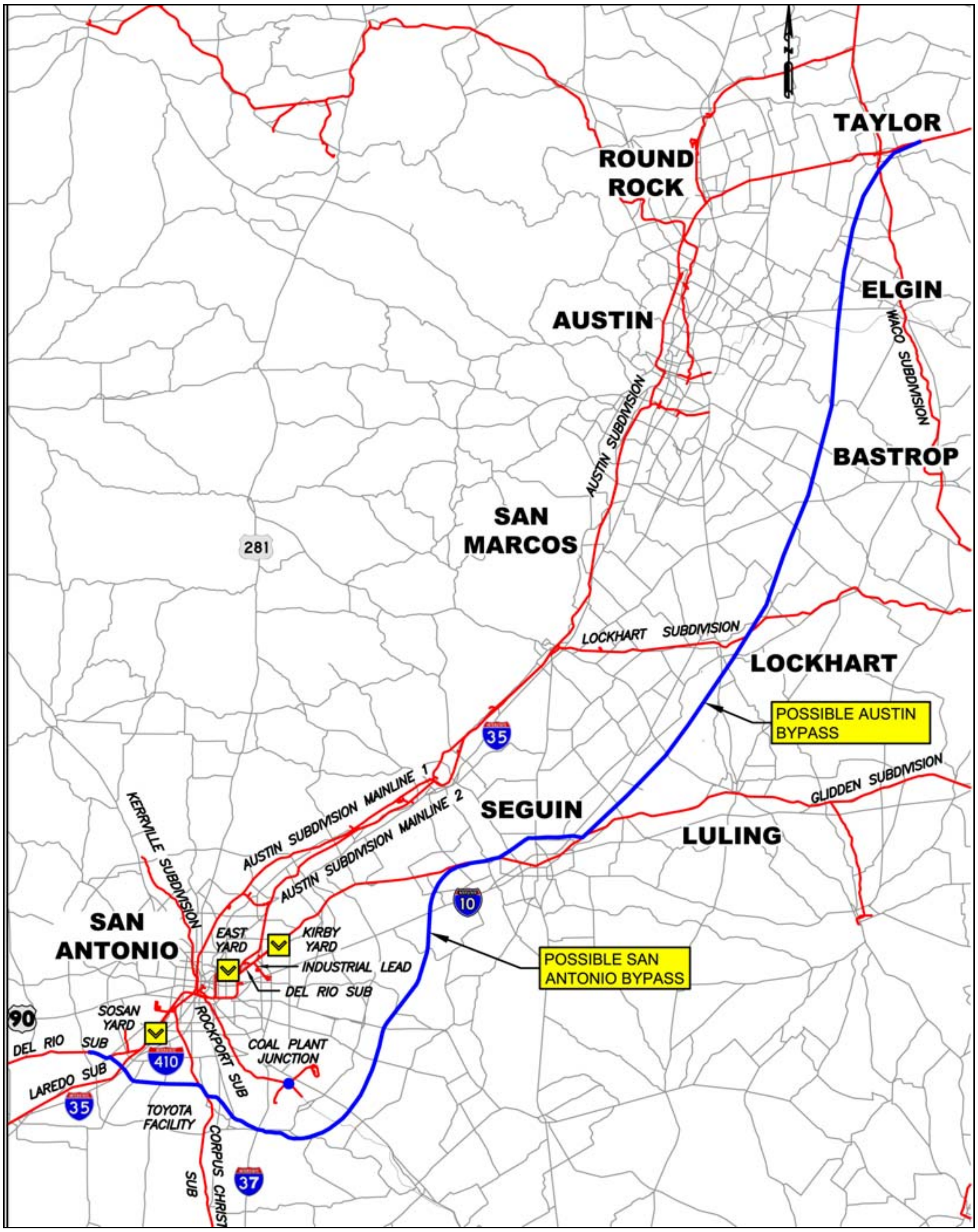


Figure 7-1: San Antonio Region Railroad Subdivisions and Possible Bypass Locations

This bypass would provide east-west and north-south connectivity through a loop around San Antonio that relocates and links all of UP's mainlines outside the metropolitan area. The east-west and north-south connectivity currently occurs within the city of San Antonio and must be alternately provided in order to relocate through-freight services to an alternate alignment. Trains to and from the north could be relocated from the Austin Subdivision to a new Taylor/Seguin direct route alignment, connecting with a San Antonio bypass near Seguin or an upgrade Austin Subdivision ML 2.

The study team also identified the need for new facilities if a bypass were constructed to provide for the diversion of freight car classification operations, fueling, servicing, repairs, re-crews, intermodal transfers, etc. These operations are currently performed at SoSan, East, and Kirby Yards, which are within the San Antonio metropolitan area. Implementing replacement facilities along the possible bypass route would potentially relocate all through-freight services from the east, west, and south (as well as train classification movements) from within the San Antonio urban area.

The relocation of San Antonio's yard operations to a new location(s) presents significant challenges from an engineering and operational perspective, as well as possible environmental impacts. It is estimated that approximately 70 to 75 percent of the trains moving into/out of San Antonio are "worked" at SoSan Yard, located near Kelly USA. East Yard is primarily used as an industrial service yard for local and regional customers. North-south trains terminating in San Antonio therefore typically do so at East Yard, located north of the Alamo Dome and the Amtrak Station. Kirby Yard, located east of San Antonio near Kirby, is a crew change point as well as in-line fueling facility. Kirby Yard is also equipped for unloading auto racks and provides some local service.

In order to optimize the efficiencies of new yard facilities, the study team determined that it would be preferable to construct one such facility toward the western end of the possible San Antonio bypass; potentially at or near UP's new intermodal facility located between the Del Rio and Laredo Subdivisions near I-35.[1] This location could serve as a main line fueling facility and crew exchange point for through-freight operations and handle typical mechanical department operations for that area.

Another yard facility may be necessary on the eastern end of the alignment potentially near Marion and could be used for train make-up for the San Antonio area, thereby potentially reducing traffic entering East Yard for that same purpose. A facility at Marion could provide the operational logistics as a staging area for local trains, a crew exchange point, and a locomotive fueling facility. Located northeast of

[1] San Antonio, Texas, November 29, 2006 – UP today announced a preliminary layout design of its new $90 million state-of-the-art intermodal terminal in Southwest Bexar County. The design will provide truck and auto access and egress points at Interstate 35.

San Antonio, mixed freight trains could be routed to this location, reducing traffic through the city, with freight cars separated for local delivery.

The study team also investigated the feasibility of connecting a San Antonio bypass to the existing Austin Subdivision, in the event that the Taylor to Seguin direct route is not implemented. This information was provided in the prior CTRN report, in which two possible alignments were identified that would connect the Austin Subdivision to the Glidden Subdivision. One possible alignment would connect with the Glidden Subdivision just west of Marion and traverse northward to connect with the Austin Subdivision ML 2 south of New Braunfels. The second possible alignment would connect with the Glidden Subdivision on the Seguin north possible bypass and traverse northward to a connection with the Austin Subdivision north of New Braunfels.

The study team has determined that a San Antonio bypass may be feasible with the incorporation of ancillary railroad items such as, but not limited to, yard facilities, train crew accommodations, in-line fueling facilities, and maintenance facilities that are intended to replace those currently located on the existing rail lines. Although such a bypass has shown to have an increase in the overall mileage trains must travel, and the associated operating expenses, there also appears to be an increase in the operating benefits to the railroad in terms of increased efficiencies, reduced meet/pass interference, increased train speeds, and more importantly, the potential for an increase in rail line capacity permitting future growth. However, the San Antonio bypass on it's own merit does not present an ideal benefit/cost ratio in terms of both the public and private benefits associated with this possible alternative. Connectivity to a possible bypass of the Austin area (via a direct Seguin to Taylor route) has demonstrated a substantial increase in private benefits, and with the additional reduction of through-freight trains passing through the heart of San Antonio, a significant public benefit to the San Antonio metropolitan area.

The task of relocating through-freight operations along the Austin Subdivision would be a significant undertaking; however, it could be completed incrementally by upgrading certain sections while constructing new alignments, although such phasing may not be supported by UP. The added benefits that may be provided to the traveling public in terms of increased safety and providing avenues of transportation alternatives may warrant the expense.

The potential public benefits associated with the relocation of through-freight rail services in the corridor could include:

- Reductions in public exposure at roadway-rail crossings (vehicular delay, accidents, horn noise) by moving the route outside of the Austin and San Antonio metro areas and other communities including Taylor, Elgin, Bastrop, Lockhart, and San Marcos,
- Reductions in hazardous materials movements within urban areas,

- Improvements to air quality from reductions in vehicular idling and reduced locomotive operations,
- Reductions in fuel usage for vehicular traffic,
- Improvements in economic development opportunities, and
- Possible implementation of commuter rail services in the existing corridor.

Potential benefits to UP could include:

- Reductions in train accident exposure at highway-rail grade crossings,
- Possible increases in freight rail capacity,
- Improvements in train operating efficiency along the new route,
- Possibility of the railroad to "grow business" due to possible increases in capacity,
- Short term reductions in maintenance expenses on the newly constructed alignments, and
- Reductions in Total Central Curve Angle which may correlate to reductions in wear and tear on locomotives, rolling stock, roadbed, track and structures.

Identified Infrastructure Improvements

Improvements identified in this study for the 12-county San Antonio region comprised of Atascosa, Bandera, Bexar, Comal, Frio, Guadalupe, Kendall, Kerr, McMullen, Medina, Uvalde, and Wilson Counties are categorized as:

- Grade crossing improvements consisting of grade separations (bridges to separate the streets from the railroad) and grade crossing closings (closing and rerouting the street at the intersection with the railroad)
- Railroad infrastructure improvements to existing railroad infrastructure to improve capacity and connectivity on existing rail lines
- Possible railroad bypass alternatives (the relocation of through-freight trains to new rail corridors)

Grade Crossing Improvements

The study team analyzed at-grade crossings in the region and evaluated the crossings based on roadway and rail alignments, vehicular and train traffic counts, and crossing accident information.

Every crossing in the region has not been evaluated; rather the analysis of grade crossings was limited to those locations which the traffic data analysis (average traffic volumes of vehicles and trains) and RTC modeling results warranted further review. There are multiple crossings initially identified as candidates for grade separations or closures that may remain at-grade due to lower vehicular traffic volumes and/or an excessive additional travel distance required to reroute traffic. The identification of grade separations or closures should not be misconstrued as a final listing, but rather as a list of improvements that may ultimately require additional analysis and additions as well.

Grade separations consist of roadway overpasses and underpasses that separate vehicular traffic from rail traffic, minimizing the safety exposure associated with the roadway/rail interface. The number of roadways, estimated costs and associated public benefits identified as potential grade separations is provided in Table 7-1. The potential grade separations are listed individually with supporting detail such as location, AADT, number of crossing accidents within the past five years, estimated cost, public benefit, and benefit/cost ratios in Appendix G. All potential grade separations are classified as level 3 improvements and may be ranked by the ratio of estimated public benefit to the estimated cost of implementation.

Railroad Subdivision	Number of Identified Grade Separations	Estimated Cost	Estimated Public Benefit (20-year)	Ratio: Benefit/Cost (20-year)
Austin ML-1	21	$ 267,900,000	$ 290,020,000	1.08
Austin ML-2	10	$ 177,800,000	$ 74,910,000	0.42
Corpus Christi	9	$ 84,200,000	$ 39,980,000	0.47
Del Rio	11	$ 126,300,000	$ 218,800,000	1.73
Glidden	8	$ 165,900,000	$ 103,080,000	0.62
Laredo	7	$ 101,700,000	$ 60,560,000	0.60
Total:	66	$ 923,800,000	$ 787,350,000	0.85

Table 7-1: Summary of Potential Grade Separations

A breakdown of the order of magnitude cost estimates and the estimated associated public benefits are included in Appendix C and Appendix G, respectively.

Crossing closures consist of closing a roadway at the point where the roadway traverses the railroad. A crossing closure may require an alternate route for vehicular through-traffic. Crossing closures minimize the safety hazards associated with the vehicle/train interface; however, only crossing closures that would redirect traffic to a grade separated structure include the calculated associated public benefits. A list of crossings identified for potential closure is provided in Table 7-2, with supporting detail such as location, AADT, number of crossing accidents within the past five years, estimated cost, public benefit, and benefit/cost ratios listed in Appendix G. All potential crossing closures are classified as level 3 improvements and may be ranked by the ratio of estimated public benefit to the estimated cost of implementation.

Railroad Subdivision	Number of Identified Crossing Closures	Total Estimated Cost	Estimated Public Benefit (20-year)	Ratio: Benefit/Cost (20-year)
Austin ML-1	26	$ 1,300,000	$ 18,480,000	14.22
Austin ML-2	4	$ 200,000	$ 5,550,000	27.75
Corpus Christi	3	$ 150,000	$ 1,000,000	6.67
Del Rio	21	$ 1,050,000	$ 53,980,000	51.41
Glidden	2	$ 100,000	$ 440,000	4.40
Laredo	9	$ 450,000	$ 9,400,000	20.89
Total:	65	$ 3,250,000	$ 88,850,000	27.34

Table 7-2: Potential Crossing Closures

A breakdown of the order of magnitude cost estimates and the estimated associated public benefits are included in Appendix C and Appendix G, respectively.

Railroad Improvements

Rail capacity enhancements foster the economic growth of the region by improving the efficiency of freight rail operations as well as minimizing disturbance to residents of the region. Providing additional rail capacity relieves congestion along the rail corridors and allows trains to pass through the region more quickly. Examples of rail capacity enhancements are listed as follows:

- Adding a mainline track
- Adding switches and passing sidings at strategic locations to allow trains to pass one another or to idle without causing delays
- Expanding rail yard capacity
- Constructing connections from one rail line to another to improve rail traffic mobility
- Relocating rail yard and/or intermodal facilities
- Relocating through-freight rail traffic onto new alignments (bypass routes)

Any improvements to rail capacity or network efficiency within the San Antonio area could impact the regional rail network as well. To fully understand and quantify the impact of proposed improvements, the identified improvements (which may be deemed local to the San Antonio area) must also be viewed in perspective to the overall rail network as modeled. The improvements in and around the study area may have a direct impact on inbound and outbound rail freight movements within the study area and beyond. Consequently, the analysis of rail infrastructure improvements must be regional in nature, with detail given to the immediate San Antonio area.

RTC modeling results indicated that significant delays occur in the San Antonio area east of Kirby Yard on the Glidden Subdivision and at Tower 112 on the Del Rio Subdivision, located southwest of Kirby Yard. The greatest number of dispatching conflicts was shown to occur on the Austin Subdivision ML 1 between San Antonio and Adams and on the Kerrville Subdivision between Tower 112 and Apache Junction.

There has been some improvement to the delays experienced at Apache Junction with the implementation of the new Comal Street bypass. Until August 2006, the Kerrville Subdivision ran in a southerly direction down the middle of S. Comal Street near the Bexar County Jail, crossing Commerce, Buena Vista, Matamoros, El Paso, and Guadalupe Streets as well as several smaller streets prior to crossing the Austin Subdivision ML 1 at-grade with a crossing diamond at Apache Junction. There was no direct route into San Fernando Yard, located one block east of the Kerrville Subdivision, and southbound trains were required to cross at Apache Junction and then reverse into the yard. The Comal Street bypass alignment removed this portion of the Kerrville Subdivision track starting in the vicinity of Comal and Morales Streets at the north end. This created a direct connection onto the Austin Subdivision ML 1 and the north end of San Fernando Yard, eliminating the crossing diamond at Apache Junction and the reverse moves at Tower 112.

Additionally, rail infrastructure enhancements, geared toward accommodating the increase in train volumes, are currently being undertaken by the railroads themselves, and will be discussed later in this section.

However, improvements within the San Antonio area alone may not provide the regional relief necessary to consistently maintain fluid train movements through the entire region, hence the need to consider improvements that extend beyond San Antonio to Macdona, San Marcos, Lockhart, Austin, Taylor, and Hearne.

A list of potential improvements to the existing rail network is provided in Table 7-3, along with estimated costs and identified improvement classifications (near-, mid-, or long-range). The improvements are targeted at improving the operation of train traffic, with forecasted growth, and may have long lasting effects on the movement of freight through the region. None of these improvements have been constructed nor are currently under construction. Order of magnitude estimates for the identified rail improvements are included in Appendix D.

Improvement	Railroad Subdivision	Estimated Cost	Classification Level	Description of Work
1	Del Rio	$6,520,000	4	Construct second mainline Alamo Jct. to Withers Jct.
2	Del Rio	$ 6,460,000	4	Construct a second mainline and switches on the Del Rio Subdivision between East Yard and Kirby Yard milepost 203.5 to 201.4
3	Corpus Christi	$ 5,340,000	4	Construct a 9000' siding track and switches adjacent to the Corpus Christi Subdivision near the lead track to the Toyota Facility
4	Lockhart to Austin ML-1	$ 880,000	1	Construct new connection track between Austin ML1 and Lockhart Subdivisions in San Marcos.
5	Del Rio to Glidden	$ 3,370,000	1	Extend the new second mainline of the Del Rio Subdivision at milepost 201.40 one mile north to "Seven States Corporate Park"
6	Del Rio	$ 1,310,000	1	Construct new switches on the Del Rio Subdivision near Quintana Road for a proposed connection into the north end of SoSan Yard
7	Corpus Christi	$ 25,190,000	4	Extend the new Mauermann Siding north and south as a second mainline to SoSan Yard
8	Laredo	$ 2,740,000	4	Construct new Laredo Subdivision mainline track approximately 1.0 miles from SoSan Yard west to Heafer Junction
9	Austin ML-1 to Del Rio	$ 3,000,000	1	Construct new connections in the northeast and northwest quadrants of the Austin ML-1 and Del Rio Subdivision diamond south of San Fernando Yard and Apache Jct.
10	Austin ML-2	$ 6,190,000	4	Extend and connect Fratt and Remount Auto Facility sidings to join Austin ML-2
11	Austin ML-1	$ 5,020,000	4	Extend Hestes and Hutto sidings (Austin ML 1, south of Taylor) to just over 2 miles in length
12	Austin ML-1	$ 6,080,000	4	Extend Landas Park siding (Austin ML-1) to a length of 2.9 miles
13	Austin ML-1	$ 4,480,000	4	Extend and connect both North Loop and Adams sidings (Austin ML-1) to create a 3.74 mile long passing siding
14	Laredo	$ 6,010,000	4	Upgrade/extend Pearsall storage track (Laredo Sub.) to a 2.9 mile siding
15	Glidden	$ 4,910,000	4	Upgrade/extend Converse storage track (Glidden Sub. East of Kirby Yard) to a 2 mile long siding
16	Lockhart to Waco	$ 21,670,000	4	Install full CTC between Taylor, Smithville, and San Marcos
17	Austin ML-1	$ 8,620,000	4	Siding upgrades between Round Rock and San Antonio to provide sufficient locations for train meets (7 locations)
18	Austin ML-1	$ 900,000	1	Upgrade Austin ML-1 sidings to CTC at Adams, Landas Park, Texas Lehigh, Buda, Austin, McNeil and White Lime
19	Del Rio	$ 6,040,000	4	Construct an additional Del Rio Sub-division main track west and adjacent to the Del Rio Subdivision to Macdona
20	Lockhart	$ 5,040,000	4	Construct one new siding west of Lockhart
21	Lockhart	$ 10,080,000	2	Upgrades to Lockhart (curve modifications and line swings)
22	Lockhart	$ 15,060,000	4	Construct 3 new sidings between Lockhart and Smithville
23	Waco	$ 9,620,000	4	Construct 2 new sidings between Smithville and Phelan
24	Waco	$ 5,880,000	2	Upgrades to Phelan (curve modifications and line swings)
25	Waco	$ 5,040,000	2	Construct new siding between Phelan and Elgin
26	Waco	$ 1,590,000	4	Upgrades to Elgin by Extending Siding (consider 12.3 mile line change)
27	Waco	$ 5,040,000	4	Construct new siding between Elgin and Taylor
28	Waco to Austin ML-1	$ 1,340,000	1	Construct a new connection at Taylor between the between the Waco and Austin Subdivisions (consider bypass route)
Total:		$183,420,000		

Table 7-3: Identified Potential Rail Improvements

The improvements in Table 7-3 are not based on evaluations of engineering feasibility but rather required upgrades in order to improve train operations as suggested by the simulation exercises. Alternative capacity increases in the same general areas would provide basically the same level of improvement to train operations.

Observations of train movements over the rail network show that the current one-way operating pattern on the Austin Subdivision between San Marcos, Taylor, and Hearne can accommodate additional growth with track improvements. This could allow for additional capacity to accommodate rock trains between Taylor and McNeil and operationally assist the northerly flow of one-way freight traffic. South of San Marcos, where there is significant bi-directional traffic, improvements would be needed to increase capacity even with two existing tracks available. The added improvements would be necessary to improve the flow of traffic in the greater San Antonio area, including traffic growth on the Laredo and Glidden Subdivisions that does not directly impact service on the Austin Subdivision.

It is difficult without a detailed economic analysis and benefit/cost study to establish the financial benefits resulting from infrastructure improvements, although the majority of improvements discussed in this section are anticipated to contain an associated, although not necessarily quantified, benefit for the railroads.

Potential benefits that may be realized by the railroads as a result of the modeled improvements may include:

- Reduced exposure to roadway-rail crossings
- Improved train operating efficiency
- Reduced train delays
- Improved train run-times
- Reduced public exposure in general

Benefits to the private sector are based on the degree to which operational performance measures such as train mileage, run time, and delay time for each planning case change relative to those of the base case. Each performance measure has been translated to an economic value using the following unit costs:

- Train mileage = $51.23/mile
- Run time or delay time = $407.19/hour
- Fuel = $3.33/gallon[2]

The train mileage cost of $51.23/mile is a representative industry cost that reflects rail operating expense per train mile. The run and delay time cost of $407.19/hour assumes a 60:40 ratio of yard-to-line haul operating times within San Antonio, where expected yard operating expenses are $285.82 per hour and line haul operating expenses are $589.24 per hour.

[2] Houston Spot Diesel Prices, Argus Rail Business, Vol. 14,16, April 21, 2008.

Rail Infrastructure Improvement Planning Cases

The identified potential rail improvements (listed in Table 7-3) were used to develop planning cases, as discussed in the following section, and modeled in RTC. Planning cases, representing improvements and/or relocations, were investigated with the ultimate goal of improving train mobility and efficiency as well as addressing the areas of greatest congestion within the network. As the tables following each RTC planning case will show, a comparison of the performance measures listed below is made between the base case and the potential improvements included in the planning cases.

Operating performance of trains is measured by the following:

- Total Run Time
- Stop/Delay Time
- Delay Percentage
- Delay per 100 Train Miles
- Average Train Speed

The total run time is the average daily hours of train operation in each part of the network. This time includes dwell time for train make-up, en route switching, crew changes, fueling, or other activities. Stop or delay time also is shown as average daily hours. A delay percentage is calculated as the stop time as a share of total run time. For the respective segments, the stop time represents the total time that trains are stopped awaiting meets with other trains, or because of track congestion ahead. It does not include acceleration and deceleration times associated with train stop time, because that time may be split between segments. However, stop time for the total network does include acceleration and deceleration times as part of the overall measure of delay, so the resulting delay percentage calculations for the individual segments are not directly comparable with the delay percent for the total network. The tabulated RTC results for each planning case include the minutes of delay per 100 train miles, the average speed of all trains operated in each segment as well as on the full network, fuel in gallons, and gallons consumed per mile.

Base Case

Existing railroad infrastructure and operations were analyzed to develop an RTC base case model for comparison to potential alternatives and improvements. The RTC model was run for each case (base case and planning cases) for a four week simulation period, which accounts for day to day variances in operations. The cases were run for the full network, including the lines to Hearne via Austin, Smithville, and Giddings. The base case for measurement of the impact or benefit of proposed capacity improvements is the performance of the current network.

Eight additional daily trains were added to the simulation to represent anticipated traffic growth with the opening of the Toyota Assembly Plant, so that this set of simulations reflects expected train operations during the coming year. Similarly, several track improvement projects recently completed or now underway to support the Toyota operation were incorporated into the network to reflect anticipated operations when the plant opens. These improvements make up the base case simulation. Simulation results for this case are shown in Table 7-4.

RTC Performance Measure	**Base Case Results**
Trains Operated (28 days)	2,891
Train Miles (28 Days)	359,028
Total Run Time Hours (Avg. Daily Hours)	496.2
Delay Time Hours (Avg. Daily Hours)	86.6
Delay Percentage	17.50%
Delay Minutes/100 Train Miles	40.52
Average Speed	25.8
Fuel (gallons)	2,956,784
Gallons/Train Mile	8.2

Table 7-4: RTC Base Case Summary

Planning Cases A, B1, B2, and C test possible bypass routes that may route trains around metropolitan areas such as San Antonio, San Marcos, New Braunfels, and Austin. Tables 7-5 and 7-6 show estimated costs and route mileages for the four planning cases, and are followed by detailed discussions of each planning case.

Following the discussion of Planning Cases A, B1, B2, and C are four additional Planning Cases 1 through 4, which test improvements intended to improve railroad operating efficiency and performance in the region.

	Limits	Miles	Cost
PC A - SA Bypass	Seguin (Glidden MP 170) to Macdona (Del Rio MP 223) via San Antonio Bypass		**$1,369,610,000**
Upgrades to Existing Track	Marion (Glidden MP 187) to Glidden MP 170	17	$166,290,000
North Seguin Bypass	Glidden MP 170 to Glidden MP 175	9	$99,590,000
San Antonio Bypass	Glidden MP 175 to Macdona (Del Rio MP 223)	59	$725,730,000
Grade Separations (14 Roadway and 2 Rail) on Bypass Route	Seguin (Glidden MP 170) to Macdona (Del Rio MP 223)	n/a	$163,000,000
Macdona Yard w/ Fueling Facility	Macdona	n/a	$200,000,000
Marion Yard	Glidden MP 187	n/a	$15,000,000
PC B (1) - AUS Bypass	Taylor (ASML MP 144) to Seguin (Glidden MP 170) via Austin Bypass, Seguin to Macdona via Glidden/ Del Rio Sub		**$1,595,850,000**
Upgrades to Existing Track	Seguin (Glidden MP 170) to East Yard (Del Rio MP 207)	37	$400,720,000
Upgrades to Existing Track	Tower 112 (Del Rio MP 211) to Tower 105 (Del Rio MP 213)	2	$47,780,000
Upgrades to Existing Track	Tower 105 (Laredo MP 260) to SoSan Yard (Laredo MP 264)	4	$93,450,000
Taylor to Lockhart Bypass	Taylor (ASML MP 144) to Lockhart	52	$656,930,000
Lockhart to Seguin Bypass via SH 130 Seg. 6	Lockhart to Seguin (North end of North Seguin Bypass at Glidden MP 170)	25	$328,970,000
8 Roadway Grade Separations on Bypass Route	Taylor to Seguin (Glidden MP 170)	n/a	$68,000,000
PC B (2) - AUS Bypass	Taylor (ASML MP 144) to Seguin (Glidden MP 170) via		**$1,741,260,000**
Upgrades to Existing Track	Seguin (Glidden MP 170) to Wye (Del Rio MP 206)	36	$400,720,000
Upgrades to Existing Track	Wye to Tower 112 via ASML 2	5	$127,160,000
Upgrades to Existing Track	Tower 112 (Del Rio MP 211) to Tower 105 (Del Rio MP 213)	2	$47,780,000
Upgrades to Existing Track	Tower 105 (Laredo MP 260) to SoSan Yard (Laredo MP 264)	4	$93,450,000
Taylor to Lockhart Bypass	Taylor (ASML MP 144) to Lockhart	52	$656,930,000
Lockhart to Seguin Bypass via SH 130 Seg. 6	Lockhart to Seguin (North end of North Seguin Bypass at Glidden MP 170)	25	$328,970,000
8 Roadway Grade Separations on Bypass Route	Taylor to Seguin (Glidden MP 170)	n/a	$68,000,000
2 Grade Separations and 1 Crossing Closure on ASML 2	Wye to Tower 112 via ASML 2	n/a	$18,250,000
PC C - SA & AUS Bypass	Taylor to Macdona (Del Rio MP 223) via Austin and San Antonio Bypasses		**$2,423,510,000**
Upgrades to Existing Track	Marion (Glidden MP 187) to Seguin (Glidden MP 170)	17	$166,290,000
Taylor to Lockhart Bypass	Taylor (ASML MP 144) to Lockhart	52	$656,930,000
Lockhart to Seguin Bypass via SH 130 Seg. 6	Lockhart to Seguin (North end of North Seguin Bypass at Glidden MP 170)	25	$328,970,000
North Seguin Bypass	Glidden MP 170 to Glidden MP 175	9	$99,590,000
San Antonio Bypass	Glidden MP 175 to Macdona (Del Rio MP 223)	59	$725,730,000
Grade Separations (22 Roadway and 2 Rail) on Bypass Route	Taylor to Macdona (Del Rio MP 223)	n/a	$231,000,000
Macdona Yard w/ Fueling Facility	Macdona	n/a	$200,000,000
Marion Yard	Glidden MP 187	n/a	$15,000,000

Table 7-5: Estimated Planning Case Costs

Mileage Comparison	Limits	Miles
San Antonio Bypass (including North Seguin Bypass)	Macdona to Seguin	68
Existing Route	Macdona to Seguin via Del Rio Sub	54
Austin Bypass (PC B1)	Taylor to Seguin via Bypass, Seguin to Macdona via Del Rio Sub	131
Austin Bypass (PC B2)	Taylor to Seguin via Bypass, Seguin to Wye Connection at ASML 2, Wye to Tower 112 via ASML 2, Tower 112 to Macdona via Del Rio Sub	131
Existing Route	Taylor to Macdona via ASML 1 and Del Rio Sub	127
Combined San Antonio and Austin Bypass	Macdona to Taylor via Bypass	145
Existing Route	Taylor to Macdona via ASML 1 and Del Rio Sub	127

Table 7-6: Estimated Planning Case Route Mileages

Planning Case A – San Antonio Bypass

Planning Case A analyzed the base case plus a possible San Antonio bypass with new yards at Marion and Macdona. The San Antonio bypass alternative consists of a potential new double track rail corridor for an approximate length of 68 miles that would bypass San Antonio between Seguin (where the bypass would connect to the existing Glidden Subdivision line) and Macdona (where the bypass would connect to the existing Del Rio Subdivision). Planning Case A also includes upgrades to existing track between Marion and the connection with the possible Austin bypass in Seguin. The new yard at Marion would replace most of the activities currently completed at East Yard. The new yard at Macdona would serve as a fueling facility for through-trains. The conceptual location of the possible San Antonio bypass is shown in Figure 7-2. The estimated cost of Planning Case A is approximately **$1.37 billion**, including the cost of identified grade separated roadway and rail crossings.

Trains that could be rerouted to a San Antonio bypass consist of through-trains primarily from the Glidden and Del Rio Subdivisions, coal trains that serve regional power plants, and intermodal trains that are currently serviced at either SoSan or East Yards. However, local service trains, rock trains to and from Hunter (north of San Antonio), passenger trains (Amtrak Texas Eagle and Sunset Limited routes), and international freight from Laredo that is destined for SoSan Yard would remain on existing rail lines.

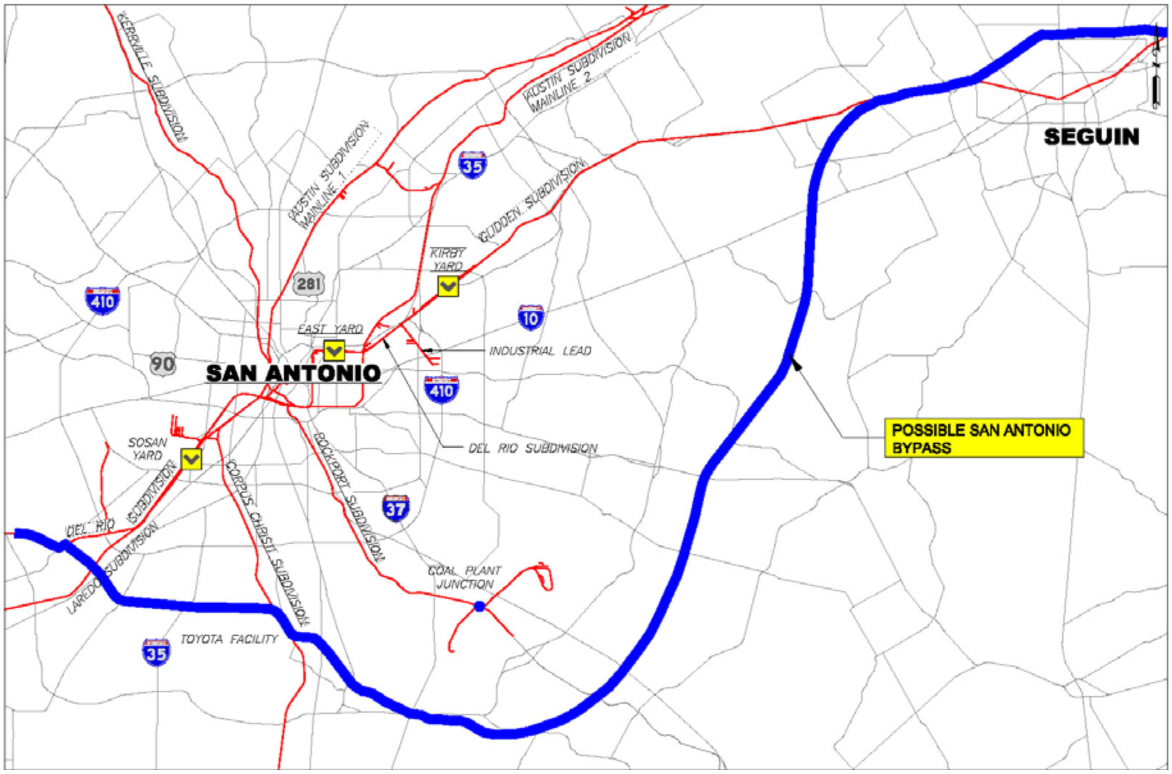


Figure 7-2: Possible San Antonio Bypass
(note: conceptual bypass route shown is for illustrative purposes only)

Table 7-7 and Figure 7-4 show daily train counts on existing subdivisions for the base case (no-build) scenario and the bypass scenario, as well as the projected percent reduction in daily trains on existing lines resulting from the possible bypass route. As shown in Table 7-7, the possible San Antonio bypass route is projected to provide reductions in daily train volumes ranging from 3 to 20 daily trains (25 to 70 percent) on existing lines running through San Antonio, depending on location. Although, the daily train volume would be increased by 13 trains on the Glidden Subdivision between Flatonia and Seguin.

Railroad Subdivision	Daily Trains		Percent Change
	Base Case	Bypass Case	
Possible San Antonio Bypass, Seguin to Macdona	N/A	31	100%
Austin Subdivision ML 1, East of Taylor	22	13	-41%
Austin Subdivision ML 1, Taylor to Round Rock	30	21	-30%
Austin Subdivision ML 1, Round Rock to San Marcos	25	16	-36%
Austin Subdivision ML 1 and 2, San Marcos to Garden Ridge	36	23	-36%
Austin Subdivision ML 1, Garden Ridge to San Antonio (Twr 105)	22	16	-27%
Austin Subdivision ML 2, Garden Ridge to Del Rio Sub	10	3	-70%
Austin Subdivision ML 2, Del Rio Sub to Downtown San Antonio (Twr 112)	10	3	-70%
Corpus Christi Subdivision, SoSan Yard to Toyota Plant	13	5	-62%
Del Rio Subdivision, Kirby to Downtown San Antonio (Twr 105)	35	15	-57%
Del Rio Subdivision, Downtown San Antonio (Twr 105) to Macdona	24	5	-79%
Del Rio Subdivision, Macdona to Hondo	27	27	0%
Glidden Subdivision, Flatonia to Seguin	27	40	48%
Glidden Subdivision, Seguin to Kirby	27	13	-52%
Laredo Subdivision, San Antonio to Gessner	18	11	-39%
Laredo Subdivision, Gessner to Melon	18	18	0%
Lockhart Subdivision, San Marcos to West Point	12	9	-25%

Table 7-7: Daily Train Counts and Percent Change Resulting from Possible San Antonio Bypass

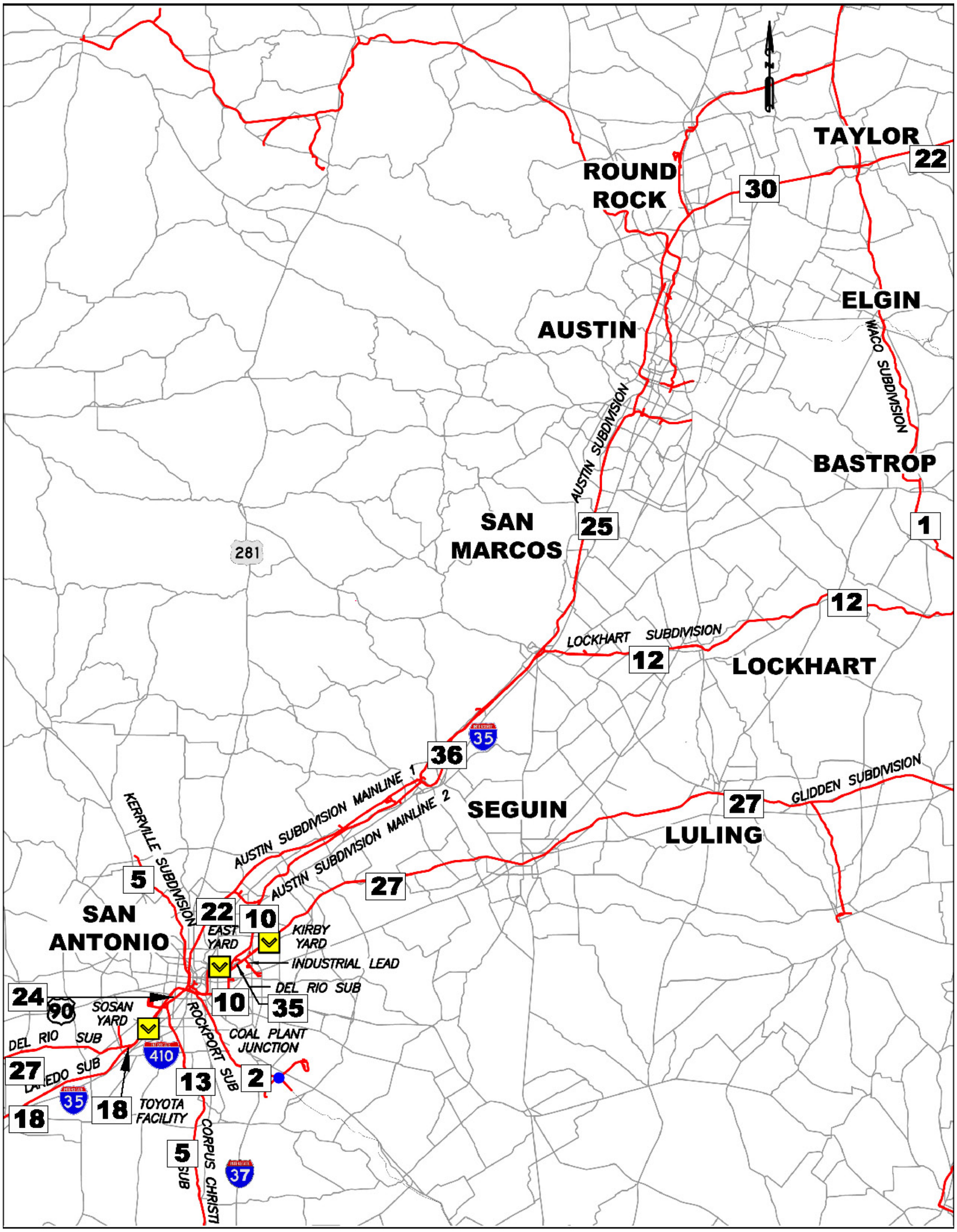


Figure 7-3: Avg. Daily Trains for Base Case Scenario (No-Build)

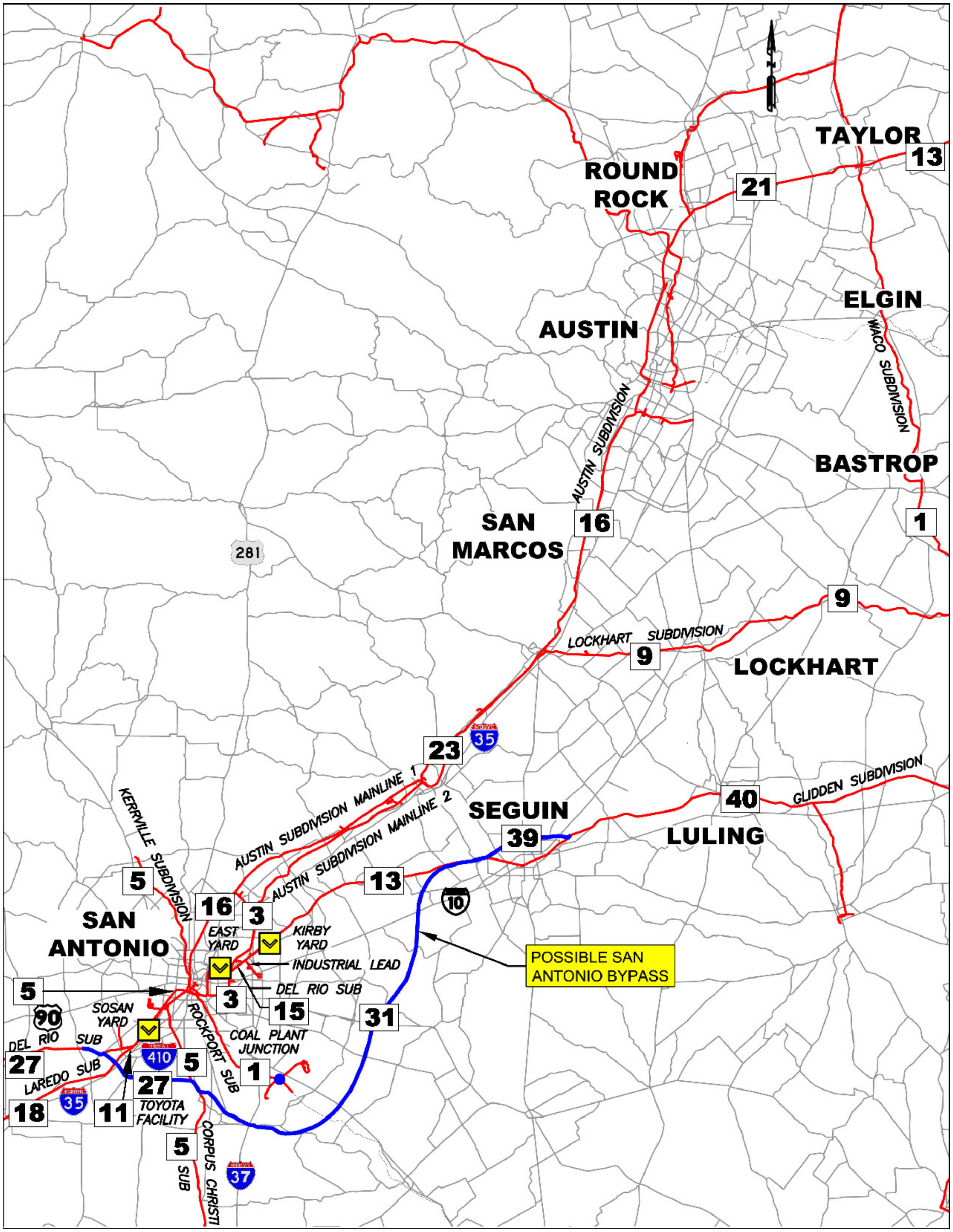


Figure 7-4: Avg. Daily Trains for Planning Case A (Possible San Antonio Bypass)
(note: conceptual bypass route shown is for illustrative purposes only)

Public Benefit Analysis

Currently, railroad operations and major truck routes pass directly through San Antonio central business districts. With many of the top employers of the region centrally located, the exposure of truck and rail freight movement to the traveling public brings with it a potential increase in exposure to hazardous materials transportation and increased safety hazards and delays in general.

The potential public benefits associated with the relocation of through-freight rail services from existing rail lines in the region to a San Antonio bypass (from Seguin to Macdona) could include:

- Reductions in vehicular delays and improved safety at highway-rail grade crossings,
- Improvements to air quality resulting from reductions in vehicular idling and reduced locomotive operations,
- Reductions in fuel usage for vehicular traffic, improvements in economic development opportunities, and
- Reductions in hazardous materials movement within urban areas.

The San Antonio bypass was shown to benefit the public by reducing train traffic through the urban and residential areas of San Antonio. Additionally, the possible bypass provides public benefit by reducing train traffic through cities located along the rail lines throughout the entire modeled network between San Antonio and Taylor, such as New Braunfels, San Marcos, and Austin. The reduction in train traffic, in turn reduces the safety hazards and delays motorists experience at roadway-railroad crossings in the region. The possible bypass imposes a public cost burden due to the introduction of train traffic between Seguin and Macdona; however, this burden is offset by a reduction in the public burden associated with roadway-railroad crossings along the existing subdivisions.

Grade Crossing Impedance Reduction

The estimated public benefit of the possible San Antonio bypass (from Seguin to Macdona) resulting from the reduction in public burden associated with the at-grade roadway-railroad crossings was calculated to be more than **$348 million**, as shown in Table 7-8. The public benefits shown in Table 7-8 extend beyond the San Antonio study area to include benefits in Hays, Travis, and Williamson Counties, since the impact of the bypass extends throughout the entire region.

Railroad Subdivision	No-Build Scenario	Bypass Scenario (A)	Bypass Benefit (difference)
Austin Subdivision (San Marcos to Williamson County Line)	$297,030,000	$185,580,000	$111,450,000
Austin No 1 (San Marcos to Downotwn San Antonio)	$454,610,000	$271,850,000	$182,760,000
Austin No 2 (San Marcos to Downotwn San Antonio)	$91,390,000	$32,640,000	$58,750,000
Corpus Christi (Downtown San Antonio to Toyota Plant)	$78,170,000	$114,510,000	-$36,340,000
Del Rio (Kirby to Macdona)	$324,240,000	$175,570,000	$148,670,000
Giddings (Flatonia to Mumford)	$18,990,000	$25,520,000	-$6,530,000
Glidden (Flatonia to Kirby)	$92,530,000	$51,800,000	$40,730,000
Kerrville	$143,190,000	$108,320,000	$34,870,000
Laredo (Downtown San Antonio to Gessner)	$123,390,000	$175,600,000	-$52,210,000
Lockhart (San Marcos to Smithville)	$44,130,000	$24,540,000	$19,590,000
Rockport	$34,290,000	$4,720,000	$29,570,000
Waco (Smithville to Taylor)	$8,720,000	$9,550,000	-$830,000
Subtotal:	**$1,710,680,000**	**$1,180,200,000**	**$530,480,000**
Possible Bypass without Grade Separations	$0	$182,360,000	-$182,360,000
Total (without grade separations on bypass)			**$348,120,000**
Possible Bypass with Grade Separations	$0	$29,060,000	-$29,060,000
Total (with grade separations on bypass)			**$501,420,000**

Table 7-8: Public Costs at Roadway-Railroad Crossings (for a 20-year period)

The public cost burden due to the introduction of train traffic on a Seguin-Macdona route, shown in Table 7-8 as approximately **$182 million**, would be significantly reduced by grade separating or closing some of the roadway-railroad crossings along the corridor. Interstate crossings along the route such as I-35, I-37, and I-10 would be required to be grade separated in order to comply with Federal Highway Administration (FHWA) regulations, and, therefore are included as part of the base cost.

Additional crossings along the route were analyzed and determined to be candidates for potential grade separation based on traffic flow volumes for both vehicular and train traffic. The potential grade separations are listed in Table 7-9 with their associated average daily traffic volumes for vehicles (AADT) and trains, as well as their estimated costs, and estimated public benefits. In all, the grade separations identified would reduce the public cost burden of the bypass by approximately **$153 million**, thereby increasing the public benefit of the bypass to approximately **$501.4 million** as shown in Table 7-8.

Street Name	City Name	AADT	Estimated Cost	20-Year Benefit (2007 dollars)	Benfit/ Cost Ratio
IH 35 (Mainlanes and frontage roads)	San Antonio	44,500	$16,000,000	$37,390,000	2.34
FM 2790 (Somerset Road)	San Antonio	5,200	$8,000,000	$2,890,000	0.36
SH 16	San Antonio	19,400	$8,000,000	$10,980,000	1.37
US HWY 281	Cassin	14,000	$12,000,000	$6,790,000	0.57
IH 37 (Mainlanes and frontage roads)	Buena Vista	49,000	$16,000,000	$38,440,000	2.40
Loop 1604	Buena Vista	5,000	$8,000,000	$2,860,000	0.36
US HWY 181	Saspamco	18,400	$12,000,000	$8,720,000	0.73
FM 3432 (Sulphur Springs Road)	La Vernia	3,300	$8,000,000	$1,650,000	0.21
US HWY 87	Adkins	10,500	$12,000,000	$4,600,000	0.38
FM 1346	St. Hedwig	1,900	$5,000,000	$990,000	0.20
IH 10 (Mainlanes and frontage roads)	Santa Clara	36,500	$16,000,000	$22,730,000	1.42
FM 78	McQueeney	5,500	$8,000,000	$2,650,000	0.33
SH 46	McQueeney	13,900	$10,000,000	$6,270,000	0.63
SH 123	Geronimo	14,000	$8,000,000	$6,340,000	0.79
Total:			**$147,000,000**	**$153,300,000**	**1.04**

Table 7-9: Potential Grade Separations on the Possible San Antonio Bypass Route (Seguin to Macdona)

Reduced Locomotive Emissions

Additionally, the San Antonio bypass provides public benefit in the form of reduced locomotive emissions (pollutants) in the region. The locomotive emissions reduction for the bypass is a function of the reduced run time hours and delay time hours from the base case, as listed in Table 7-11. Planning Case A provides a public benefit from reduced locomotive emissions over the 20-year study period of **$3.4 million** as shown in Table 7-10.

The total public benefits over a 20-year duration, assuming the crossings listed in Table 7-9 would be grade separated, are shown in Table 7-10 for Planning Case A.

Public Sector Benefits ($ million)	
Grade Crossing Impedance (Freight)	501.40
Locomotive Emssions Reduction	3.39
Total ($ million)	504.79

Table 7-10: Public Benefits for Planning Case A

The public benefit of the San Antonio bypass is the result of the relocation of freight trains out of urban and residential areas onto a bypass that runs predominately through rural areas. However, the San Antonio bypass scenario (without the Austin bypass) may not carry the potential for commuter rail implementation that would significantly increase the value of public benefit for the bypass. Commuter rail may not be feasible on existing rail lines in conjunction with a possible San Antonio bypass because the rail lines north of San Antonio (which would not be impacted significantly by the San Antonio bypass) may not sustain commuter rail operations due to the lack of available capacity from freight operations. The Austin bypass would reduce freight train volumes on existing lines north of San Antonio, thereby providing capacity that could potentially support commuter rail operations.

Private Benefit Analysis

Planning Case A provides significant performance benefits compared with the base case. Run time and stop time are reduced, and the delay ratio improves. Minutes of delay per 100 train miles drops, and average train speeds over the entire network increase. The addition of the bypass to the network removes more trains from the existing trackage, with a consequent reduction in conflicts and delays to the trains that remain on existing trackage.

Table 7-11 compares the simulation results of the base case to Planning Case A, and lists the net change in each RTC simulation parameter that is expected to occur upon implementation of this planning case. For example, construction of the San Antonio bypass from Macdona to Seguin would likely increase operating distances by 15,477 train miles over a 28-day period, resulting in the consumption of approximately 173,296 additional gallons of diesel fuel over the same time period. On the other hand, this planning case should reduce total run time by 11 hours per day.

RTC Performance Measure	Base Case Results	Planning Case A Results	Net Change
Trains Operated (28 days)	2,891	2,663	-228
Train Miles (28 Days)	359,028	374,505	15,477
Total Run Time Hours (Avg. Daily Hours)	496.2	485.3	-10.9
Delay Time Hours (Avg. Daily Hours)	86.6	86.4	-0.2
Delay Percentage	17.50%	17.8%	0.3%
Delay Minutes/100 Train Miles	40.52	38.76	-1.8
Average Speed	25.8	27.6	1.8
Fuel (gallons)	2,956,784	3,130,080	173,296
Gallons/Train Mile	8.2	8.3	0.1

Table 7-11: RTC Planning Case A Summary

Table 7-12 shows the economic benefit to the private sector over a 20-year study period, based on changes in performance measures attributable to Planning Case A as shown in Table 7-11. The methodology used in the analysis of private benefits is discussed in greater detail in section 10.

Relocation of train traffic to an outer San Antonio bypass increases 20-year train mileage costs by $111.97 million and increases fuel costs by $81.49 million over this same period when discounted at a nominal cost of capital of 6.68 percent (see Appendix G for cost of capital calculations). This planning case also reduces 20-year run time and delay time costs by $17.60 million and $0.27 million respectively, resulting in a burden (i.e., costs minus savings) of approximately $176 million over the project life. However, the San Antonio bypass also provides a benefit in the form of reduced track maintenance and grade crossing accident costs of $8.92 million and $3.80 million, respectively. Total private sector costs and savings associated with Planning Case A amount to a net private sector cost of **$163 million**.

Private Sector Benefits ($ million)	
Freight Rail Operations:	
Train Miles	-111.97
Run Time	17.60
Delay Time	0.27
Fuel	-81.49
Track Maintenance Savings	8.92
Grade Crossing Accident Avoidance	3.80
Total ($ million)	-162.86

Table 7-12: Private Benefits for Planning Case A

Planning Cases B1 and B2– Austin Bypass

Planning Cases B1 and B2 each analyzed the base case plus an Austin bypass with a new intermodal yard at Macdona. The Austin bypass is a potential new rail corridor for an approximate length of 77 miles between Taylor (where the bypass would connect to the existing Austin Subdivision line) and Seguin (where the bypass would connect to the existing Glidden Subdivision) that would bypass Austin, San Marcos, and other towns. The conceptual location of an Austin bypass is shown in Figure 7-5.

In Planning Case B1, trains were routed via the existing Del Rio Subdivision between the possible Austin bypass connection in Seguin and railroad Tower 112, which is how trains are currently routed under existing conditions. Planning Case B1 also includes upgrades to existing track between Seguin and East Yard as well as between Tower 112 and SoSan Yard. The estimated cost of Planning Case B1 is **$1.6 billion**, including the cost of identified grade separated roadway-railroad crossings.

In Planning Case B2, trains were routed via the existing Austin Subdivision ML 2 between the possible Austin bypass connection in Seguin and railroad Tower 112. Planning Case B2 would require the construction of a new wye connection between the Del Rio Subdivision and Austin Subdivision ML 2. Planning Case B2 also includes upgrades to existing track between Seguin and the possible new wye connection along the Del Rio Subdivision, between the wye and Tower 112 on the Austin Subdivision ML 2, and between Tower 112 and SoSan Yard on the Del Rio Subdivision. The estimated cost of Planning Case B2 is **$1.74 billion**, including the cost of identified grade separated roadway-railroad crossings.

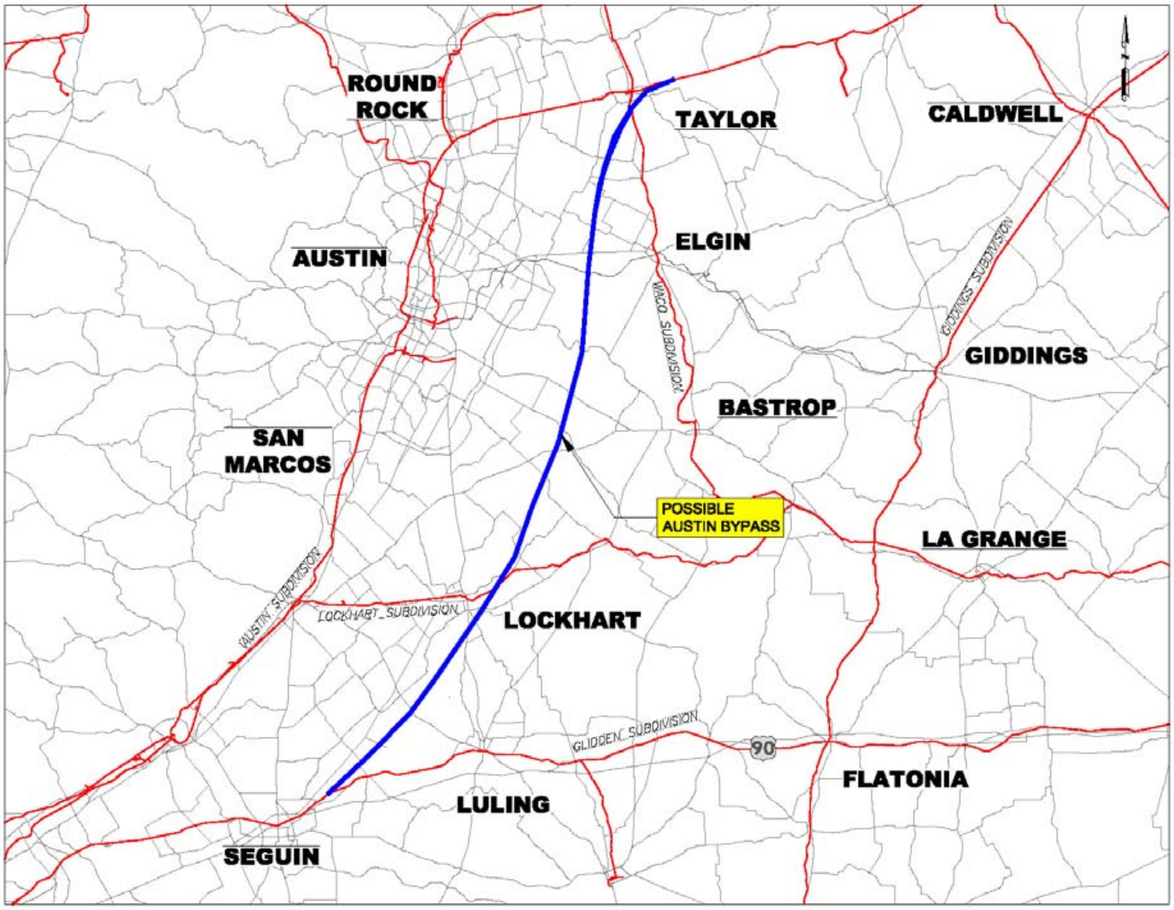


Figure 7-5: Possible Austin Bypass
(note: conceptual bypass route shown is for illustrative purposes only)

Figure 7-6 shows the location of the existing San Antonio rail network, including railroad Tower 112 and the connection between the Del Rio and Austin ML 2 Subdivisions.

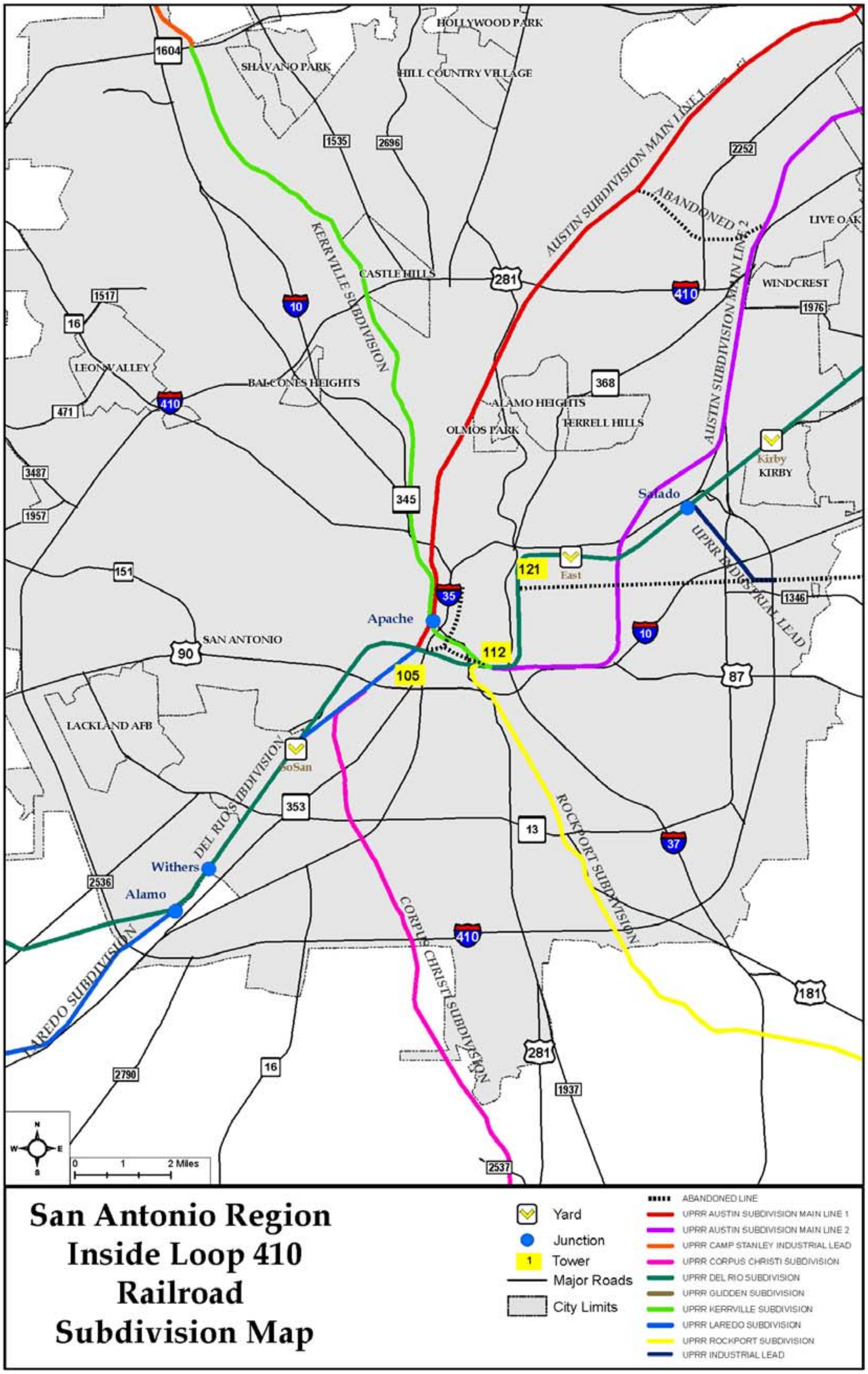


Figure 7-6: San Antonio Rail Network

Trains that may be rerouted to the Austin bypass include through-trains and manifest (mixed-freight) trains running north-south and destined for Hearne, Dallas-Fort Worth, and other destinations north of Austin. Trains that would remain on the existing rail lines consist of passenger trains (Amtrak Texas Eagle route), rock trains to Hunter and Georgetown, local trains providing service between Taylor and San Marcos, and coal trains (minimal). Additionally, connectivity would be maintained to Capital Metro owned freight lines in the region.

Table 7-13 and Figures 7-7 through 7-9 show the daily train counts on existing subdivisions for the base case (no-build) scenario and the bypass scenarios, as well as the projected percent reduction in daily trains on existing lines resulting from the possible bypass routes. As shown in Table 7-13, an Austin bypass route would provide reductions in daily train volumes of up to 23 daily trains on existing lines running through San Marcos, Austin, and various other cities, depending on location. Although, the daily train volumes would be increased on segments of the Austin Subdivision ML 1, Del Rio Subdivision, and the Glidden Subdivision.

Railroad Subdivision	Daily Trains			Percent Change (B1)	Percent Change (B2)
	Base Case	Bypass Case (B1)	Bypass Case (B2)		
Possible Austin Bypass, Seguin to Lockhart	N/A	28	28	100%	100%
Possible Austin Bypass, Lockhart to Taylor	N/A	29	29	100%	100%
Austin Subdivision ML 1, East of Taylor	22	33	33	50%	50%
Austin Subdivision ML 1, Taylor to Round Rock	30	13	13	-57%	-57%
Austin Subdivision ML 1, Round Rock to San Marcos	25	8	8	-68%	-68%
Austin Subdivision ML 1 and 2, San Marcos to Garden Ridge	36	12	12	-67%	-67%
Austin Subdivision ML 1, Garden Ridge to San Antonio (Twr 105)	22	8	8	-64%	-64%
Austin Subdivision ML 2, Garden Ridge to Del Rio Sub	10	1	1	-90%	-90%
Austin Subdivision ML 2, Del Rio Sub to Downtown San Antonio (Twr 112)	10	1	48	-90%	380%
Corpus Christi Subdivision, SoSan Yard to Toyota Plant	13	13	13	0%	0%
Del Rio Subdivision, Kirby to Downtown San Antonio (Twr 105)	35	56	10	60%	-71%
Del Rio Subdivision, Downtown San Antonio (Twr 105) to	24	36	36	50%	50%
Glidden Subdivision, Flatonia to Seguin	27	24	24	-11%	-11%
Glidden Subdivision, Seguin to Kirby	27	52	52	93%	93%
Laredo Subdivision, San Antonio to Gessner	18	18	18	0%	0%
Lockhart Subdivision, San Marcos to West Point	12	6	6	-50%	-50%

Table 7-13: Daily Train Counts and Percent Change Resulting from Possible Austin Bypass

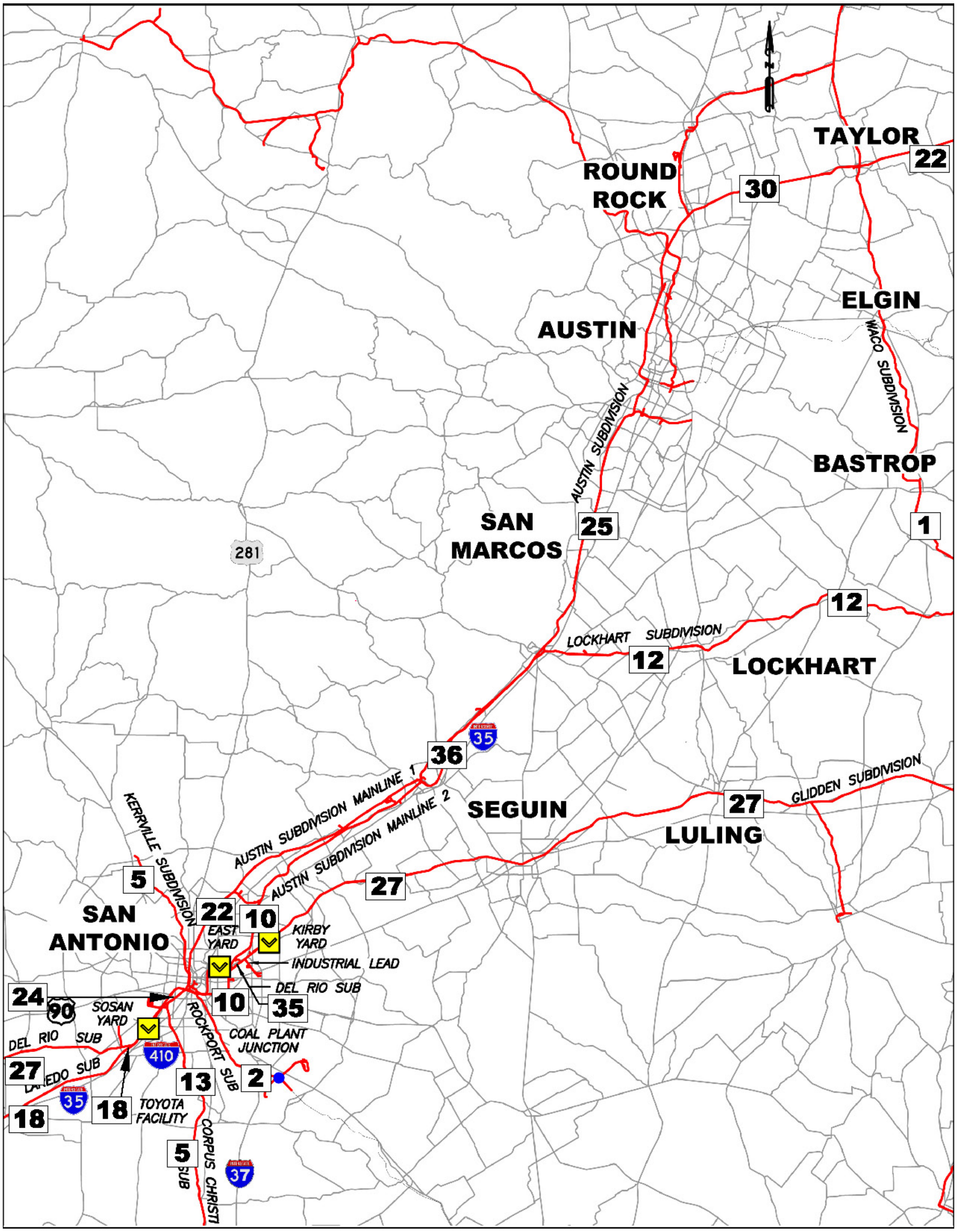


Figure 7-7: Avg. Daily Trains for Base Case Scenario (No-Build)

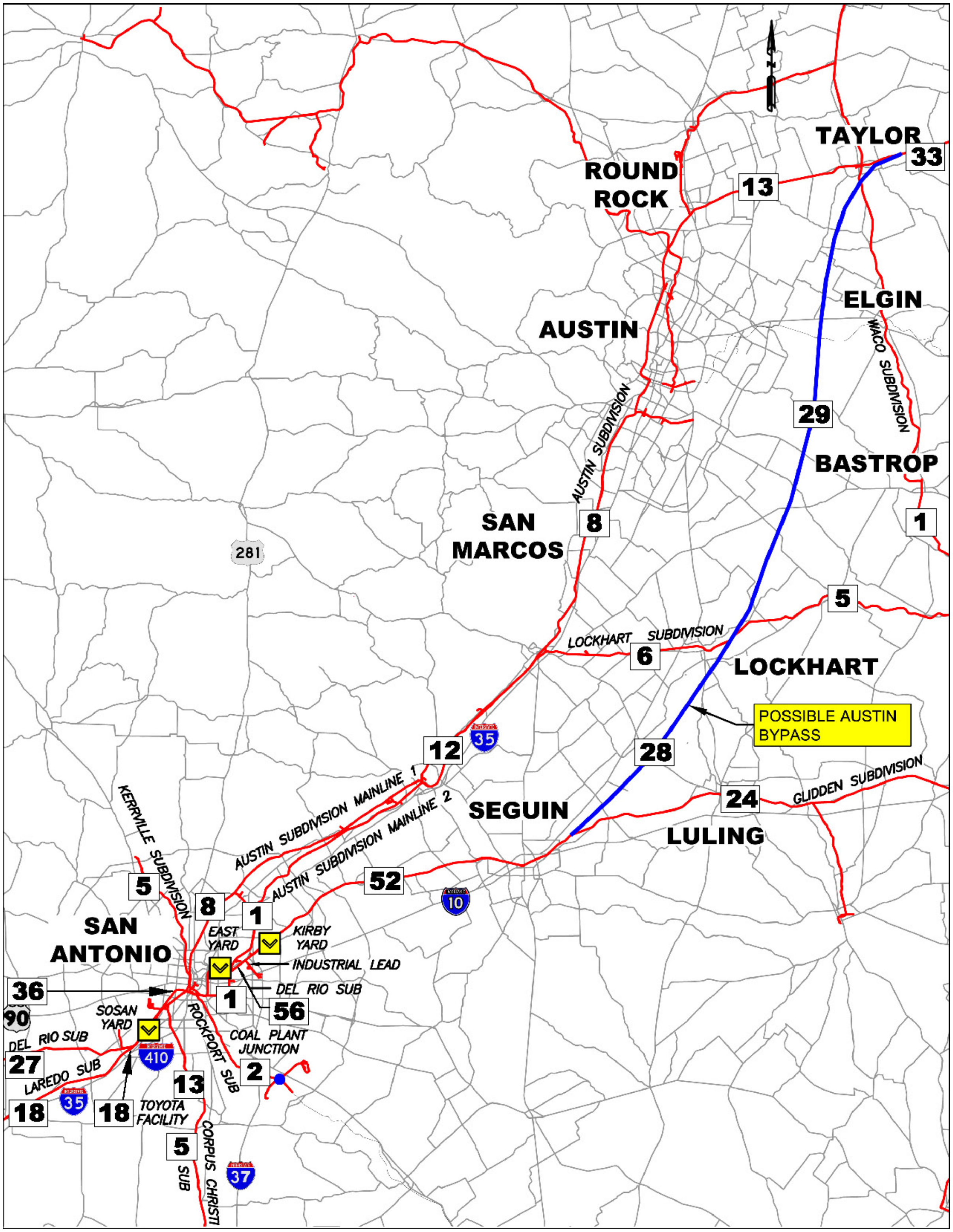


Figure 7-8: Avg. Daily Trains for Planning Case B1 (Possible Austin Bypass)
(note: conceptual bypass route shown is for illustrative purposes only)

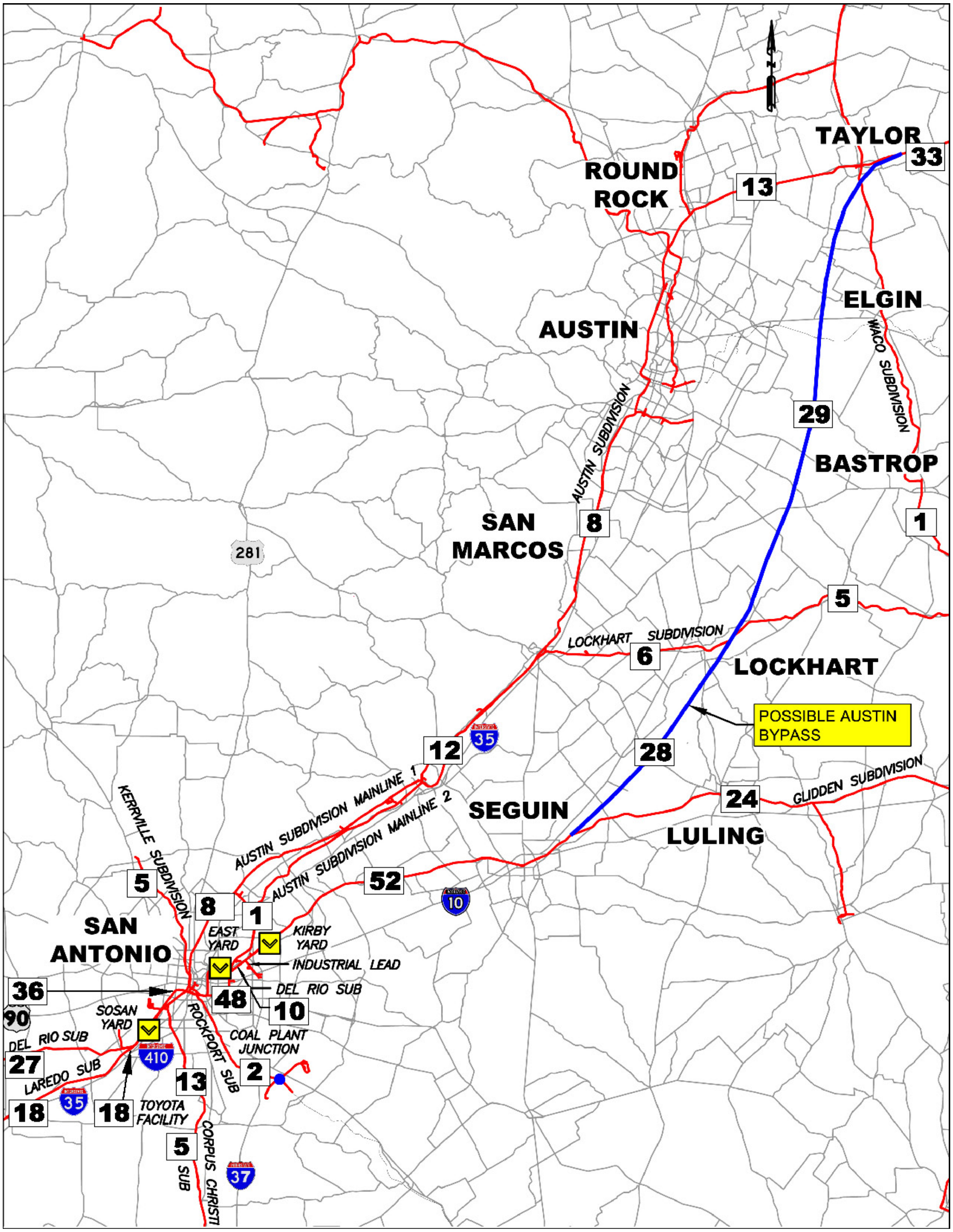


Figure 7-9: Avg. Daily Trains for Planning Case B2 (Possible Austin Bypass)
(note: conceptual bypass route shown is for illustrative purposes only)

Public Benefit Analysis

The potential public benefits associated with the relocation of through-freight rail services from existing rail lines in the region to an Austin bypass (Taylor-Seguin) would be similar to those of the San Antonio bypass such as reductions in vehicular delays, safety hazards (including roadway-railroad crossings as well as reduced hazardous material exposure), vehicle and locomotive emissions, and fuel usage, in addition to the possible implementation of commuter rail services in the existing corridor.

Commuter rail service between Austin and San Antonio has been desired for some time, and relocation of through-trains to a bypass would allow for these plans to materialize. The relocation of freight rail operations would lessen grade crossing impedance, provide an alternative to vehicular travel, and capture the benefits of transit-oriented development.

Grade Crossing Impedance Reduction

The Austin bypass was shown to benefit the public by reducing train traffic and therefore delay and safety hazards through urban and residential areas including San Marcos and Austin. Like the San Antonio bypass, an Austin bypass would impose a public cost burden due to the introduction of train traffic between Taylor and Seguin; however, this burden is offset by a reduction in the public burden associated with roadway-railroad crossings along the existing Austin Subdivision mainlines.

The estimated public benefit of an Austin bypass resulting from the reduction in public burden associated with the at-grade roadway-railroad crossings in the region was calculated to be approximately **$6.5 million** for Planning Case B1 and **$263 million** for Planning Case B2, as shown in Tables 7-14 and 7-15, respectively. The public benefits shown in Tables 7-14 and 7-15 extend beyond the San Antonio study area to include benefits in Hays, Travis, and Williamson Counties, since the impact of the bypass is not restricted to the San Antonio area.

Railroad Subdivision	No-Build Scenario	Bypass Scenario (B1)	Bypass Benefit (difference)
Austin Subdivision (San Marcos to Williamson County Line)	$297,030,000	$126,270,000	$170,760,000
Austin No 1 (San Marcos to Downotwn San Antonio)	$454,610,000	$165,120,000	$289,490,000
Austin No 2 (San Marcos to Downotwn San Antonio)	$91,390,000	$10,910,000	$80,480,000
Corpus Christi (Downtown San Antonio to Toyota Plant)	$78,170,000	$122,930,000	-$44,760,000
Del Rio (Kirby to Macdona)	$324,240,000	$618,860,000	-$294,620,000
Giddings (Flatonia to Mumford)	$18,990,000	$11,630,000	$7,360,000
Glidden (Flatonia to Kirby)	$92,530,000	$114,220,000	-$21,690,000
Kerrville	$143,190,000	$129,060,000	$14,130,000
Laredo (Downtown San Antonio to Gessner)	$123,390,000	$262,650,000	-$139,260,000
Lockhart (San Marcos to Smithville)	$44,130,000	$18,830,000	$25,300,000
Rockport	$34,290,000	$33,310,000	$980,000
Waco (Smithville to Taylor)	$8,720,000	$7,670,000	$1,050,000
Subtotal:	**$1,710,680,000**	**$1,621,460,000**	**$89,220,000**
Possible Bypass without Grade Separations	$0	$82,750,000	-$82,750,000
Total (without grade separations on bypass)			**$6,470,000**
Possible Bypass with Grade Separations	$0	$29,900,000	-$29,900,000
Total (with grade separations on bypass)			**$59,320,000**

Table 7-14: Planning Case B1 Public Costs at Roadway-Railroad Crossings (for a 20-year period)

Railroad Subdivision	No-Build Scenario	Bypass Scenario (B2)	Bypass Benefit (difference)
Austin Subdivision (San Marcos to Williamson County Line)	$297,030,000	$126,270,000	$170,760,000
Austin No 1 (San Marcos to Downotwn San Antonio)	$454,610,000	$165,120,000	$289,490,000
Austin No 2 (San Marcos to Downotwn San Antonio)	$91,390,000	$10,410,000	$80,980,000
Corpus Christi (Downtown San Antonio to Toyota Plant)	$78,170,000	$122,930,000	-$44,760,000
Del Rio (Kirby to Macdona)	$324,240,000	$362,640,000	-$38,400,000
Giddings (Flatonia to Mumford)	$18,990,000	$11,630,000	$7,360,000
Glidden (Flatonia to Kirby)	$92,530,000	$114,220,000	-$21,690,000
Kerrville	$143,190,000	$129,060,000	$14,130,000
Laredo (Downtown San Antonio to Gessner)	$123,390,000	$262,650,000	-$139,260,000
Lockhart (San Marcos to Smithville)	$44,130,000	$18,830,000	$25,300,000
Rockport	$34,290,000	$33,310,000	$980,000
Waco (Smithville to Taylor)	$8,720,000	$7,670,000	$1,050,000
Subtotal:	**$1,710,680,000**	**$1,364,740,000**	**$345,940,000**
Possible Bypass without Grade Separations	$0	$82,750,000	-$82,750,000
Total (without grade separations on bypass)			**$263,190,000**
Possible Bypass with Grade Separations	$0	$29,900,000	-$29,900,000
Total (with grade separations on bypass)			**$316,040,000**

Table 7-15: Planning Case B2 Public Costs at Roadway-Railroad Crossings (for a 20-year period)

As modeled, the Laredo and Corpus Christi Subdivisions showed a decrease in average train speeds from the base case, which increased the public burden associated with at-grade crossing delays. These train speed decreases may be associated with the logic used in the RTC model when prioritizing train movements into and out of the SoSan Yard area. However, given the magnitude of the train speed decreases, the existing operating plan may require review and reprioritization, which may in turn increase train speeds on the Laredo and Corpus Christi Subdivisions and reduce the associated public burden shown in Tables 7-14 and 7-15.

The public cost burden due to the introduction of train traffic on a new Taylor to Seguin route, shown in Tables 7-14 and 7-15 as nearly **$83 million**, would be reduced by grade separating some of the roadway-railroad crossings along the corridor. Crossings along the route were analyzed and determined to be candidates for potential grade separation based on traffic flow volumes for both vehicular and train traffic. The potential grade separations are listed in Table 7-16 with their associated average daily traffic volumes for vehicles (AADT) and trains, as well as their estimated costs, and estimated public benefits. Certain crossings along the route may be required to be grade separated in order to comply with FHWA regulations.

In all, the grade separations identified would reduce the public cost burden of the possible bypass route by approximately **$53 million**, thereby increasing the public benefit of the bypass to more than **$59 million** for Planning Case B1 as shown in Table 7-14 and **$316 million** for Planning Case B2 as shown in Table 7-15.

The public costs and benefits shown in Table 7-15 for Planning Case B2 assume the grade separation of two crossings (Houston Street and Presa Street) and the closure of one crossing (Hoefgen Street) on the Austin Subdivision ML 2 between the Del Rio Subdivision and Tower 112. Since Planning Case B2 would add approximately 47 average daily trains to this rail segment, leaving these three crossings at-grade would result in a net public burden of nearly $9 million on the Austin Subdivision ML 2 as opposed to the nearly $81 million benefit shown in Table 7-15.

Street Name	City Name	AADT	Estimated Cost	20-Year Benefit (2007 dollars)	Benfit/ Cost Ratio
SH 80	Prairie Lea	5,300	$8,000,000	$2,720,000	0.34
US HWY 183	Lockhart	14,900	$6,000,000	$9,530,000	1.59
FM 20	Lockhart	5,500	$6,000,000	$2,820,000	0.47
FM 812	Cedar Creek	4,600	$8,000,000	$2,190,000	0.27
SH 21	Cedar Creek	8,200	$8,000,000	$3,960,000	0.50
SH 71	Cedar Creek	28,700	$12,000,000	$15,070,000	1.26
US HWY 290	Littig	26,700	$12,000,000	$13,600,000	1.13
SH 95 (Main Street)	Taylor	6,300	$8,000,000	$2,960,000	0.37
Total:			**$68,000,000**	**$52,850,000**	**0.78**

Table 7-16: Potential Grade Separations on the Possible Austin Bypass Route (Taylor to Seguin)

Like the San Antonio bypass, the public benefit of the Austin bypass shown in Tables 7-14 and 7-15 is the result of the relocation of freight trains out of urban and residential areas onto the bypass that runs through more rural areas.

Reduced Locomotive Emissions

Also like the San Antonio bypass, the Austin bypass provides additional public benefit in the form of reduced locomotive emissions (pollutants) in the region. Planning Case B provides a public benefit from reduced locomotive emissions over the 20-year study period of nearly **$17 million** as shown in Table 7-17.

Existing Rail Corridor Value (Commuter Rail)

Additionally, an Austin bypass provides public benefit due to the potential for the implementation of a commuter rail system that accompanies Planning Case B. The public benefits associated with the implementation of commuter rail include vehicle reduction on regional roadways, increased property values, and increased property tax revenue. The commuter rail system would also have an associated public burden due to the introduction of additional rail traffic (passenger trains) on existing rail lines, thereby by impacting impedance at roadway-rail crossings. However, the burden would be offset by the benefits of commuter rail previously listed for a cumulative public benefit of more than **$510 million** over the 20-year study period. The methodology used in the analysis of public benefits of commuter rail systems is discussed in greater detail in the analysis of public benefits of Planning Case C, which is located later in this section. The total public benefits are shown in Table 7-17 for Planning Case B.

Public Sector Benefits ($ million)		
Commuter Rail System:	**B1**	**B2**
Vehicle Reduction	67.37	67.37
Facility Value	284.76	284.76
Property Value	106.00	106.00
Additions to Property Tax Revenue	80.74	80.74
Grade Crossing Impedance (Commuter)	-27.95	-27.95
Grade Crossing Impedance (Freight)	59.32	316.04
Locomotive Emssions Reduction	16.86	16.50
Total ($ million)	587.10	843.46

Table 7-17: Public Benefits for Planning Cases B1 and B2

Private Benefit Analysis

Planning Case B provides significant performance benefits compared with the base case. Run time and stop time are reduced, and the delay ratio improves. Minutes of delay per 100 train miles drops, and average train speeds over the entire network increase. The addition of the possible bypass to the network removes more trains from the existing trackage, with a consequent reduction in conflicts and delays to the trains that remain on existing trackage.

Table 7-18 compares the simulation results of the base case to Planning Cases B1 and B2, and lists the net change in each RTC simulation parameter that is expected to occur upon implementation of each planning case. For example, construction of the possible Austin bypass from Taylor to Seguin would likely reduce total run time by up to 52 daily hours and delay time by up to 28 hours per day, depending on whether trains are routed via Planning Case B1 or B2. The RTC results also show that Planning Cases B1 and B2 would reduce the net train miles traveled as well as fuel consumption despite an increase in actual route miles from the existing network. This net reduction is due primarily to a reduction in local train miles traveled in Planning Cases B1 and B2.

RTC Performance Measure	Base Case Results	Planning Case B1 Results	Planning Case B2 Results	Net Change (B1)	Net Change (B2)
Trains Operated (28 days)	2,891	2,888	2,888	-3	-3
Train Miles (28 Days)	359,028	357,047	356,965	-1,981	-2,063
Total Run Time Hours (Avg. Daily Hours)	496.2	443.9	444.9	-52.3	-51.3
Delay Time Hours (Avg. Daily Hours)	86.6	58.55	60.74	-28.1	-25.9
Delay Percentage	17.50%	13.2%	13.7%	-4.3%	-3.8%
Delay Minutes/100 Train Miles	40.52	27.6	28.6	-12.9	-11.9
Average Speed	25.8	28.7	28.7	2.9	2.9
Fuel (gallons)	2,956,784	2,956,571	2,955,889	-213	-895
Gallons/Train Mile	8.2	8.3	8.3	0.1	0.1

Table 7-18: RTC Planning Cases B1 and B2 Summary

Table 7-19 shows the economic benefit to the private sector over a 20-year study period, based on changes in performance measures attributable to Planning Cases B1 and B2 as shown in Table 7-18. The methodology used in the analysis of private benefits is discussed in greater detail in section 10.

Relocation of train traffic to an outer Austin bypass in Planning Case B1 decreases 20-year train mileage costs by $14.33 million and decreases fuel costs by $0.10 million over this same period when discounted at a nominal cost of capital of 6.68 percent. This planning case also reduces 20-year run time and delay time costs by $84.44 million and $44.94 million respectively, resulting in a benefit (i.e., savings minus costs) of approximately $144 million over the project life. This Austin bypass route also provides a benefit in the form of reduced track maintenance and grade crossing accident costs of $13.83 million and $4.35 million, respectively. The total of all private sector savings associated with Planning Case B1 are nearly **$162 million**.

Relocation of train traffic to an outer Austin bypass in Planning Case B2 decreases 20-year train mileage costs by $14.92 million and decreases fuel costs by $0.42 million over this same period when discounted at a nominal cost of capital of 6.68 percent. This planning case also reduces 20-year run time and delay time costs by $82.82 million and $41.54 million respectively, resulting in a benefit (i.e., savings minus costs) of approximately $140 million over the project life. This Austin bypass route also provides a benefit in the form of reduced track maintenance and grade crossing accident costs of $13.83 million and $4.35 million, respectively. The total of all private sector savings associated with Planning Case B2 are nearly **$158 million**.

Private Sector Benefits ($ million)		
Freight Rail Operations:	**B1**	**B2**
Train Miles	14.33	14.92
Run Time	84.44	82.82
Delay Time	44.94	41.54
Fuel	0.10	0.42
Track Maintenance Savings	13.83	13.83
Grade Crossing Accident Avoidance	4.35	4.35
Total ($ million)	161.99	157.89

Table 7-19: Private Benefits for Planning Cases B1 and B2

Planning Case C – San Antonio and Austin Bypass

Planning Case C analyzed the base case plus possible San Antonio and Austin bypasses from Taylor to Macdona and new yards at Marion and Macdona. The Austin bypass in conjunction with the San Antonio bypass would allow through-trains that are typically routed on the UP Austin, Glidden, Del Rio, Laredo, Corpus Christi, Rockport, and Lockhart Subdivisions to be rerouted onto the bypass away from large metropolitan areas. The conceptual location of an Austin-San Antonio bypass is shown in Figure 7-10. Planning Case C also includes upgrades to existing track between Marion and the connection with the possible Austin bypass in Seguin. The estimated cost of Planning Case C is more than **$2.42 billion**, including the cost of identified grade separated roadway and rail crossings.

Although Amtrak passenger trains, rock trains, auto trains destined for Kirby Yard in San Antonio, local service trains, and a minimal number of coal trains must remain on the existing rail lines, all other trains on the network may be able to be rerouted to the Austin-San Antonio bypass.

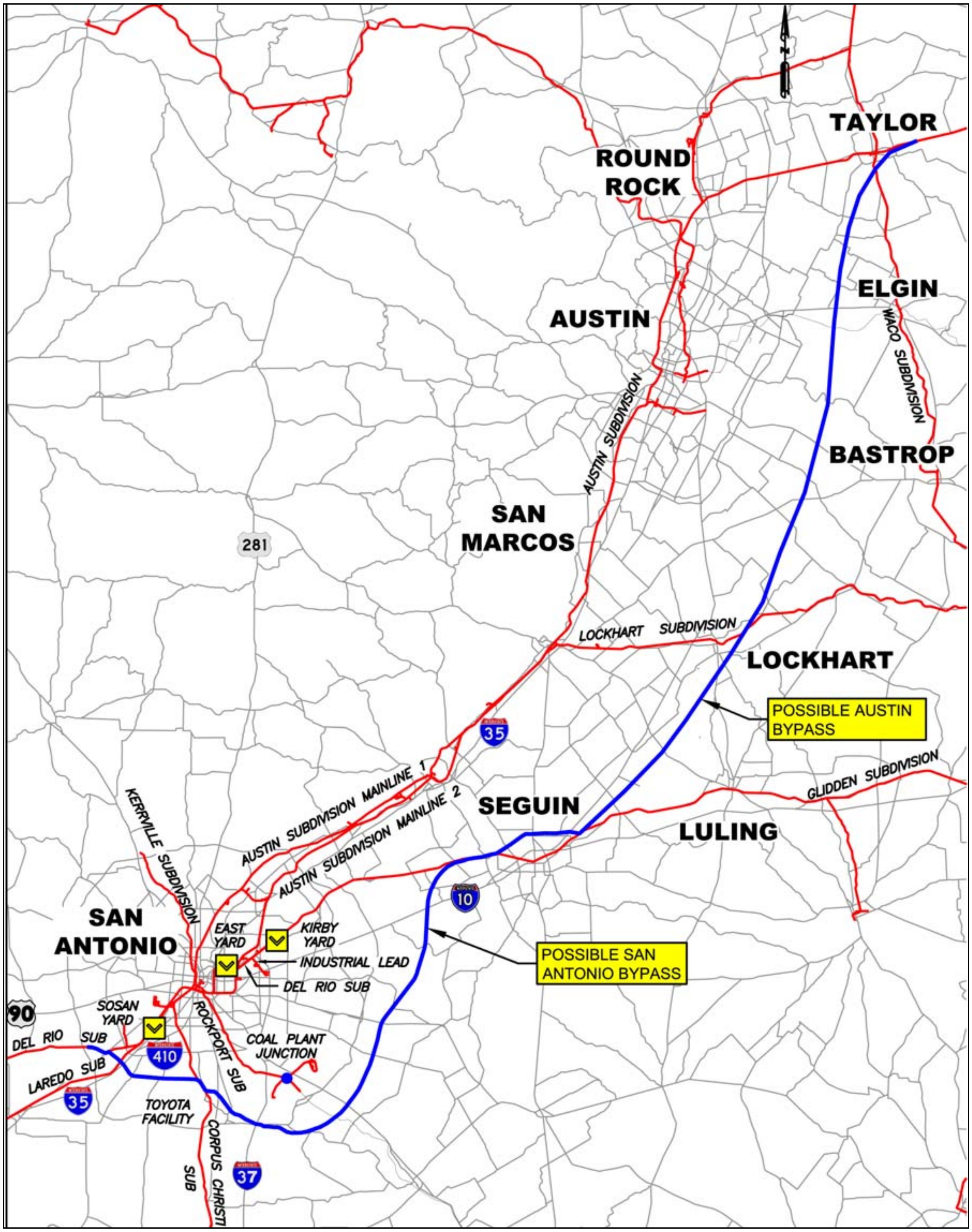


Figure 7-10: Possible Austin-San Antonio Bypass
(note: conceptual bypass route shown is for illustrative purposes only)

Table 7-20 and Figure 7-12 the daily train counts on existing subdivisions for the base case (no-build) scenario and the possible Austin-San Antonio bypass scenario, as well as the projected percent reduction in daily trains on existing lines resulting from the possible bypass route. As shown in Table 7-20, the Austin-San Antonio bypass route is projected to provide reductions in daily train volumes from 3 to 24 daily trains (11 to 90 percent) on existing lines running through San Antonio, New Braunfels, San Marcos, Austin, and various other cities, depending on location.

Railroad Subdivision	Average Daily Trains		Percent Change
	Base Case	Bypass Case	
Possible Austin-San Antonio Bypass, Taylor to Seguin	N/A	29	100%
Possible Austin-San Antonio Bypass, Seguin to Macdona	N/A	42	100%
Austin Subdivision ML 1, East of Taylor	22	33	50%
Austin Subdivision ML 1, Taylor to Round Rock	30	12	-60%
Austin Subdivision ML 1, Round Rock to San Marcos	25	7	-72%
Austin Subdivision ML 1 and 2, San Marcos to Garden Ridge	36	12	-67%
Austin Subdivision ML 1, Garden Ridge to San Antonio (Twr 105)	22	7	-68%
Austin Subdivision ML 2, Garden Ridge to Del Rio Sub	10	1	-90%
Austin Subdivision ML 2, Del Rio Sub to Downtown San Antonio (Twr 112)	10	1	-90%
Corpus Christi Subdivision, SoSan Yard to Toyota Plant	13	4	-69%
Del Rio Subdivision, Kirby to Downtown San Antonio (Twr 105)	35	14	-60%
Del Rio Subdivision, Downtown San Antonio (Twr 105) to Macdona	24	4	-83%
Glidden Subdivision, Flatonia to Seguin	27	24	-11%
Glidden Subdivision, Seguin to Kirby	27	14	-48%
Laredo Subdivision, San Antonio to Gessner	18	2	-89%
Lockhart Subdivision, San Marcos to West Point	12	5	-58%

Table 7-20: Daily Train Counts and Percent Change Resulting from Possible Austin-San Antonio Bypass

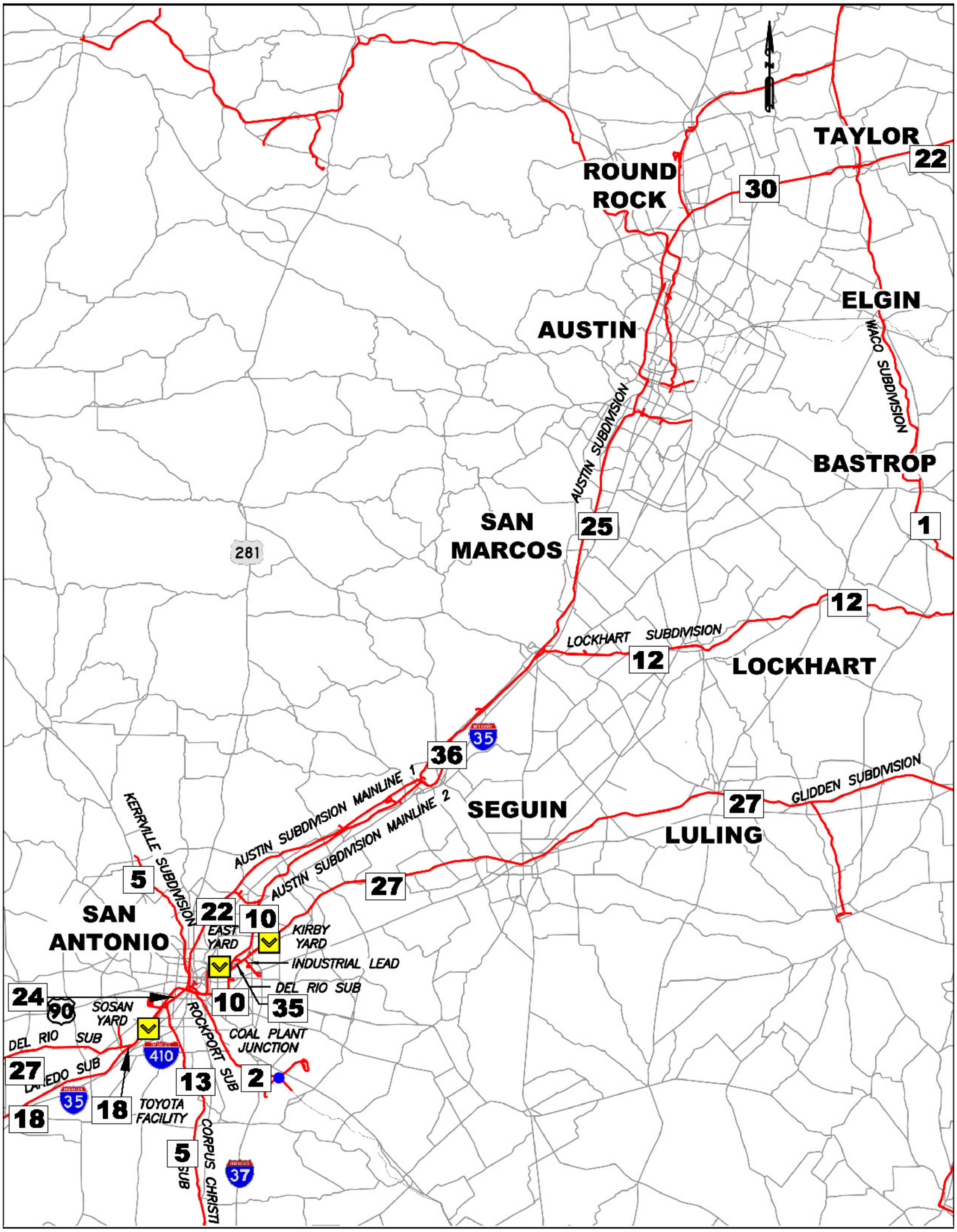


Figure 7-11: Average Daily Trains Counts for Base Case Scenario (No-Build)

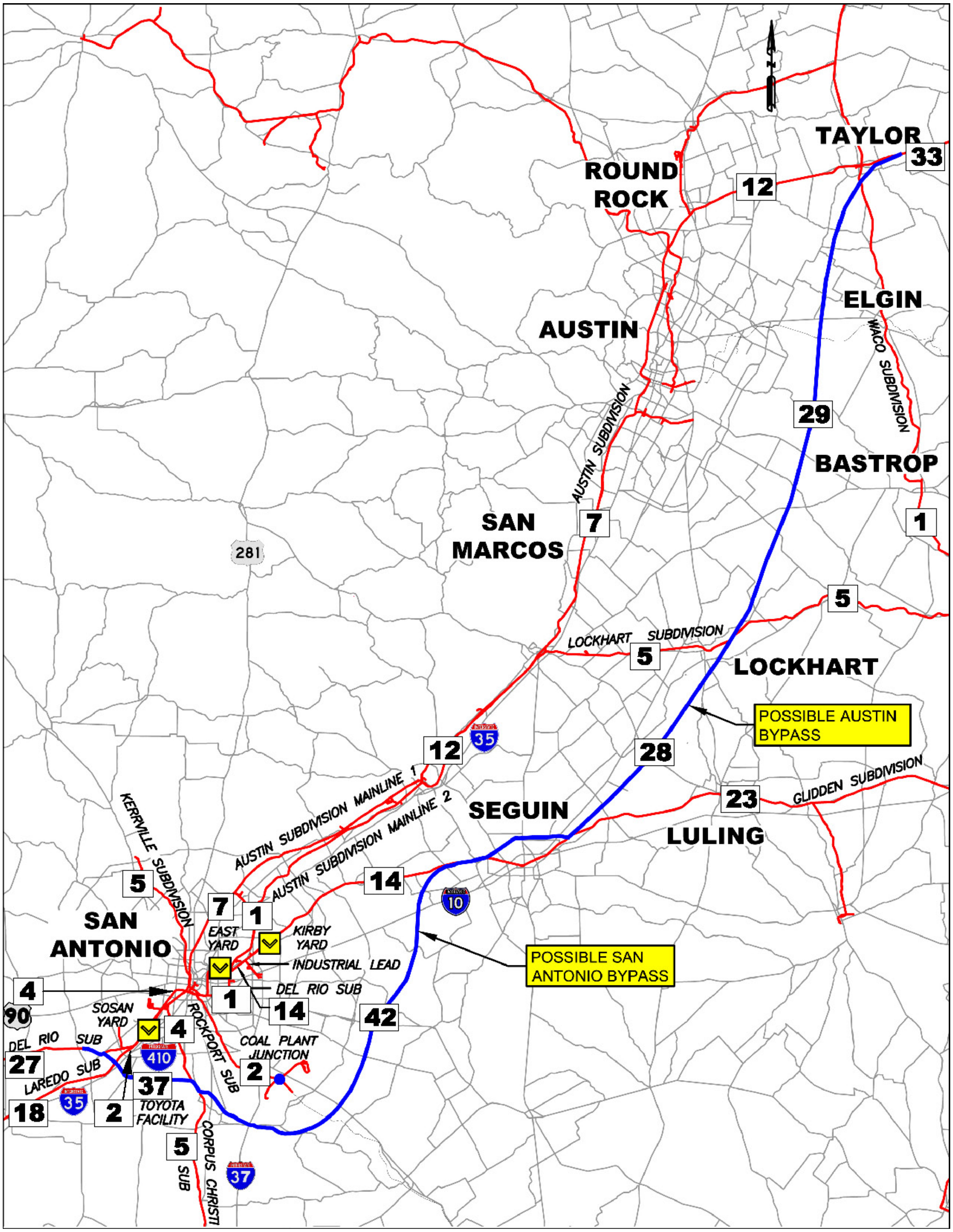


Figure 7-12: Average Daily Trains Counts for Austin-San Antonio Bypass Scenario
(note: conceptual bypass route shown is for illustrative purposes only)

Public Benefit Analysis

The benefits of a rail bypass to the public are associated with the reduced interaction of vehicles with trains and the opportunity to improve urban areas that are otherwise not possible due to existing freight rail operations. The potential public benefits associated with an Austin-San Antonio bypass include those listed previously for the San Antonio bypass and the Austin bypass.

Commuter rail service between Austin and San Antonio has been desired for some time, and relocation of through-trains to a bypass would allow for these plans to materialize. The relocation of freight rail operations would lessen grade crossing impedance, provide an alternative to vehicular travel, and capture the benefits of transit-oriented development.

Grade Crossing Impedance Reduction

The Austin-San Antonio bypass was shown to benefit the public by reducing train traffic and associated safety hazards and delays through urban and residential areas including San Antonio, San Marcos, New Braunfels, and Austin. The possible bypass imposes a public cost burden due to the introduction of train traffic on the possible new Taylor to Macdona route; however, this burden is offset by a reduction in the public burden associated with roadway-railroad crossings along the existing subdivisions such as the Austin and Del Rio Subdivisions.

The estimated public benefit of an Austin-San Antonio bypass (from Taylor to Macdona) resulting from the reduction in public burden associated with the at-grade roadway-railroad crossings in the region was calculated to be approximately **$632 million**, as shown in Table 7-21.

Railroad Subdivision	No-Build Scenario	Bypass Scenario (C)	Bypass Benefit (difference)
Austin Subdivision (San Marcos to Williamson County Line)	$297,030,000	$128,490,000	$168,540,000
Austin No 1 (San Marcos to Downotwn San Antonio)	$454,610,000	$140,720,000	$313,890,000
Austin No 2 (San Marcos to Downotwn San Antonio)	$91,390,000	$6,490,000	$84,900,000
Corpus Christi (Downtown San Antonio to Toyota Plant)	$78,170,000	$86,870,000	-$8,700,000
Del Rio (Kirby to Macdona)	$324,240,000	$114,310,000	$209,930,000
Giddings (Flatonia to Mumford)	$18,990,000	$11,570,000	$7,420,000
Glidden (Flatonia to Kirby)	$92,530,000	$47,180,000	$45,350,000
Kerrville	$143,190,000	$107,920,000	$35,270,000
Laredo (Downtown San Antonio to Gessner)	$123,390,000	$39,380,000	$84,010,000
Lockhart (San Marcos to Smithville)	$44,130,000	$18,470,000	$25,660,000
Rockport	$34,290,000	$41,190,000	-$6,900,000
Waco (Smithville to Taylor)	$8,720,000	$7,660,000	$1,060,000
Subtotal:	**$1,710,680,000**	**$750,250,000**	**$960,430,000**
Possible Bypass without Grade Separations	$0	$327,920,000	-$327,920,000
Total (without grade separations on bypass)			**$632,510,000**
Possible Bypass with Grade Separations	$0	$65,500,000	-$65,500,000
Total (with grade separations on bypass)			**$894,930,000**

Table 7-21: Public Costs at Roadway-Railroad Crossings (for a 20-year period)

The construction of a rail bypass would prevent through-trains from blocking existing grade crossings and, consequently, reduce the impedance of vehicles and therefore the public costs associated with the crossings as shown in Table 7-21. The public benefits associated with reduced impedance are measured as reductions in the generation of emissions, the consumption of volatile organic compounds (fuel and oil), and the loss of time by vehicles idling at grade crossings. The discounted value of grade crossing impedance reduction for the possible Austin-San Antonio bypass is included as part of the net present value analysis provided in Appendix G.

The public cost burden due to the introduction of train traffic on the possible new Taylor to Macdona route, shown in Table 7-21 as nearly **$328 million**, would be significantly reduced by grade separating or closing some of the roadway-railroad crossings along the possible bypass route. Interstate crossings along the route such as I-35, I-37, and I-10 would be required to be grade separated in order to comply with FHWA regulations.

Additional crossings along the route were determined to be candidates for potential grade separation based on traffic flow volumes for both vehicular and train traffic are listed in Table 7-22. In all, the grade separations identified would reduce the public cost burden of the bypass route by approximately **$262.4 million**, thereby increasing the public benefit of the bypass over a 20-year period to more than **$894 million** as shown in Table 7-22.

Street Name	City Name	AADT	Estimated Cost	20-Year Benefit (2007 dollars)	Benfit/ Cost Ratio
IH 35 (Mainlanes and frontage roads)	San Antonio	44,500	$16,000,000	$47,210,000	2.95
FM 2790 (Somerset Road)	San Antonio	5,200	$8,000,000	$3,530,000	0.44
SH 16	San Antonio	19,400	$8,000,000	$13,700,000	1.71
US HWY 281	Cassin	14,000	$12,000,000	$10,410,000	0.87
IH 37 (Mainlanes and frontage roads)	Buena Vista	49,000	$16,000,000	$62,550,000	3.91
Loop 1604	Buena Vista	5,000	$8,000,000	$4,110,000	0.51
US HWY 181	Saspamco	18,400	$12,000,000	$13,850,000	1.15
FM 3432 (Sulphur Springs Road)	La Vernia	3,300	$8,000,000	$2,410,000	0.30
US HWY 87	Adkins	10,500	$12,000,000	$7,150,000	0.60
FM 1346	St. Hedwig	1,900	$5,000,000	$1,370,000	0.27
IH 10 (Mainlanes and frontage roads)	Santa Clara	36,500	$16,000,000	$36,490,000	2.28
FM 78	McQueeney	5,500	$8,000,000	$4,020,000	0.50
SH 46	McQueeney	13,900	$10,000,000	$970,000	0.10
SH 123 (Austin Street)	Geronimo	14,000	$8,000,000	$970,000	0.12
SH 80	Prairie Lea	5,300	$8,000,000	$2,680,000	0.34
US HWY 183	Lockhart	14,900	$6,000,000	$9,430,000	1.57
FM 20	Lockhart	5,500	$6,000,000	$2,790,000	0.47
FM 812	Cedar Creek	4,600	$8,000,000	$2,230,000	0.28
SH 21	Cedar Creek	8,200	$8,000,000	$4,050,000	0.51
SH 71	Cedar Creek	28,700	$12,000,000	$15,490,000	1.29
US HWY 290	Littig	26,700	$12,000,000	$13,980,000	1.17
SH 95 (Main Street)	Taylor	6,300	$8,000,000	$3,030,000	0.38
Total:			**$215,000,000**	**$262,420,000**	**1.22**

Table 7-22: Potential Grade Separations on the Possible Austin-San Antonio Bypass Route (Taylor to Macdona)

The public benefit of the possible Austin-San Antonio bypass shown in Table 7-21 is the result of the relocation of freight trains out of urban and residential areas onto the bypass that runs through primarily rural areas.

Reduced Locomotive Emissions

Also like the San Antonio bypass, the Austin bypass provides additional public benefit in the form of reduced locomotive emissions (pollutants) in the region. Planning Case C provides a public benefit from reduced locomotive emissions over the 20-year study period of **$19 million** as shown in Table 7-23.

Existing Rail Corridor Value (Commuter Rail)

Additionally, an Austin-San Antonio bypass would provide public benefit due to the potential for the implementation of a commuter rail system that accompanies Planning Case C. The public benefits associated with the implementation of commuter rail include vehicle reduction on regional roadways, increased property values, and increased property tax revenue. The commuter rail system would also have an associated public burden due to the introduction of additional rail traffic (passenger trains) on existing rail lines, thereby impacting impedance at roadway-rail crossings. However, the burden would be offset by the benefits of commuter rail previously listed for a cumulative public benefit of more than **$510 million** over the 20-year study period. The methodology used in the analysis of public benefits of commuter rail systems is discussed in greater detail in section 10 of this report.

Table 7-23 lists the public benefits associated with Planning Case C including the benefits of grade crossing impedance reduction, the potential for implementation of a commuter rail system, and locomotive emissions reduction, for a total value of more than **$1.42 billion**.

Public Sector Benefits ($ million)	
Commuter Rail System:	
Vehicle Reduction	67.37
Facility Value	284.76
Property Value	106.00
Additions to Property Tax Revenue	80.74
Grade Crossing Impedance (Commuter)	-27.95
Grade Crossing Impedance (Freight)	894.93
Locomotive Emssions Reduction	19.10
Total ($ million)	1424.95

Table 7-23: Public Benefits for Planning Case C

Private Benefit Analysis

The benefits of a rail bypass to UP are generally associated with improved operating and maintenance conditions, as reflected by savings in time and cost. A sufficiently designed facility will also reduce the railroad's exposure to grade crossing incidents and eliminate the related damages to property.

Table 7-24 compares the simulation results of the base case to Planning Case C, and lists the net change in each RTC simulation parameter that is expected to occur upon implementation of this planning case. For example, construction of the possible Taylor-San Antonio bypass will likely increase operating distances by 6,500 train miles over a 28-day period, resulting in the consumption of approximately 59,613 additional gallons of diesel fuel over the same time period. On the other hand, this planning case should reduce total run time and delay time by 63 and 24 hours, respectively.

RTC Performance Measure	Base Case Results	Planning Case C Results	Net Change
Trains Operated (28 days)	2,891	2,663	-228
Train Miles (28 Days)	359,028	365,528	6,500
Total Run Time Hours (Avg. Daily Hours)	496.2	433.6	-62.6
Delay Time Hours (Avg. Daily Hours)	86.6	62.6	-24.0
Delay Percentage	17.50%	14.4%	-3.1%
Delay Minutes/100 Train Miles	40.52	28.78	-11.7
Average Speed	25.8	30.1	4.3
Fuel (gallons)	2,956,784	3,016,397	59,613
Gallons/Train Mile	8.2	8.3	0.1

Table 7-24: RTC Planning Case C Summary

Table 7-25 shows the economic benefit to the private sector over a 20-year study period, based on changes in performance measures attributable to Planning Case C. Relocation of train traffic to an outer Austin-San Antonio bypass in Planning Case C increases 20-year train mileage costs by $47.02 million and increases fuel costs by $28.03 million over this same period when discounted at a nominal cost of capital of 6.68 percent. This planning case also reduces 20-year run time and delay time costs by $101.06 million and $38.57 million respectively, resulting in a benefit (i.e., savings minus costs) of approximately $65 million over the project life. This Austin-San Antonio bypass route also provides a benefit in the form of reduced track maintenance and grade crossing accident costs of $22.76 million and $8.15 million, respectively. The total of all private sector savings associated with Planning Case C are nearly **$96 million**.

Private Sector Benefits ($ million)	
Freight Rail Operations:	
Train Miles	-47.02
Run Time	101.06
Delay Time	38.57
Fuel	-28.03
Track Maintenance Savings	22.76
Grade Crossing Accident Avoidance	8.15
Total ($ million)	95.49

Table 7-25: Private Benefits for Planning Case C

Planning Case 1

Planning Case 1, as shown in Figure 7-13 with the RTC results tabulated in Table 7-26, includes rail improvements 1 and 8 as previously listed in Table 7-3, which were tested in order to address operational efficiency with the installation of a second mainline route in and out of SoSan Yard. This allows traffic a straight route between SoSan, Withers, and Alamo Junction.

Improvement 1, located in southwest San Antonio, consists of the addition of a second mainline from Alamo Junction to Withers Junction on the Del Rio Subdivision and is a planned UP improvement. Improvement 8 consists of an additional mainline on the Laredo Subdivision from SoSan Yard to Heafer Junction. Planning Case 1 is estimated to cost **$9.3 million**.

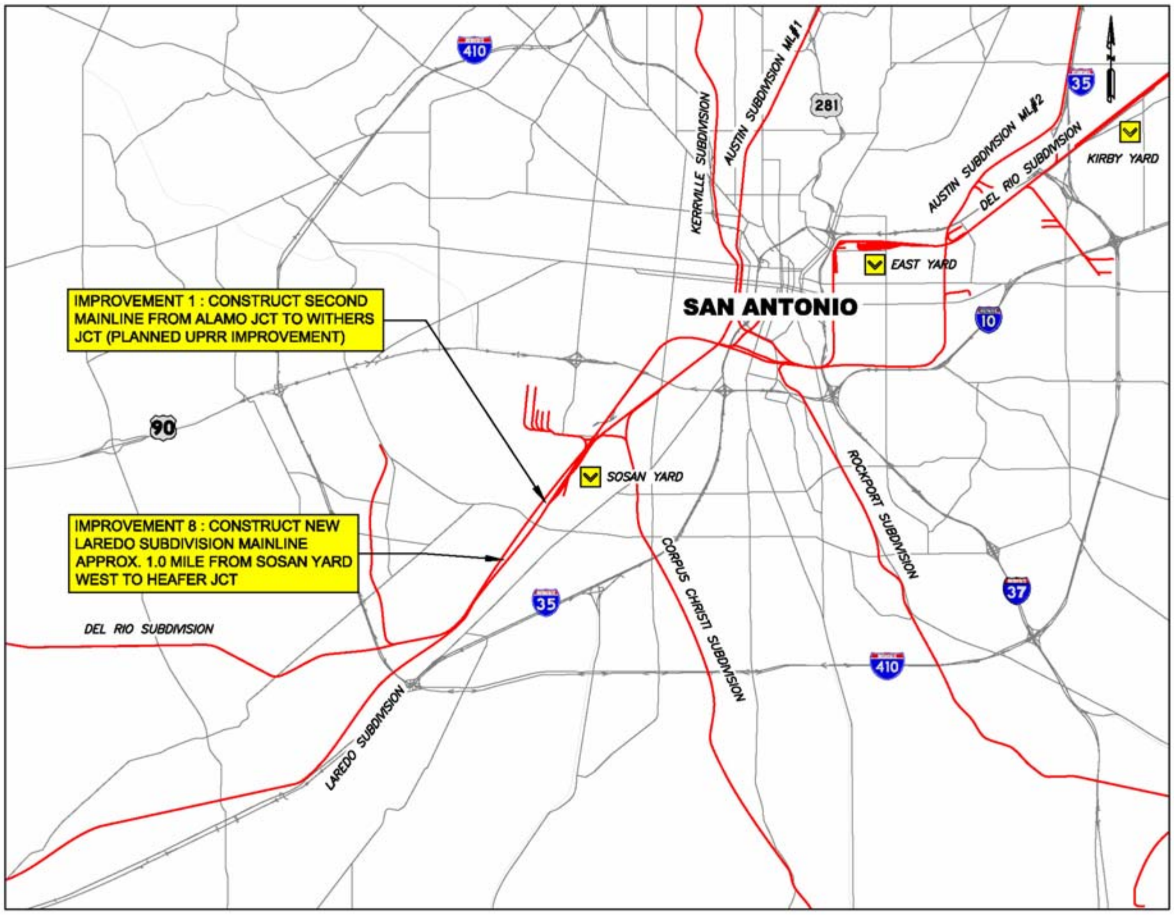


Figure 7-13: Planning Case 1 Improvements

Table 7-26 compares the RTC simulation results of the base case to Planning Case 1. In this instance, implementing Improvement 1 and 8 increases total operating distance by only 5 miles over a 28-day period, and results in the consumption of only 16 additional gallons of diesel fuel. Total run time for Case 1 is expected to increase by 0.20 hours per day and delay time should be reduced by 0.60 hours per day.

RTC Performance Measure	Base Case	Case 1	Net Increase
Trains Operated (28 days)	2,861	2,861	0
Train Miles (28 days)	356,835	356,840	5
Total Run Time Hours (1 day)	493.40	493.60	0.20
Delay Time Hours (1 day)	79.80	79.20	-0.60
Delay Percent (1 day)	16.20%	16.00%	-0.20%
Delay Minutes/ 100 T (1 day)	37.57	37.27	-0.30
Average Speed	25.80	25.80	0.00
Fuel (gallons) (28 days)	2,918,686	2,918,670	16
Gallons/Train Mile (28 days)	8.20	8.20	0.00

Table 7-23: Net Change in Simulation Results for Planning Case 1

The annualized economic benefit to the private sector for Case 1 is shown in Table 7-27, whereby train mileage costs are expected to increase by $3,074 and additional fuel costs are negligible ($340). Also, this planning case should increase run time costs by $27,363 while reducing delay time costs by $82,089. Overall, annual private benefits accruing form the implementation of Case 1 should be $51,312. Total project value (private benefit) is expected to be **$670,000** over a project duration of 20 years.

Private Benefit	Annual Value
Train Miles	($3,074)
Run Time Hours	($27,363)
Delay Time Hours	$82,089
Fuel	($340)
Total First Year Benefit	$51,312
20-Year Present Value	$670,000

Table 7-27: Private Benefits for Planning Case 1

Planning Case 1 made no significant changes in train counts in the San Antonio metropolitan area, meaning that the improvements did not have a quantifiable public benefit.

Planning Case 2

Planning Case 2, as shown in Figure 7-14 with the RTC results tabulated in Table 7-27, includes the improvements of Planning Case 1 with the addition of rail improvements 2 and 3 (as listed previously in Table 7-3), which were tested in order to address operational efficiency with the installation and completion of a second mainline route between East Yard and Kirby Yard. The new siding and switches at Toyota would allow for a passing siding for train meets, keeping the Corpus Christi Subdivision available for through-train movements.

Improvement 2, located in east-central San Antonio, consists of the addition of a second mainline on the Del Rio Subdivision between East Yard and Kirby Yard. This improvement is approximately located between IH 35 and State Highway 78 to the north and south and between New Braunfels Avenue on the west and Forest Road in Kirby, to the east. Improvement 3 consists of the construction of a 9000-foot siding track adjacent to the Corpus Christi Subdivision near the Toyota facility and is a planned UP improvement. The Toyota Facility is located approximately 13 miles south of central San Antonio. Planning Case 2 is estimated to cost **$21 million**.

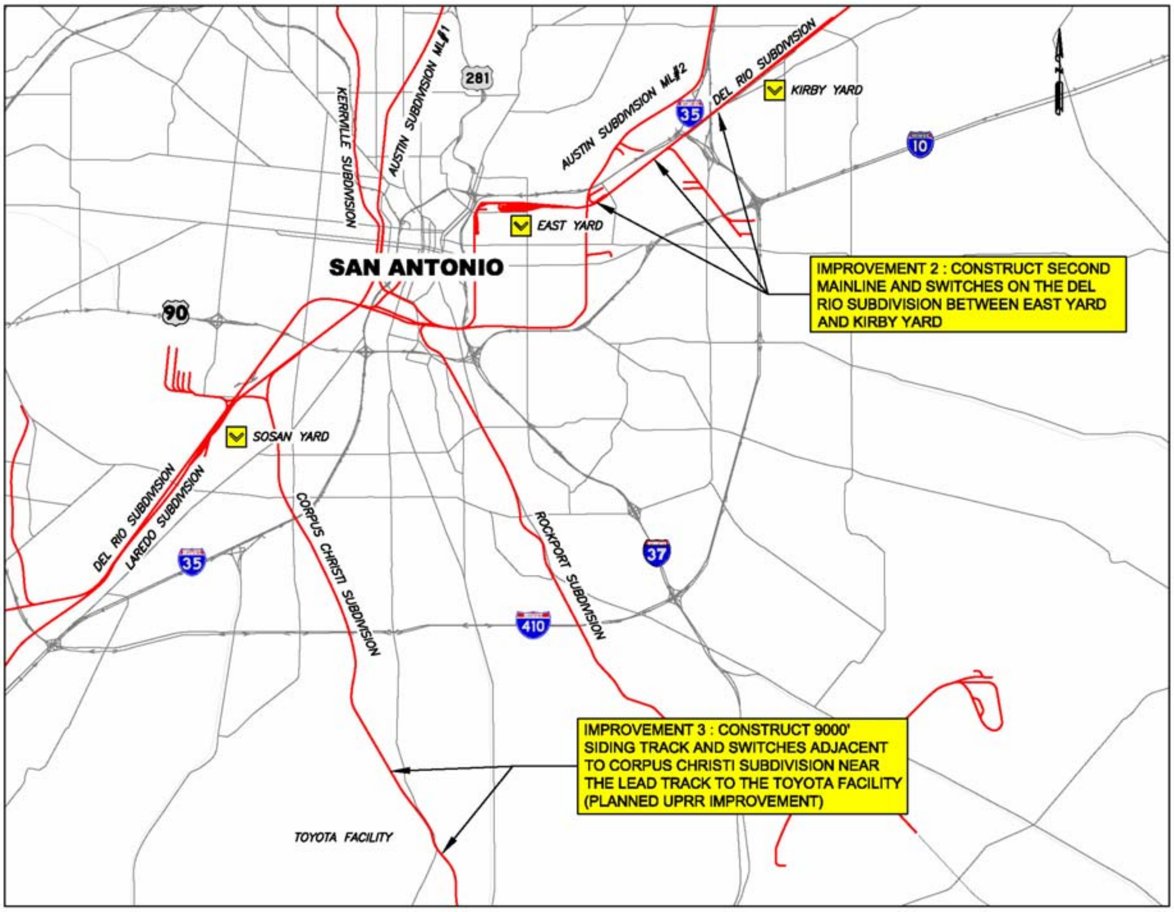


Figure 7-14: Planning Case 2 Improvements

Table 7-28 compares the simulation results of the base case to Planning Case 2. In this instance, implementing Planning Case 1 plus rail improvements 2 and 3 increases total operating distance by only 3 miles over a 28-day period, and results in the consumption of only 199 additional gallons of diesel fuel. Total run time and delay time for Case 2 is expected to decrease by 3.80 and 4.50 hours per day, respectively.

Simulation Parameter	Base Case	Case 2	Net Increase
Trains Operated (28 days)	2,861	2,861	0
Train Miles (28 days)	356,835	356,838	3
Total Run Time Hours (1 day)	493.40	489.60	-3.80
Delay Time Hours (1 day)	79.80	75.30	-4.50
Delay Percent (1 day)	16.20%	15.40%	-0.80%
Delay Minutes/ 100 T (1 day)	37.57	35.47	-2.10
Average Speed	25.80	26.00	0.20
Fuel (gallons) (28 days)	2,918,686	2,918,885	199
Gallons/Train Mile (28 days)	8.20	8.20	0.00

Table 7-28: Net Change in Simulation Results for Planning Case 2

The annualized economic benefit to the private sector for Case 2 is shown in Table 7-29. This case results in an increase in train mileage costs of $1,844 and additional fuel costs of $4,227. Run time costs are expected to decrease by $0.5 million and delay time costs are expected to decrease by $0.6 million. Total first year private benefits that result from Case 2 should be approximately $1.1 million, while total project value is expected to be **$14.8 million** for a project duration of 20 years.

Private Benefit	Annual Value
Train Miles	($1,844)
Run Time Hours	$519,898
Delay Time Hours	$615,668
Fuel	($4,227)
Total First Year Benefit	$1,129,495
20-Year Present Value	**$14,820,000**

Table 7-29: Private Benefits for Planning Case 2

Planning Case 2 made no significant changes in train counts in the San Antonio metropolitan area, meaning that the improvements did not have a quantifiable public benefit.

Planning Case 3

Planning Case 3, as shown in Figure 7-15 with the RTC results tabulated in Table 7-30, includes the improvements of Planning Cases 1 and 2 in addition to rail improvements 5 and 6 (as previously listed in Table 7-3) which were tested to address network fluidity and capacity. Improvement 5 consists of the extension of the new second mainline on the Del Rio Subdivision at Kirby Interlocking north for approximately one mile and includes the limits of the switch to the Seven Springs Corporate Park. Improvement 6 is the connection of the two Del Rio Subdivision mainlines through switches at the north end of SoSan Yard in the vicinity of Quintana Road. Planning Case 3 is estimated to cost nearly **$26 million**.

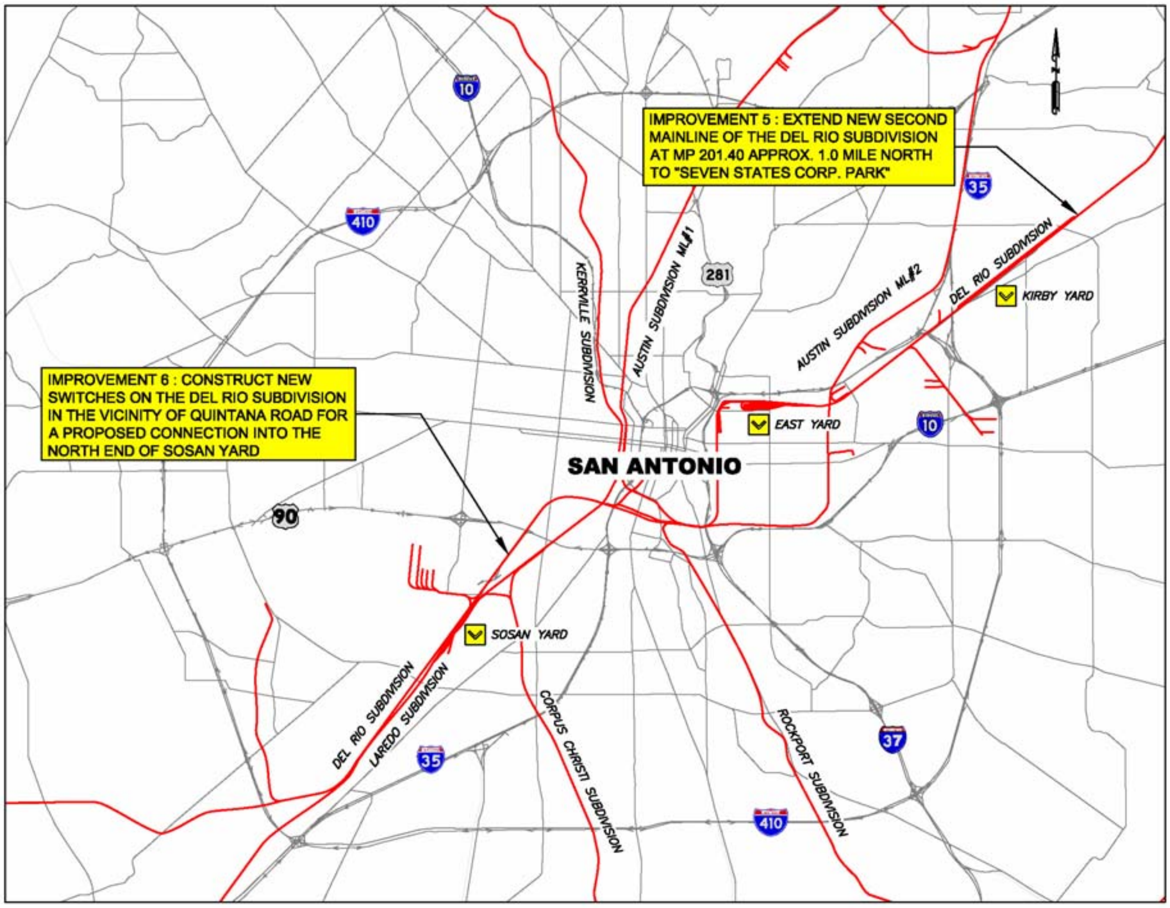


Figure 7-15: Planning Case 3 Improvements

Planning Case 3 involves the implementation of Case 2 in addition to Improvements 5 and 6. As Table 7-30 shows, Case 3 increases total operating distance by only 13 miles over a 28-day period, and results in the consumption of 510 additional gallons of diesel fuel. Total run time and delay time for Case 3 is expected to decrease by 4.50 and 4.80 hours per day, respectively.

Simulation Parameter	Base Case	Case 3	Net Increase
Trains Operated (28 days)	2,861	2,861	0
Train Miles (28 days)	356,835	356,848	13
Total Run Time Hours (1 day)	493.40	488.90	-4.50
Delay Time Hours (1 day)	79.80	75.00	-4.80
Delay Percent (1 day)	16.20%	15.30%	-0.90%
Delay Minutes/ 100 T (1 day)	37.57	35.29	-2.28
Average Speed	25.80	26.10	0.30
Fuel (gallons) (28 days)	2,918,686	2,919,196	510
Gallons/Train Mile (28 days)	8.20	8.20	0.00

Table 7-30: Net Change in Simulation Results for Planning Case 3

The annualized economic benefit to the private sector for Case 3 is shown in Table 7-31. This case results in an increase in train mileage costs of $7,992 and additional fuel costs of $10,832. Run time costs are expected to decrease by approximately $0.6 million and delay time costs are expected to decrease by approximately $0.7 million. Total first year private benefits that result from Case 3 should be approximately $1.3 million, while total project value is expected to be **$16.4 million** for a project duration of 20 years.

Private Benefit	Annual Value
Train Miles	($7,992)
Run Time Hours	$615,668
Delay Time Hours	$656,713
Fuel	($10,832)
Total First Year Benefit	$1,253,557
20-Year Present Value	**$16,450,000**

Table 7-31: Private Benefits for Planning Case 3

Planning Case 3 made no significant changes in train counts in the San Antonio area, meaning that the improvements did not have a quantifiable public benefit.

Planning Case 4

Planning Case 4, as shown in Figure 7-16 with the RTC results tabulated in Table 7-32, includes the improvements of Planning Cases 1, 2, and 3 in addition to rail improvements 13 and 15 (as previously listed in Table 7-3), which were tested to improve meet/pass efficiency and reduce train delays. Improvement 13 is the extension and connection of North Loop and Adams sidings located north of San Antonio on the Austin ML 1 Subdivision, resulting in a 3.7 mile long main track passing siding with a universal cross-over. Improvement 15 consists of upgrading and extending the Converse storage track on the Glidden Subdivision northwest of downtown San Antonio. Planning Case 4 is estimated to cost **$35 million**.

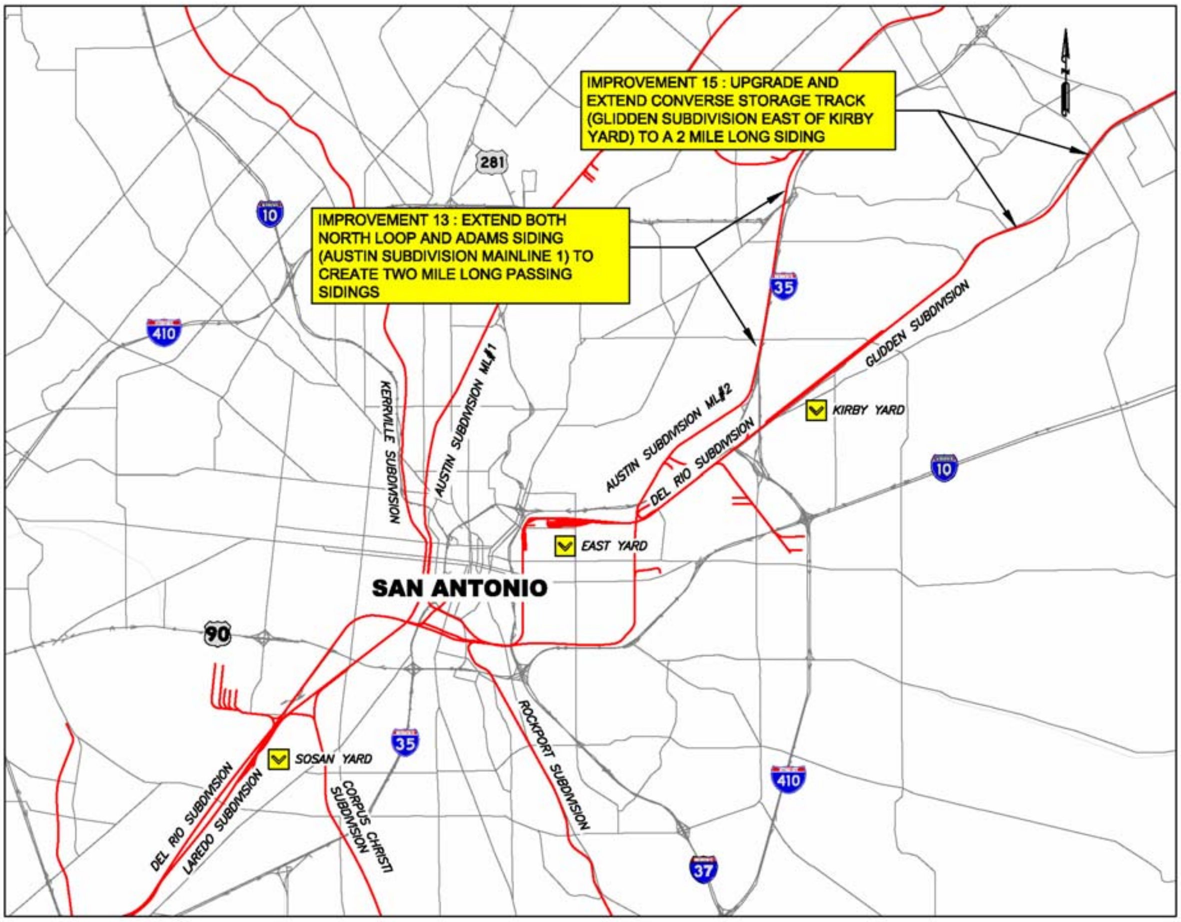


Figure 7-16: Planning Case 4 Improvements

As Table 7-32 shows, Case 4 decreases total operating distance by one mile over a 28-day period, while increasing the consumption diesel fuel by 1,153 gallons. The increase in fuel consumption with no additional train miles is most likely due to conflicts between train movements that result in added wait times or due to changes in operating speeds. Total run time and delay time for Case 4 is expected to decrease by 3.80 and 4.90 hours per day, respectively.

Simulation Parameter	Base Case	Case 4	Net Increase
Trains Operated (28 days)	2,861	2,861	0
Train Miles (28 days)	356,835	356,834	-1
Total Run Time Hours (1 day)	493.40	489.60	-3.80
Delay Time Hours (1 day)	79.80	74.90	-4.90
Delay Percent (1 day)	16.20%	15.30%	-0.90%
Delay Minutes/ 100 T (1 day)	37.57	35.26	-2.31
Average Speed	25.80	26.00	0.20
Fuel (gallons) (28 days)	2,918,686	2,919,839	1,153
Gallons/Train Mile (28 days)	8.20	8.20	0.00

Table 7-32: Net Change in Simulation Results for Planning Case 4

The annualized economic benefit to the private sector for Case 4 is shown in Table 7-33. This case results in an increase in train mileage costs of only $615 and additional fuel costs of $24,490. Run time costs are expected to decrease by approximately $0.5 million and delay time costs are expected to decrease by approximately $0.7 million, resulting in total first year private benefits of approximately $1.2 million for Case 4. The total project value is expected to be **$15.3 million** for a duration of 20 years.

Private Benefit	Annual Value
Train Miles	$615
Run Time Hours	$519,898
Delay Time Hours	$670,394
Fuel	($24,490)
Total First Year Benefit	$1,166,417
20-Year Present Value	**$15,310,000**

Table 7-33: Private Benefits for Planning Case 4

Planning Case 4 made no significant changes in train counts in the San Antonio metropolitan area, meaning that the improvements did not have a quantifiable public benefit.

Figure 7-17 shows the RTC network with Planning Cases 1 through 4 Improvements as they would appear on the RTC computer screen for the San Antonio area.

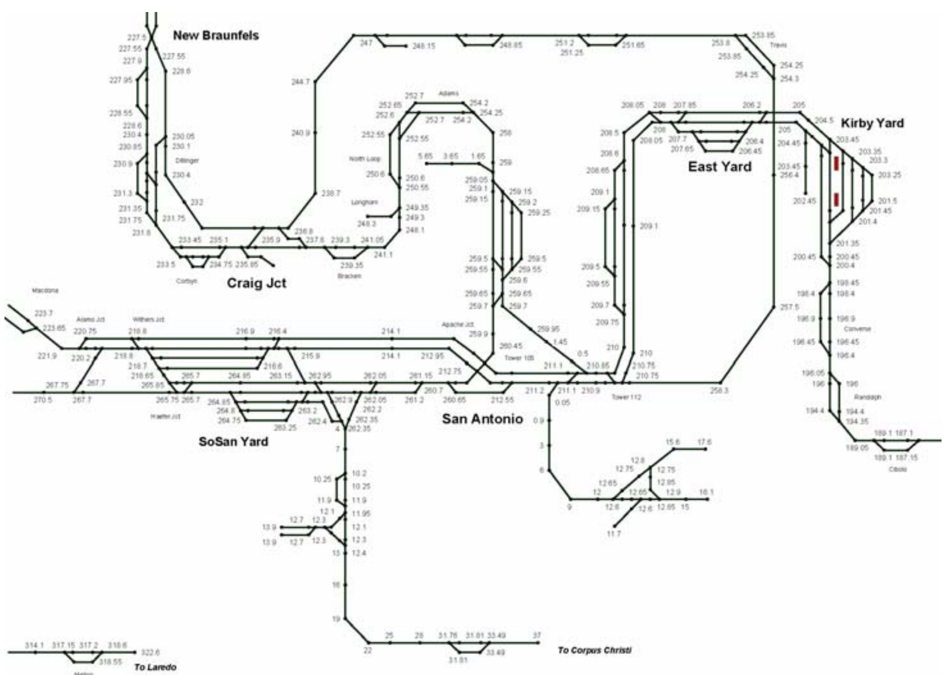


Figure 7-17 RTC Network with Improvements

Planning Case Comparisons

Table 7-34 summarizes base case and planning case simulation results for the bypass alternatives, while Table 7-35 compares the base case and Planning Cases 1 through 4.

RTC Performance Measure	Base Case	PC A - SA Bypass	PC B1 - AUS Bypass	PC B2 - AUS Bypass	PC C - SA & AUS Bypass
Trains Operated (28 Days)	2,891	2,663	2,888	2,888	2,663
Train Miles (28 Days)	359,028	374,505	357,047	356,965	365,528
Run Time (Avg. Daily Hrs)	496.2	485.3	443.9	444.9	433.6
Stop Time (Avg. Daily Hrs)	86.6	86.4	58.55	60.74	62.6
Delay (%)	17.5%	17.8%	13.2%	13.7%	14.4%
Delay Minutes/100TM	40.51	38.76	27.6	28.6	28.78
Average Speed	25.8	27.6	28.7	28.7	30.1
Fuel (gallons)	2,956,784	3,130,080	2,956,571	2,955,889	3,016,397
Gallons/ Train Mile	8.2	8.3	8.3	8.3	8.3

Table 7-34: RTC Summary of Planning Cases A, B, and C

RTC Performance Measure	Base Case	PC 1	PC 2	PC 3	PC 4
Trains Operated (28 Days)	2,861	2,861	2,861	2,861	2,861
Train Miles (28 Days)	356,835	356,840	356,838	356,848	356,834
Run Time (Avg. Daily Hrs)	493.4	493.6	489.6	488.9	489.6
Stop Time (Avg. Daily Hrs)	79.8	79.2	75.3	75	74.9
Delay (%)	16.2%	16.0%	15.4%	15.3%	15.3%
Delay Minutes/100TM	37.57	37.27	35.47	35.29	35.26
Average Speed	25.8	25.8	26.0	26.1	26.0
Fuel (gallons)	2,918,686	2,918,670	2,918,885	2,919,196	2,919,839
Gallons/ Train Mile	8.2	8.2	8.2	8.2	8.2

Table 7-35: RTC Summary of Planning Cases 1, 2, 3, and 4

The largest impact to train operations occurs when Planning Cases A, B, and C are compared to the base case. The San Antonio bypass (Planning Case A) shows a 4.3 percent increase in train miles, an increase of nearly 6 percent in fuel consumption and an increase of 1.2 percent in gallons/train mile for the total network. Other categories that reflect improvements for train movements include: reduced total run time hours by 2.2 percent, reduced delay minutes/100 train miles by 4.3 percent, and increased average speed by 6.9 percent.

Construction of the possible Austin bypass from Taylor to Seguin would likely reduce total run time by approximately 10 percent and delay time by up to 32 percent, depending on whether trains are routed via Planning Case B1 or B2. The RTC results also show that Planning Cases B1 and B2 would reduce the net train miles traveled as well as fuel consumption despite an increase in actual route miles from the existing network. This net reduction is due primarily to a reduction in local train miles traveled in Planning Cases B1 and B2.

The combined San Antonio and Austin bypass (Planning Case C) shows impacts to train performance for the following measures:

- Train Miles – increased by 1.8%
- Run Time – reduced by 12.6%
- Hours of Delay – reduced by 27.7%
- Delay Minutes/ 100 Train Miles – reduced by 29%
- Average Train Speed – increased by 16.5%
- Fuel Consumption – increased by 2%
- Gallons of Fuel/ Train Mile – increased by 1.2%

Planning Case 1 shows a general improvement in all of the measures as compared to the base case. Because improvements in one area cause trains to operate at different times in adjacent segments, and thus change the interaction with other trains, the simulation results may vary by location. The improvements are more substantial in the south segment of the network, where the two double track projects provide the greatest direct benefit, but minor improvement also results in the north and east segments. Total run time is reduced by 12 minutes per day, and the percent of run time consumed by trains stopping to wait for available track space is reduced from 16.2% to 16.0%.

Planning Case 2 includes improvements in the east and south segments of the network, and provides additional improvement to train operating measurements in the east and north segments of the network over Planning Case 1. Planning Case 2 results in the total run time dropping from 493.6 hours per day (Case 1) to 489.6 hours, and it provides a significant reduction in the delay minutes per 100 train miles, from 37.27 (Case 1) to 35.47 minutes.

Planning Case 3 adds double track east of Kirby Yard, and shows further operating improvements particularly in the north and south segments of the network. Compared with Case 2, Planning Case 3 results in delay time reductions of 18 minutes per day. Delay time per 100 train miles dropped from 35.47 to 35.29 minutes. Overall performance of Planning Case 3 in all segments of the network shows improvements compared to the base case.

Planning Case 4 makes additional capacity improvements in the north and east segments of the rail network by upgrading selected sidings. Planning Case 4 provides further improvement over Case 3, particularly in terms of reduced delay minutes per 100 train miles. Generally, efficiencies in train operations occur in all categories.

The total impact of all the planning cases functioning as a whole is demonstrated by comparing Planning Case 4 to the base case. The delay percentage drops from 16.2 percent to 15.3 percent, delay minutes per 100 train miles drops from 37.57 minutes to 35.26 minutes, and average speed increases from 25.8 to 26 miles per hour.

Table 7-36 shows the average number of daily trains operated over each segment of the network for the bypass planning cases. Planning Cases 1 through 4 have no significant impact on average train volumes from the base case.

Railroad Subdivision	Average Daily Trains				
	Base Case	Case A - SA Bypass	Case B1 - AUS Bypass	Case B2 - AUS Bypass	Case C - SA&AUS Bypass
Possible Austin-San Antonio Bypass, Taylor to Seguin	N/A	N/A	29	29	29
Possible Austin-San Antonio Bypass, Seguin to Macdona	N/A	31	N/A	N/A	42
Austin Subdivision ML 1, East of Taylor	22	13	33	33	33
Austin Subdivision ML 1, Taylor to Round Rock	30	21	13	13	12
Austin Subdivision ML 1, Round Rock to San Marcos	25	16	8	8	7
Austin Subdivision ML 1 and 2, San Marcos to Garden Ridge	36	23	12	12	12
Austin Subdivision ML 1, Garden Ridge to San Antonio (Twr 105)	22	16	8	8	7
Austin Subdivision ML 2, Garden Ridge to Del Rio Sub	10	3	1	1	1
Austin Subdivision ML 2, Del Rio Sub to Downtown San Antonio (Twr 112)	10	3	1	48	1
Corpus Christi Subdivision, SoSan Yard to Toyota Plant	13	5	13	13	4
Del Rio Subdivision, Kirby to Downtown San Antonio (Twr 105)	35	15	56	10	14
Del Rio Subdivision, Downtown San Antonio (Twr 105) to Macdona	24	5	36	36	4
Del Rio Subdivision, Macdona to Hondo	27	27	27	27	27
Glidden Subdivision, Flatonia to Seguin	27	40	24	24	23
Glidden Subdivision, Seguin to Kirby	27	13	52	52	14
Laredo Subdivision, San Antonio to Gessner	18	11	18	18	2
Laredo Subdivision, Gessner to Melon	18	18	18	18	18
Lockhart Subdivision, San Marcos to West Point	12	9	6	6	5

Table 7-36: Average Daily Train Volumes by Segment

Planning Case Benefit/Cost Summary

The estimated public and private benefits for each planning case are shown in Table 7-37 along with associated cost/benefit comparisons. As shown in the table, Planning Case C has the highest total public benefit to cost ratio as well as the highest total benefit to cost ratio. The estimated private benefit is largely due to savings in run time and delay time over the 20-year period.

Planning Case	Estimated Cost	Estimated Public Benefit	Ratio: Public Benefit/Cost	Estimated Private Benefit	Ratio: Private Benefit/ Cost	Estimated Total Benefit	Ratio: Total Benefit/Cost
A	$ 1,369,610,000	$ 504,790,000	0.37	$ (162,860,000)	-0.12	$ 341,930,000	0.25
B1	$ 1,595,850,000	$ 587,100,000	0.37	$ 161,990,000	0.10	$ 749,090,000	0.47
B2	$ 1,741,260,000	$ 843,460,000	0.48	$ 157,890,000	0.09	$ 1,001,350,000	0.58
C	$ 2,423,510,000	$1,424,950,000	0.59	$ 95,490,000	0.04	$ 1,520,440,000	0.63
1	$ 9,260,000	NA	NA	$ 670,000	0.07	$ 670,000	0.07
2	$ 21,060,000	NA	NA	$ 14,820,000	0.70	$ 14,820,000	0.70
3	$ 25,740,000	NA	NA	$ 16,450,000	0.64	$ 16,450,000	0.64
4	$ 35,130,000	NA	NA	$ 15,310,000	0.44	$ 15,310,000	0.44
Estimated public and private benefits are based on a 20-year study period.							

Table 7-37: Planning Case Estimated Cost and Benefits Summary

The possible San Antonio bypass analyzed in Planning Case A was shown to provide a public benefit in the form of reduced impedance (delay, accidents, and emissions) at roadway-rail crossings of more than $501.4 million over the no-build scenario. Incorporating the Austin bypass with the San Antonio bypass, as analyzed in Planning Case C, would add a public benefit of more than $393.5 million. The majority of the additional benefit that may be seen from incorporating a possible Austin bypass with the San Antonio bypass option would be seen on the Laredo and Austin ML 1 Subdivisions. The public benefits of reduced impedance at grade crossings along each rail subdivision for Planning Cases A, B, and C are shown in Table 7-38. The values shown represent the difference in impedance costs relative to the base case.

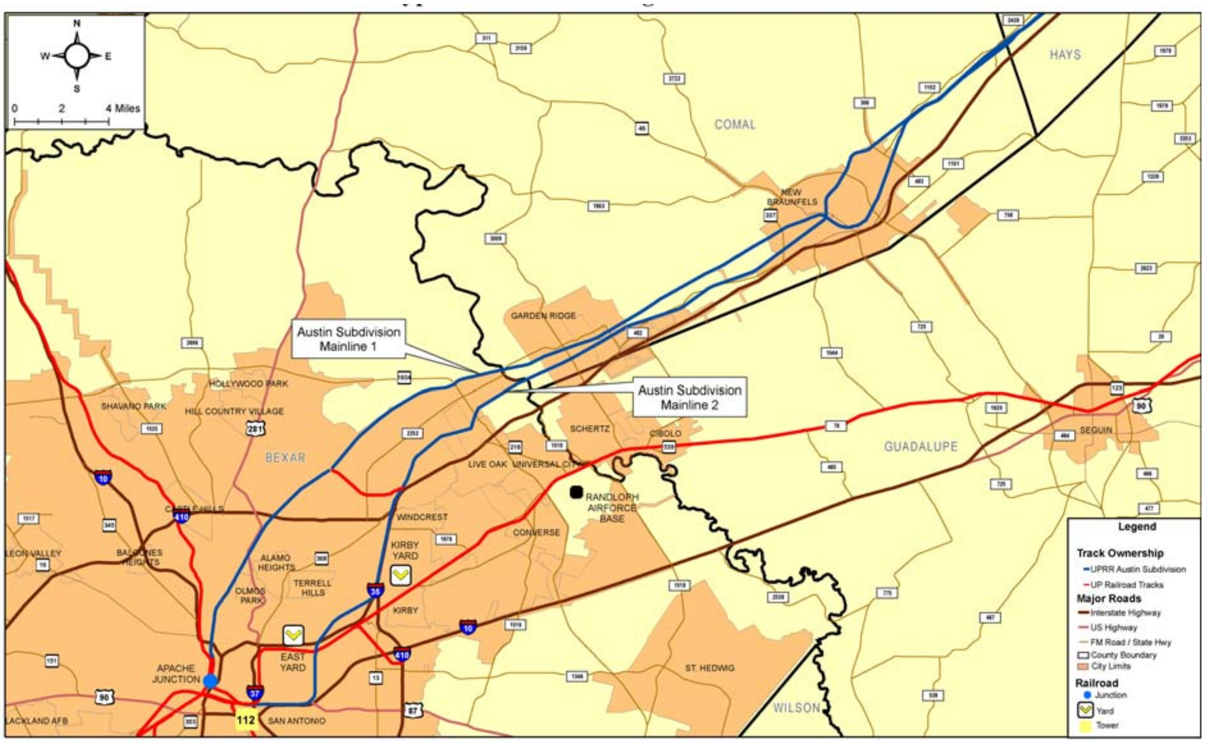
Railroad Subdivision	PC A - SA Bypass	PC B1 - Austin Bypass	PC B2 - Austin Bypass	PC C - SA & Austin Bypass
Austin Subdivision (San Marcos to Williamson County Line)	$111,450,000	$170,760,000	$170,760,000	$168,540,000
Austin No 1 (San Marcos to Downotwn San Antonio)	$182,760,000	$289,490,000	$289,490,000	$313,890,000
Austin No 2 (San Marcos to Downotwn San Antonio)	$58,750,000	$80,480,000	$80,980,000	$84,900,000
Corpus Christi (Downtown San Antonio to Toyota Plant)	-$36,340,000	-$44,760,000	-$44,760,000	-$8,700,000
Del Rio (Kirby to Macdona)	$148,670,000	-$294,620,000	-$38,400,000	$209,930,000
Giddings (Flatonia to Mumford)	-$6,530,000	$7,360,000	$7,360,000	$7,420,000
Glidden (Flatonia to Kirby)	$40,730,000	-$21,690,000	-$21,690,000	$45,350,000
Kerrville	$34,870,000	$14,130,000	$14,130,000	$35,270,000
Laredo (Downtown San Antonio to Gessner)	-$52,210,000	-$139,260,000	-$139,260,000	$84,010,000
Lockhart (San Marcos to Smithville)	$19,590,000	$25,300,000	$25,300,000	$25,660,000
Rockport	$29,570,000	$980,000	$980,000	-$6,900,000
Waco (Smithville to Taylor)	-$830,000	$1,050,000	$1,050,000	$1,060,000
Possible Bypass with Grade Separations	-$29,060,000	-$29,900,000	-$29,900,000	-$65,500,000
Total (with grade separations on bypass)	**$501,420,000**	**$59,320,000**	**$316,040,000**	**$894,930,000**

Table 7-38: 20-Year Grade Crossing Impedance Reduction/Public Benefit

SECTION 8: IDENTIFIED IMPROVEMENTS

The potential improvements included in the RTC planning cases in addition to identified grade separations and crossing closures have been organized by railroad subdivision and are described in the following section. Maps showing the locations of each railroad subdivision are included in Appendix E.

Austin Subdivision ML 1



The tracks of the Austin Subdivision ML 1 were originally constructed in 1881 by the International & Great Northern Railroad. The Subdivision originates in Hearne, Texas and passes through Taylor, Georgetown, Round Rock, Austin, San Marcos, and New Braunfels before it ends in downtown San Antonio with the tracks continuing southward as the Laredo Subdivision. From San Antonio to Austin, it generally parallels Interstate 35 and also parallels the Austin Subdivision ML 2 between San Marcos and San Antonio. The Subdivision is approximately 171 miles in total length, approximately 44 of which are in the San Antonio Region study area in Comal and Bexar Counties. The Austin Subdivision ML 1 is a single track mainline with numerous sidings utilized in a bidirectional manner, with trains dispatched to operate in both directions, averaging between 20 and 30 trains daily, depending upon location.

Potential improvements along the Austin Subdivision ML 1 include grade separations, crossing closures, and rail capacity enhancements, as listed in Table 8-1 and described in the following section.

Austin Subdivision Mainline 1				
Grade Separations	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)**	**Ratio: Benefit/Cost (20-year)**
Ashby	3	$ 11,000,000	$ 3,950,000	0.36
Basse	3	$ 7,100,000	$ 20,970,000	2.95
Broadway & Bitters	3	$ 27,300,000	$ 28,040,000	1.03
Classen	3	$ 7,000,000	$ 10,120,000	1.45
Culebra/Fredericksburg	3	$ 17,300,000	$ 24,090,000	1.39
FM 2252	3	$ 5,800,000	$ 14,120,000	2.43
FM 3009 (Austin ML-1 and ML-2)	3	$ 18,500,000	$ 1,420,000	0.08
FM 306	3	$ 7,100,000	$ 17,350,000	2.44
Hildebrand	3	$ 15,700,000	$ 24,260,000	1.55
Jones Maltsberger	3	$ 11,800,000	$ 18,040,000	1.53
Judson	3	$ 5,000,000	$ 9,950,000	1.99
Laredo	3	$ 10,400,000	$ 8,650,000	0.83
Martin	3	$ 20,000,000	$ 11,150,000	0.56
McCullough	3	$ 8,300,000	$ 11,330,000	1.37
Oconnor	3	$ 7,900,000	$ 23,070,000	2.92
Poplar	3	$ 8,800,000	$ 7,190,000	0.82
Ruiz	3	$ 26,300,000	$ 3,810,000	0.14
San Antonio	3	$ 12,300,000	$ 7,620,000	0.62
Sunset	3	$ 11,900,000	$ 12,700,000	1.07
Thousand Oaks	3	$ 20,600,000	$ 25,900,000	1.26
Woodlawn	3	$ 7,800,000	$ 6,290,000	0.81
Crossing Closures	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)***	**Ratio: Benefit/Cost (20-year)**
Arbor	3	$ 50,000	$ 260,000	5.20
Bridge St	3	$ 50,000	NA	NA
Castell St	3	$ 50,000	$ 360,000	7.20
Coll St	3	$ 50,000	NA	NA
Comal Ave	3	$ 50,000	$ 360,000	7.20
Commerce St	3	$ 50,000	$ 9,670,000	193.40
Craig	3	$ 50,000	$ 330,000	6.60
Delgado St	3	$ 50,000	$ 690,000	13.80
Dora St	3	$ 50,000	NA	NA
Elm St	3	$ 50,000	$ 360,000	7.20
Elsmere	3	$ 50,000	$ 300,000	6.00
Hickman St	3	$ 50,000	$ 520,000	10.40
Hollywood Ave	3	$ 50,000	$ 470,000	9.40
Jahn St	3	$ 50,000	$ 510,000	10.20
Kings Hwy	3	$ 50,000	$ 470,000	9.40
Laurel St	3	$ 50,000	$ 340,000	6.80
Lombrano St	3	$ 50,000	$ 320,000	6.40
Magnolia	3	$ 50,000	$ 470,000	9.40
Main Ave (Zilla)	3	$ 50,000	$ 600,000	12.00
Mill St	3	$ 50,000	NA	NA
Mistletoe	3	$ 50,000	$ 1,170,000	23.40
Perez St	3	$ 50,000	NA	NA
Rivas St	3	$ 50,000	$ 290,000	5.80
Russell	3	$ 50,000	$ 330,000	6.60
Summit Ave	3	$ 50,000	$ 330,000	6.60
Tampico St	3	$ 50,000	$ 330,000	6.60

Table 8-1: Austin Subdivision ML 1 Improvements

Rail Improvements	Improvement Classification Level	Estimated Cost	Estimated Public Benefit (20-year)	Ratio: Benefit/Cost (20-year)
#4 - Construct one new connection track between Austin ML1 and Lockhart Subdivisions in San Marcos.	1	$ 880,000	NA	NA
#9 - Construct new connections in the northeast and northwest quadrants of the Austin ML-1 and Del Rio Subdivision diamond south of San Fernando Yard and Apache Jct.	1	$ 3,000,000	NA	NA
#11 - Extend Hestes and Hutto sidings (Austin ML 1, south of Taylor) to just over 2 miles in length	4	$ 5,020,000	NA	NA
#12 - Extend Landas Park siding (Austin ML-1) to a length of 2.9 miles	4	$ 5,020,000	NA	NA
#13 - Extend and connect both North Loop and Adams sidings (Austin ML-1) to create a 3.74 mile long passing siding	4	$ 4,050,000	NA	NA
#17 - Siding upgrades between Round Rock and San Antonio to provide sufficient locations for train meets (7 locations)	4	$ 8,620,000	NA	NA
#18 - Upgrade Austin ML-1 sidings to CTC at Adams, Landas Park, Texas Lehigh, Buda, Austin, McNeil and White Lime	1	$ 900,000	NA	NA
#28 - Construct a new connection at Taylor between the between the Waco and Austin Subdivisions (consider bypass route)	1	$ 1,340,000	NA	NA
*Public benefit could only be estimated for crossing closures which would be rerouted to a grade separated crossing. However, all crossing closures produce a public benefit of improved safety.				
**No public benefits of individual rail improvements were identified.				
Class 1 Improvements (Near-term Improvements)	1	$ 6,120,000	NA	NA
Class 3 Improvements (Separations/Closures)	3	$ 269,200,000	$ 308,500,000	1.15
Class 4 Improvements (Long-term Improvements)	4	$ 22,710,000	NA	NA
Total Identified Improvements		$ 298,030,000	$ 308,500,000	1.04

Table 8-1 (cont'd): Austin Subdivision ML 1 Improvements

A breakdown of the order of magnitude cost estimates and the estimated associated public benefits of the identified potential grade separations are included in Appendix C and Appendix G, respectively.

Grade Separations

Grade Separation of Ashby Place on the Austin Subdivision ML 1

Ashby Place is currently a two-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in the city of San Antonio. This roadway, with approximately 5,300 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the overpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 3 of 40 located in Appendix F.

The constraints located in the vicinity of Ashby Place consist of adjacent commercial and residential property, San Pedro Springs Park, and a leaking petroleum storage tank site. Access to adjacent properties could be maintained via access roads alongside Ashby Place along with at-grade u-turns located beneath the overpass on each side of the railroad.

The grade separation of Ashby Place is estimated to cost $11.0 million. The estimated public benefit calculated for the grade separation of Ashby Place is approximately $3.95 million, which is 36 percent of the estimated cost of the grade separation.

Grade Separation of Basse Rd on the Austin Subdivision ML 1

Basse Road is currently a four-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County within the city of San Antonio. This roadway, with approximately 24,700 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the overpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 6 of 40 located in Appendix F. The constraints located in the vicinity of Basse Road consist of the adjacent golf course and park as well as the 100-year floodplain.

Access to adjacent properties would not be available along the identified grade separated Basse Road structure for a length of less than one mile. However, since no properties have been identified to currently access the roadway along this segment, minimal or no right-of-way acquisition should be required.

The grade separation of Basse Road is estimated to cost $7.1 million, with an estimated public benefit of $20.97 million, which is nearly three times the estimated cost of the grade separation.

Grade Separation of Bitters Rd and Broadway St on Austin Subdivision ML 1

Bitters Road is currently a two-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in the city of San Antonio. Approximately 27,300 daily vehicles cross the UP at this location. Broadway Street is currently a four-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in the city of San Antonio. Approximately 33,500 daily vehicles cross the UP at this location. These roadways have been identified as potential candidates for grade separation. The potential underpass structures along Bitters Road, Broadway Street, and Wetmore Road would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the underpass structures is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheets 9 and 10 of

40 located in Appendix F. The constraints located in the vicinity of Bitters Road and Broadway Street consist of adjacent industrial and commercial property, an oil/gas pipeline, public water well, and the airport located west of the railroad.

In order to maintain connectivity, the lanes of Wetmore Road must be depressed to meet the underpass mainlanes of Bitters Road and Broadway Street. Access to adjacent properties along Wetmore Road could be maintained via a frontage road west of the existing Wetmore Road mainlanes. Access to adjacent properties along Bitters Road and Broadway Street could be maintained via access roads alongside the underpass structures with at-grade u-turns located above the underpass mainlanes on the east side of the railroad.

The grade separation of Bitters Road and Broadway Street is estimated to cost \$27.3 million with an estimated public benefit of \$28 million, which is three percent greater than the estimated cost of the grade separation.

Grade Separation of Classen Rd on the Austin Subdivision ML 1

Classen Road is currently a two-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in the city of Bracken. This roadway, with approximately 11,900 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the overpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 13 of 40 located in Appendix F. The constraints located in the vicinity of Classen Road consist of the adjacent residential property and a cemetery. Access to adjacent properties and connecting roadways could be maintained via access roads alongside Classen Road with at-grade u-turns located beneath the overpass on each side of the railroad.

The grade separation of Classen Road is estimated to cost \$7.0 million with an estimated public benefit of \$10.1 million, which is nearly 1.5 times greater than the estimated cost of the grade separation.

Grade Separation of Fredericksburg Road and Culebra Avenue on the Austin Subdivision ML 1

Fredericksburg Road and Culebra Avenue are each currently four-lane roadways that cross the UP Austin Subdivision ML 1 in Bexar County in San Antonio. Approximately 19,000 daily vehicles cross the UP at Fredericksburg Road and approximately 13,000 daily vehicles cross the railroad at Culebra Avenue. These roadways have been identified as potential candidates for grade separation. The potential four-lane roadway underpasses would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the underpasses is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 3 of 40 located in Appendix F. The primary constraints located in the vicinity of Fredericksburg Road and Culebra Avenue are adjacent residential and commercial properties.

Access to adjacent properties alongside the potential underpass structures would be eliminated due to the lack of available horizontal clearance for at-grade access roads alongside the underpass. The elimination of access to the identified grade separated roadways from the adjacent properties requires the acquisition of additional right-of-way alongside the roadways.

The grade separation of Fredericksburg Road and Culebra Avenue are estimated to cost $17.3 million with an estimated public benefit of $24.1 million, which is 45 percent greater than the estimated cost of the grade separation.

<u>Grade Separation of FM 2252 on the Austin Subdivision ML 1</u>

FM 2252 is currently a two-lane roadway that crosses the UP Austin Subdivision ML 1 in Comal County in the city of Bracken. This roadway, with approximately 15,100 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the overpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 18 of 40 located in Appendix F. The constraints located in the vicinity of FM 2252 consist of adjacent industrial property and the location of the 100-year floodplain.

Access to adjacent industrial properties south of the railroad along FM 2252 could be maintained via access roads along both the east and west sides of FM 2252 with at-grade turn-around lanes just south of the railroad. The connection between Bracken Drive and FM 2252 immediately north of the railroad crossing would be eliminated due to the identified potential grade separation, since Bracken Drive would run beneath the identified FM 2252 overpass bridge. However, traffic from Bracken Drive would be able to reach FM 2252 less than a mile from the existing connection located near the railroad crossing.

The grade separation of FM 2252 is estimated to cost $5.8 million, with an estimated public benefit of $14.1 million, which is approximately 2.4 times the estimated cost of the grade separation.

<u>Grade Separation of FM 3009 on the Austin Subdivision ML 1 and ML 2</u>

FM 3009 is currently a two-lane roadway that crosses the UP Austin Subdivision MLs 1 and 2 in Comal County near Selma. Approximately 2,100 daily vehicles cross the UP at this location shown in Photo 1 and Photo 2. This roadway has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from a new track alignment of Austin Subdivision MLs 1 and 2.

A preliminary layout of the overpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 21 of 40 located in Appendix F. The constraints located in the vicinity of FM 3009 consist of adjacent commercial and industrial property and oil/gas pipelines.

The new track alignment identified as part of the FM 3009 grade separation merges the Austin Subdivision MLs into two parallel mainlines approximately halfway between the existing ML 1 and ML 2 alignments. This new alignment eliminates the existing two crossings between FM 3009 and the Austin Subdivision (at ML 1 and approximately ½ mile south at ML 2) and creates one crossing where the roadway can cross both mainlines at one location. The new alignment merges back into the existing ML 1 and ML 2 alignments east of the FM 3009 crossing. Access to adjacent properties and connecting roadways west FM 3009 could be maintained via access roads along FM 3009 on the north and south sides of the railroad.

The grade separation of FM 3009 is estimated to cost $18.5 million with an estimated public benefit of $1.4 million, which is eight percent of the estimated cost of the grade separation.

Photo 1: FM 3009 at Austin Subdivision ML 1

Photo 2: FM 3009 at Austin Subdivision ML 2

Grade Separation of FM 306 on the Austin Subdivision ML 1

FM 306 is currently a two-lane roadway that crosses the UP Austin Subdivision ML 1 in Comal County in the city of New Braunfels. This roadway, with approximately 13,500 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. According to FRA data, one accident occurred at the FM 306 crossing from 2002 through 2006. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the overpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 13 of 40 located in Appendix F. The constraints located in the vicinity of Classen Road consist of the adjacent residential property and a cemetery. Access to adjacent properties could be maintained via access roads alongside FM 306 with at-grade u-turns located beneath the overpass on each side of the railroad.

The grade separation of FM 306 is estimated to cost $7.1 million with an estimated public benefit of $17.4 million, which is 2.4 times the estimated cost of the grade separation.

Grade Separation of Hildebrand Ave on the Austin Subdivision ML 1

Hildebrand Avenue is currently a four-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in San Antonio. This roadway, with approximately

27,500 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway underpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the underpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheets 4 and 5 of 40 located in Appendix F. The primary constraints located in the vicinity of Hildebrand Avenue consist of the adjacent commercial and residential property.

The potential underpass for Hildebrand Avenue would require the reconstruction of San Pedro Avenue south of its existing crossing with the railroad in order to maintain connectivity between the two streets. Access to adjacent properties along Hildebrand and San Pedro Avenue would be eliminated at the location of the identified underpass. Property access could not be maintained with access roads along the underpass since no additional right-of-way is available.

The grade separation of Hildebrand Avenue is estimated to cost $15.7 million with an estimated public benefit of $24.3 million, which is 55 percent greater than the estimated cost of the grade separation.

Grade Separation of Jones-Maltsberger on the Austin Subdivision ML 1

Jones-Maltsberger Road is currently a four-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in San Antonio. This roadway, with approximately 22,100 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway underpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the underpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 7 of 40 located in Appendix F. The constraints located in the vicinity of Jones-Maltsberger Road consist of nearby golf courses, the crossing of US 281 just north of the railroad crossing, and the 100-year floodplain. The location of the 100-year floodplain may require additional drainage design considerations for this grade separation.

Access to adjacent properties south of the railroad would be required to reroute to driveways south of the potential underpass, while ramps from the US 281 frontage roads north of the railroad would be required to connect with the potential Jones-Matlsberger underpass. Minimal right-of-way acquisition, if any, should be required since the identified grade separation remains in the existing roadway right-of-way.

The grade separation of Jones-Maltsberger Road is estimated to cost $11.8 million with an estimated public benefit of $18 million, which is 53 percent greater than the estimated cost of the grade separation.

Grade Separation of Judson Rd on the Austin Subdivision ML 1

Judson Road is currently a two-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in the city of Bracken. This roadway, with approximately 11,700 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the overpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 15 of 40 located in Appendix F. The constraints located in the vicinity of Judson Road consist of the adjacent residential property and the 100-year floodplain.

Access to adjacent properties could be maintained via the existing roadway network, although the streets of Kissing Oak and Chestnut View would need to be closed at the crossing with the potential underpass. Chestnut View Drive could be rerouted west via the identified new connection road to Mountain Vista Drive to reach Judson Road. Kissing Oak Street could be rerouted east to Lost Creek Street to reach Judson Road. The addition of the connection road between Chestnut View Drive and Mountain Vista Drive would require the acquisition of additional right-of-way.

The grade separation of Judson Road is estimated to cost $5 million with an estimated public benefit of $9.95 million, which is nearly two times the estimated cost of the grade separation.

Grade Separation of Laredo St on the Austin Subdivision ML 1

Laredo Street is currently a four-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in downtown San Antonio. This roadway, with approximately 12,200 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the overpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 1 of 40 located in Appendix F. The constraints located in the vicinity of the Laredo Street crossing with the railroad include adjacent industrial and commercial property, an oil/gas pipeline, leaking petroleum storage tanks, a school, IH-35 mainlanes, and two water crossings. The identified grade separated roadway would bridge over the railroad as well as the two water crossings.

Access to adjacent properties could be maintained via the access roads alongside Laredo Street with at-grade u-turns located beneath the potential overpass on each side of the railroad.

The grade separation of Laredo Street is estimated to cost $10.4 million with an estimated public benefit of nearly $8.7 million, which is 83 percent of the estimated cost of the grade separation.

Grade Separation of Martin St on the Austin Subdivision ML 1

Martin Street is currently a four-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in downtown San Antonio. This roadway, with approximately 15,200 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway underpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the underpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 2 of 40 located in Appendix F. The constraints located in the vicinity of Martin Street include adjacent industrial and commercial property and a nearby hospital. Access to the hospital could be impacted by the identified grade separation, which would require traffic west of the railroad to use alternate adjacent roadways such as Commerce Street or Morales Street to cross the railroad and reach the hospital. Access to adjacent properties along the identified grade separation would be eliminated due to the underpass structure and lack of available right-of-way for frontage roads.

San Marcos, Comal, Medina, and Frio Streets intersect with Martin Street along the identified grade separation and would remain at-grade and bridge over the Martin Street underpass, eliminating connectivity of traffic between the intersecting streets and Martin Street. The potential grade separation should be able to be constructed within the existing roadway right-of-way and should not require the acquisition of additional land.

The grade separation of Martin Street is estimated to cost $20.0 million with an estimated public benefit of nearly $11.2 million, which is approximately 56 percent of the estimated cost of the grade separation.

Grade Separation of McCullough on the Austin Subdivision ML 1

McCullough Avenue is currently a two-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in downtown San Antonio. This roadway, with approximately 14,500 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. According to FRA data, one accident occurred at the McCullough Avenue crossing from 2002 through 2006. The potential two-lane roadway underpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the underpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 5 of 40 located in Appendix F. The constraints located in the vicinity of McCullough Avenue consist primarily of adjacent residential and commercial property. Access to adjacent properties along the potential grade separation would be eliminated due to the underpass structure and lack of available right-of-way for frontage roads.

The grade separation of McCullough Avenue is estimated to cost $8.3 million with an estimated public benefit of $11.3 million, which is 37 percent greater than the estimated cost of the grade separation.

Grade Separation of O'Connor Road on the Austin Subdivision ML 1

O'Connor Road is currently a four-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in the city of Bracken. This roadway, with approximately 26,400 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the overpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 14 of 40 located in Appendix F. The constraints located in the vicinity of O'Connor Road include adjacent residential property and a nearby school. Access to adjacent properties could be maintained via access roads alongside O'Connor Road with at-grade u-turns located beneath the overpass on each side of the railroad.

The grade separation of O'Connor Road is estimated to cost $7.9 million with an estimated public benefit of $23 million, which is nearly three times the estimated cost of the grade separation.

Grade Separation of Poplar St on the Austin Subdivision ML 1

Poplar Street is currently a two-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in downtown San Antonio. This roadway, with approximately 8,700 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. According to FRA data, one accident occurred at the Poplar Street crossing from 2002 through 2006. The potential two-lane roadway underpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the underpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 3 of 40 located in Appendix F. The constraints located in the vicinity of Poplar Street consist of adjacent industrial and commercial property and the IH-10 main lanes located immediately east of the crossing.

Access to adjacent properties west of the railroad could be maintained via access roads alongside Poplar Street with an at-grade u-turn located above the potential underpass just west of the railroad. Access to adjacent properties east of the railroad and west of IH-10 along the identified grade separation would be eliminated due to the underpass structure and lack of available right-of-way for frontage roads.

The grade separation of Poplar Street is estimated to cost $8.8 million with an estimated public benefit of $7.2 million, which is 82 percent of the estimated cost of the grade separation.

Grade Separation of Ruiz St on the Austin Subdivision ML 1

Ruiz Street is currently a two-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in downtown San Antonio. This roadway, with approximately 5,400 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential two-lane roadway underpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the underpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 2 of 40 located in Appendix F. The constraints located in the vicinity of Ruiz Street consist primarily of adjacent residential and commercial property. Access to adjacent properties could be maintained via access roads alongside Ruiz Street with at-grade u-turns located beneath the overpass on each side of the railroad.

The grade separation of Ruiz Street is estimated to cost $26.3 million with an estimated public benefit of $3.8 million, which is approximately 14 percent of the estimated cost of the grade separation.

Grade Separation of San Antonio St on the Austin Subdivision ML 1

San Antonio Street is currently a four-lane roadway that crosses the UP Austin Subdivision ML 1 in Comal County in the city of New Braunfels. This roadway, with approximately 8,200 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway underpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the underpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 30 of 40 located in Appendix F. The constraints located in the vicinity of San Antonio Street consist of adjacent commercial, residential, and public and institutional properties, including registered historic sites. Access to adjacent properties would be eliminated alongside the identified San Antonio Street underpass due to the lack of available right-of-way for frontage roads.

The grade separation of San Antonio Street is estimated to cost $12.3 million with an estimated public benefit of $7.6 million, which is 62 percent of the estimated cost of the grade separation.

Grade Separation of Sunset Rd on the Austin Subdivision ML 1

Sunset Road is currently a four-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in the city of San Antonio. This roadway, with approximately 16,800 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway underpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the underpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 7 of 40 located in Appendix F. The constraints located in the vicinity of Sunset Road consist of adjacent commercial and residential property and the 100-year floodplain. The location of the 100-year floodplain may require additional drainage design considerations for this grade separation. Access to adjacent properties could be maintained via access roads alongside the identified Sunset Road underpass with an at-grade u-turn located above the underpass east of the railroad.

The grade separation of Sunset Road is estimated to cost $11.9 million with an estimated public benefit of $12.7 million, which is approximately seven percent greater than the estimated cost of the grade separation.

Grade Separation of Thousand Oaks Dr on the Austin Subdivision ML 1

Thousand Oaks Drive is currently a four-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in San Antonio. This roadway, with approximately 27,600 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. According to FRA data, two accidents occurred at the Thousand Oaks Drive crossing from 2002 through 2006. The potential four-lane roadway underpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the underpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 12 of 40 located in Appendix F. The constraints located in the vicinity of Thousand Oaks Drive consist primarily of the adjacent commercial properties and the proximity of Wetmore Road, which runs parallel to the railroad. In order to maintain connectivity between Wetmore Road and Thousand Oaks Drive, the existing lanes of Wetmore Road would need to be depressed to meet the lanes of the Thousand Oaks Drive underpass. Access to adjacent properties should be unaffected for properties east of the railroad, while properties west of the railroad may require additional access roads or land acquisition due to the identified underpass.

The grade separation of Thousand Oaks Drive is estimated to cost $20.6 million with an estimated public benefit of $25.9 million, which is 26 percent greater than the estimated cost of the grade separation.

Grade Separation of Woodlawn Ave on the Austin Subdivision ML 1

Woodlawn Avenue is currently a two-lane roadway that crosses the UP Austin Subdivision ML 1 in Bexar County in downtown San Antonio. This roadway, with approximately 8,200 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential two-lane roadway underpass would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the underpass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 4 of 40 located in Appendix F. The constraints located in the vicinity of Woodlawn Avenue consist primarily of the adjacent residential properties. Access to adjacent properties along the identified potential grade separation would be eliminated due to the underpass structure and lack of available right-of-way for frontage roads.

The grade separation of Woodlawn Avenue is estimated to cost $7.8 million with an estimated public benefit of $6.3 million, which is 81 percent of the estimated cost of the grade separation.

Crossing Closures

Crossing Closure of Coll Street, Mill Street, and Bridge Street on the Austin Subdivision ML 1

Coll, Mill, and Bridge Streets are each currently two-lane roadways that cross the railroad at-grade in Comal County in the city of New Braunfels. Approximately 600 vehicles cross the UP at each location daily. Coll, Mill, and Bridge Streets should be considered for closure at their intersections with the UP Austin Subdivision ML 1 in order to reduce public safety hazards currently associated with the existing at-grade crossings.

The location of the potential crossing closures as well as the alternative routes and associated distances are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 30 of 40 located in Appendix F. Constraints located in the vicinity of these streets consist primarily of residential properties as well as commercial and public buildings.

Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted from the potential crossing closures to San Antonio Street to cross the railroad. Right-of-way acquisition of the adjacent properties should not be required since no new construction is required.
The potential crossing closures are each estimated to cost $50,000. The estimated public benefit could not be calculated for these potential crossing closures since the traffic would be rerouted to another at-grade crossing; however, the closures would produce a safety benefit for the traveling public.

Crossing Closure of Comal Street, Castell Street, Elm Street, and Jahn Street on the Austin Subdivision ML 1

Comal, Castell, Elm, and Jahn Streets are each currently two-lane roadways that cross the railroad at-grade in Comal County in the city of New Braunfels. Approximately 600 vehicles cross the UP at each location daily. The crossings should be considered for closure at their intersections with the UP Austin Subdivision ML 1 in order to reduce public safety hazards currently associated with the existing at-grade crossings.

The location of the potential crossing closures as well as the alternative routes and associated distances are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 31 of 40 located in Appendix F. Constraints located in the vicinity of these streets consist primarily of residential properties as well as commercial and public buildings and nearby schools.

Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted from the potential crossing closures to Seguin Avenue, which is an existing grade separation. Right-of-way acquisition of the adjacent properties should not be required since no new construction is required.

The potential crossing closures are each estimated to cost $50,000. The estimated public benefit for closing the crossings at Comal, Castell, and Elm Streets is approximately $360 thousand for each of the crossings and the estimated benefit for closing Jahn Street is $540 thousand.

Crossing Closure of Commerce Street on the Austin Subdivision ML 1

Commerce Street is currently a two-lane roadway with main lanes that overpass the railroad and frontage roads that cross the railroad at-grade in Bexar County in San Antonio. Approximately 13,500 vehicles cross the UP at this location daily. Commerce Street should be considered for closure at the intersection with the UP Austin Subdivision ML 1 in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 2 of 40 located in Appendix F. The primary constraint located in the vicinity of this street consists of adjacent commercial properties.

Access to adjacent properties along the Commerce Street frontage roads could be maintained via the existing roadway network. Traffic could be rerouted from the potential crossing closure to cross the railroad along the grade separated lanes of Commerce Street. Right-of-way acquisition of the adjacent properties should not be required since no new construction is required.

The potential crossing closure at Commerce Street is estimated to cost $50,000 with an estimated public benefit for closing the crossing of approximately $9.7 million.

Crossing Closure of Dora Street on the Austin Subdivision ML 1

Dora Street is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in San Antonio. Approximately 400 vehicles cross the UP at this location daily. Dora Street should be considered for closure at the intersection with the UP Austin Subdivision ML 1 in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 5 of 40 located in Appendix F. The primary constraints located in the vicinity of this street consist of adjacent residential properties and area schools.

Access to adjacent properties along Dora Street could be maintained via the existing roadway network. Traffic could be rerouted from the potential crossing closure to cross the railroad along McCullough Avenue, Olmos Drive, or San Pedro Avenue. Right-of-way acquisition of the adjacent properties should not be required since no new construction is required.

The potential crossing closure at Dora Street is estimated to cost $50,000. The public benefit could not be calculated for closing the crossing since traffic may be rerouted to another at-grade crossing, although closing the crossing would produce a public benefit of improved safety.

Crossing Closure of Hickman Street on the Austin Subdivision ML 1

Hickman Street is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in San Antonio. Approximately 700 vehicles cross the UP at this location daily. Hickman Street should be considered for closure at the intersection with the UP Austin Subdivision ML 1 in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 3 of 40 located in Appendix F. Constraints located in the vicinity of this street consist primarily of residential, commercial, and industrial properties as well as a nearby school.

Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted from the potential crossing closure to the north on Ashby Place or to the south on Fredericksburg Road to cross the railroad. Both Ashby Place and Fredericksburg Road are included as potential grade separations as part of this study. Right-of-way acquisition of the adjacent properties should not be required since no new construction is required.

The potential crossing closure at Hickman Street is estimated to cost $50,000 with an estimated public benefit for closing the crossing of approximately $520 thousand.

Crossing Closure of Hollywood Ave, Elsmere Pl, Kings Hwy, and Summit Ave on the Austin Subdivision ML 1

Hollywood Avenue, Elsmere Place, Kings Highway and Summit Avenue are each currently two-lane roadways that cross the railroad at-grade in Bexar County in San Antonio. Approximately 700 vehicles cross the UP at each location daily. The crossings should be considered for closure at their intersections with the UP Austin Subdivision ML 1 in order to reduce public safety hazards currently associated with the existing at-grade crossings.

The location of the potential crossing closures as well as the alternative routes and associated distances are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 4 of 40 located in Appendix F. Constraints located in the vicinity of these streets consist primarily of residential properties as well as nearby schools.

Access to adjacent properties could be maintained via the existing roadway network. Traffic may be rerouted from the closed crossings to Fulton Avenue, which is an existing grade separation. Right-of-way acquisition of the adjacent properties would not be required since no new construction is required.

The crossing closures are each estimated to cost $50,000. The estimated public benefit for closing the crossings at Hollywood Avenue, Kings Highway and Summit Avenue is approximately $470 thousand each and the crossing at Elsmere Place is approximately $300 thousand.

Crossing Closure of Laurel Street and Lombrano Street on the Austin Subdivision ML 1

Laurel and Lombrano Streets are each currently two-lane roadways that cross the railroad at-grade in Bexar County in San Antonio. Approximately 700 vehicles cross the UP at each location daily. The crossings should be considered for closure at their intersections with the UP Austin Subdivision ML 1 in order to reduce public safety hazards currently associated with the existing at-grade crossings.

The location of the potential crossing closures as well as the alternative routes and associated distances are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 3 of 40 located in Appendix F. Constraints located in the vicinity of these streets consist primarily of adjacent commercial and industrial property.

Access to adjacent properties could be maintained via the existing roadway network. Traffic may be rerouted from the closed crossings to the north on Culebra Avenue, which is included as a potential grade separation in this study. Right-of-way acquisition of the adjacent properties would not be required since no new construction is required.

The crossing closures are each estimated to cost $50,000. The estimated public benefit for closing the crossing at Laurel Street is approximately $340 thousand and Lombrano Street is approximately $320 thousand.

Crossing Closure of Main Avenue /Zilla Street on the Austin Subdivision ML 1

Main Avenue is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in San Antonio. Approximately 700 vehicles cross the UP at this location daily. Main Avenue should be considered for closure at the intersection with the UP Austin Subdivision ML 1 in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 5 of 40 located in Appendix F. Constraints located in the vicinity of this street consist primarily of residential properties as well as a nearby school.
Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted from the potential crossing closure to McCullough Avenue, which is included as a potential grade separation in this study, to cross the railroad. Right-of-way acquisition of the adjacent properties should not be required since no new construction is required.

The potential crossing closure at Main Avenue is estimated to cost $50,000 with an estimated public benefit for closing the crossing of approximately $600 thousand.

Crossing Closure of Perez Street on the Austin Subdivision ML 1

Perez Street is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in San Antonio. Approximately 700 vehicles cross the UP at this location daily. Perez Street should be considered for closure at the intersection with the UP Austin Subdivision ML 1 in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 2 of 40 located in Appendix F. Constraints located in the vicinity of this street consist primarily of commercial properties as well as a nearby hospital. Access to and from the hospital should be minimally effected, if at all, by the closure of the Perez Street Crossing since the roadways immediately north and south of Perez Street would remain open for hospital access.

Access to adjacent properties could be maintained via the existing roadway network. Traffic may be rerouted from the closed crossing to the north on Leal Street or to the south on Morales Street or on the grade separated Commerce Street to cross the railroad. Right-of-way acquisition of the adjacent properties would not be required since no new construction is required.

The crossing closure at Perez Street is estimated to cost $50,000. The estimated public benefit could not be calculated for this crossing closure since the traffic would be rerouted to other at-grade crossings; however, the closure would produce a safety benefit for the traveling public.

Crossing Closure of Magnolia Ave, Mistletoe Ave, Craig Pl, and Russell Pl on the Austin Subdivision ML 1

Magnolia Avenue, Mistletoe Avenue, Craig Place and Russell Place are each currently two-lane roadways that cross the railroad at-grade in Bexar County in San Antonio. Approximately 700 vehicles cross the UP at each location daily. The crossings should be considered for closure at their intersections with the UP Austin Subdivision ML 1 in order to reduce public safety hazards currently associated with the existing at-grade crossings.

The location of the potential crossing closures as well as the alternative routes and associated distances are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 4 of 40 located in Appendix F. Constraints located in the vicinity of these streets consist primarily of residential properties.

Access to adjacent properties could be maintained via the existing roadway network. Traffic may be rerouted from the closed crossings to Woodlawn Avenue, which included as a potential grade separation in this study. Right-of-way acquisition of the adjacent properties would not be required since no new construction is required.

The crossing closures are each estimated to cost $50,000. The estimated public benefit for closing the crossings at Magnolia Avenue, Craig Place and Russell Place is approximately $470 thousand each and at Mistletoe Avenue is approximately $1.2 million.

Crossing Closure of Rivas St, Delgado St, and Arbor St on the Austin Subdivision ML 1

Rivas Street, Delgado Street, and Arbor Place are each currently two-lane roadways that cross the railroad at-grade in Bexar County in San Antonio. Approximately 700 vehicles cross the UP at each location daily. The crossings should be considered for closure at their intersections with the UP Austin Subdivision ML 1 in order to reduce public safety hazards currently associated with the existing at-grade crossings.

The location of the potential crossing closures as well as the alternative routes and associated distances are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 3 of 40 located in Appendix F. Constraints located in the vicinity of these streets consist of adjacent residential and commercial property as well as a nearby school.

Access to adjacent properties could be maintained via the existing roadway network. Traffic may be rerouted from the closed crossings to the north on Poplar Street or to the south on Ruiz Street, which are both included as a potential grade separations in this study. Right-of-way acquisition of the adjacent properties would not be required since no new construction is required.

The crossing closures are each estimated to cost $50,000. The estimated public benefit for closing the crossing at Rivas Street is approximately $290 thousand, at Delgado Street is approximately $690 thousand, and at Arbor Place is approximately $260 thousand.

Crossing Closure of Tampico St on the Austin Subdivision ML 1

Tampico Street is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in San Antonio. Approximately 700 vehicles cross the UP at this location daily. Tampico Street should be considered for closure at the intersection with the UP Austin Subdivision ML 1 in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 1 Constraints Map on sheet 1 of 40 located in Appendix F. Constraints located in the vicinity of this street consist primarily of adjacent residential, commercial, and industrial properties.

Access to adjacent properties could be maintained via the existing roadway network. Traffic may be rerouted from the closed crossing to the north on Guadalupe Street, which is an existing grade separation, or to the south on Laredo Street, which is included as a potential grade separation in this study. Right-of-way acquisition of the adjacent properties would not be required since no new construction is required.

The crossing closure at Tampico Street is estimated to cost $50,000 with an estimated public benefit of approximately $330 thousand.

Railroad Improvements

None of the improvements described as follows have been constructed nor are under construction.

Improvement 4 – Construct one new connection track between Austin Subdivision ML 1 and Lockhart Subdivisions in San Marcos.

The Lockhart Subdivision at milepost 51.90 connects to the Austin ML-1 Subdivision milepost 209.10 north of the San Marcos River. It is proposed to construct a connection north of the existing switch to allow for westward traffic on the Lockhart Subdivision a direct connection northward towards Austin on Austin ML-1.

Improvement 9 – Construct new connections in the northeast and northwest quadrants of the Austin Subdivision ML 1 and Del Rio Subdivision diamond south of San Fernando Yard and Apache Jct.

At approximately milepost 259.87 of the Austin ML-1 Subdivision and milepost 212.67 of the Del Rio Subdivision, it is proposed to construct northeast and northwest connections for direct train movements between the two lines.

Improvement 11 - Extend Hestes and Hutto sidings (Austin Subdivision ML 1, south of Taylor) to just over 2 miles in length

The existing Hestes and Hutto sidings are located on the west and east sides of Austin Subdivision ML 1 and extend from milepost 149.85 to milepost 151.43 and milepost 153.07 to milepost 153.80, respectively, and connect at both ends to the mainline. There is an additional stub-ended siding 712 at approximate milepost 153.30 connected to the Hestes siding. Both sidings are limited in length to meet current freight operations. It is proposed to extend the Hestes siding approximately 0.4 miles north and the Hutto siding 0.4 north and 0.7 miles south. Both locations would now provide approximate two mile-long passing sidings.

Improvement 12- Extend Landas Park siding (Austin Subdivision ML 1) to a length of 2.9 miles

Landas Park siding, milepost 227.90 to milepost 228.61 is located on the west side of ML 1 just south of New Braunfels. It is proposed to extend this siding approximately 2.2 miles to the south with a connection back into the main track.

Improvement 13 – Extend and connect both North Loop and Adams sidings (Austin Subdivision ML 1) to create a 3.7 mile long passing siding

North Loop and Adams sidings are located on the east and west sides of ML 1 and extend from milepost 250.52 to milepost 252.12 and milepost 253.38 to milepost 254.26 respectively and just north of San Antonio. It is proposed to extend North Loop siding south and Adams siding north with the addition of approximately 1.26 miles of new track and new switches. With track swings, this would result in an approximate 3.74 mile long passing siding.

Improvement 17 - Siding upgrades between Round Rock and San Antonio to provide sufficient locations for train meets

Round Rock and San Antonio have milepost designations of 160.37 and approximately 206.00 on the Austin Subdivision ML 1. Improvements to sidings in this area include lengthening and installation of #16 switches. There are existing sidings that connect on both ends to ML 1 at Round Rock (milepost 160.37 to 161.85), McNeil (milepost 166.09 to 167.16), Hooper (milepost 171.27 to 171.50), Sneed (milepost 172.51 to 174.33), Austin (milepost 179.06 to 179.50), Bergstrom (milepost 186.65 to 188.60), Buda (milepost 194.25 to 195.37), Kyle (milepost 200.20 to 201.75), Centex (milepost 206.64 to 208.35), Goodwin (milepost 220.96 to 223.14), New Braunfels (milepost 227.90 to 228.61), Brautex (milepost 230.07 to 230.78), Dittlinger (milepost 230.84 to 231.37), Corbyn (milepost 233. 44 to 235.13), Bracken (milepost 239.36 to 241.10), North Loop (milepost 250.52 to 252.12) and Adams (milepost 253.38 to 254.26).

Several of these improvements are located in areas where new railroad bridges would be needed for construction and existing rail infrastructure (switches and other sidings) are in the immediate vicinity of proposed increases in siding lengths. No work was suggested in these areas. See Table 8-2 below for improvements.

Siding Name	Milepost to Milepost		Length	Proposed Length	Comment
Round Rock	160.37	161.85	1.48	1.88	extend north
McNeil	166.09	167.16	1.07	2	extend south
Kyle	200.2	201.75	1.55	1.85	extend south
Centex	206.64	208.35	1.71	2	extend north
Dittlinger	230.84	231.37	0.53	1.45	extend south
Corbyn	233.44	235.13	1.69	2	extend north
Bracken	239.36	241.1	1.74	2	extend north
North Loop	250.52	252.12	1.6		with Improvement 15
Adams	253.38	254.26	0.88		with Improvement 15

Table 8-2: Siding Upgrades between Round Rock and San Antonio

Improvement 18 - Upgrade Austin Subdivision ML 1 sidings to CTC at Adams, Landas Park, Texas Lehigh, Buda, Austin, McNeil and White Lime

To expedite train movements and increase capacity, it is proposed to upgrade these sidings from milepost 253.80 to 165.60 on the Austin Subdivision ML 1 to computerized train control (CTC) system. Today, the ML 1 track chart indicates an ABS signal system beginning in San Antonio and milepost 259.10 to the San Antonio/Houston Division limit (milepost 94.00), about 4 ½ miles south of Hearne.

Absolute signals exist on the siding at Adams (milepost 254.26 to 253.38), no signals for the siding at Landas Park (milepost 228.61 to 227.90), absolute signal for the siding at Texas Lehigh (milepost 197.14), no signals for the siding at Buda (milepost 195.37 to 194.25), no signals for the siding at Austin (milepost 179.50 to 179.06) and no signals for McNeil siding (milepost 167.16 to 166.09). The White Lime siding (milepost 165.60) switch is located within McNeil Interlocking.

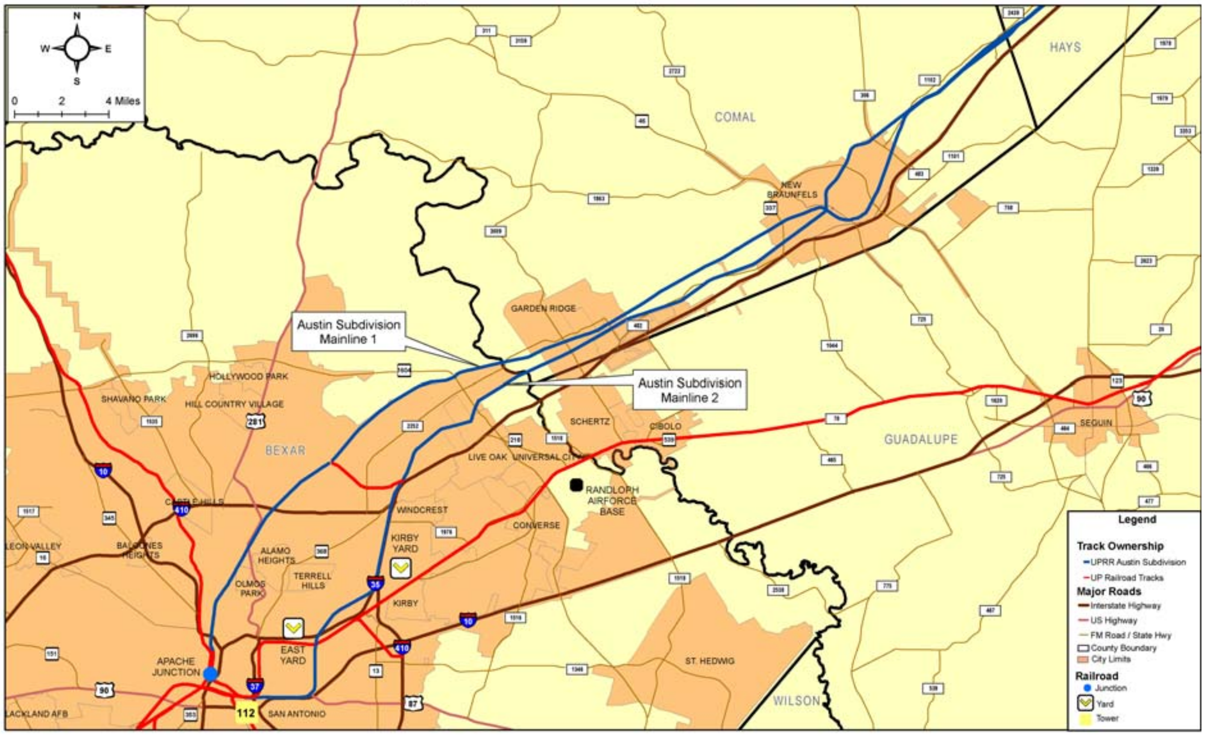
Improvement 28 - Construct a new connection at Taylor between the between the Waco and Austin Subdivisions

Construct a higher speed connection track and switches between the Waco and Austin ML-1 Subdivisions at milepost 919.35 on the Waco Subdivision. This installation would allow for through moves in either direction. There are existing #14 turn-outs connecting the Waco and Austin ML-1 Subdivisions.

There is limited room available for a South-East wye connection track. A very tight curve, approximately 7 degrees, would be required and would limit operating speed to 35 mph. There is an existing spur track to an agribusiness which would also be impacted. Construction of a broader connection (for increased speed) would impact residences, churches, businesses, a city park and an electrical substation.

The installation of new turn-outs (switches), in an area where track speeds are currently 40 mph, would be difficult at best and leave any increase in freight movement still within a confined area. If a higher speed connection between these two subdivisions is requested, then a bypass route around Taylor should be considered.

Austin Subdivision ML 2



The tracks of the Austin Subdivision ML 2 were originally constructed by the Missouri, Kansas & Texas Railway Company of Texas in 1900. The Subdivision originates in San Marcos, Texas at the end of the Lockhart Subdivision and generally parallels the Austin Subdivision ML 1 and IH-35 before it ends in downtown San Antonio with the tracks continuing southward as the Del Rio Subdivision. The Subdivision is over 50 miles in total length, approximately 44 of which are in the San Antonio Region study area in Comal and Bexar Counties.

The Austin Subdivision ML 2 is a single track mainline with limited sidings utilized in a bidirectional manner, with trains dispatched to operate in both directions, averaging 10 trains daily.

Potential improvements along the Austin Subdivision ML 2 include grade separations, crossing closures, and rail capacity enhancements, as listed in Table 8-3 with their associated costs.

A breakdown of the order of magnitude cost estimates and the estimated associated public benefits of the identified grade separations are included in Appendix C and Appendix G, respectively.

Austin Subdivision Mainline 2				
Grade Separations	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)**	**Ratio: Benefit/Cost (20-year)**
Binz Engleman Rd	3	$ 8,600,000	$ 2,790,000	0.32
Eisenhauer	3	$ 30,300,000	$ 8,650,000	0.29
FM 306	3	$ 7,300,000	$ 13,970,000	1.91
Houston St	3	$ 10,200,000	$ 3,850,000	0.38
I-35 Frontage Road	3	$ 27,800,000	$ 19,320,000	0.69
Leonhardt Rd	3	$ 8,100,000	$ 2,130,000	0.26
Rittiman	3	$ 34,300,000	$ 9,260,000	0.27
S. Presa St	3	$ 8,000,000	$ 3,170,000	0.40
Toepperwein Rd	3	$ 11,600,000	$ 2,280,000	0.20
Walzem Rd	3	$ 31,600,000	$ 9,490,000	0.30
Crossing Closures	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)***	**Ratio: Benefit/Cost (20-year)**
Fairdale	3	$ 50,000	$ 1,120,000	22.40
Fratt Rd	3	$ 50,000	$ 3,260,000	65.20
Hoefgen Ave	3	$ 50,000	$ 500,000	10.00
Lanark	3	$ 50,000	$ 670,000	13.40
Rail Improvements	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)****	**Ratio: Benefit/Cost (20-year)**
#10 - Extend and connect Fratt and Remount Auto Facility sidings to join Austin ML-2	4	$ 6,190,000	NA	NA
*Public benefit could only be estimated for crossing closures which would be rerouted to a grade separated crossing. However, all crossing closures produce a public benefit of improved safety.				
**No public benefits of individual rail improvements were identified.				
Class 3 Improvements (Separations/Closures)		$ 178,000,000	$ 80,460,000	0.45
Class 4 Improvements (Long-term Improvements)		$ 6,190,000	NA	NA
Total Identified Improvements		$ 184,190,000	$ 80,460,000	0.44

Table 8-3: Austin Subdivision ML 2 Improvements

Grade Separations

Grade Separation of Binz Engleman Rd on the Austin Subdivision ML 2

Binz Engleman Road is currently a two-lane roadway west of the railroad and a four-lane roadway east of the railroad that crosses the UP Austin Subdivision ML 2 in Bexar County northeast of downtown San Antonio. This roadway, with approximately 9,300 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Austin Subdivision ML 2.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 2 Constraints Map on sheet 7 of 39 located in Appendix F. Access to adjacent properties could be maintained via access roads alongside the identified Binz Engleman Road overpass with connections to the existing at-grade traffic lanes beyond the identified location of the potential overpass.

The grade separation of Binz Engleman Road is estimated to cost $8.6 million with an estimated public benefit of $2.8 million, which is 32 percent of the estimated cost of the grade separation.

Grade Separation of Eisenhauer Rd on the Austin Subdivision ML 2

Eisenhauer Road is currently a two-lane roadway west of the railroad and a four-lane roadway east of the railroad that crosses the UP Austin Subdivision ML 2 in Bexar County in San Antonio inside the northeast corner of Loop 410. This roadway, with approximately 21,200 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway underpass would separate vehicular traffic from the Austin Subdivision ML 2.

A preliminary layout of the underpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 2 Constraints Map on sheet 10 of 39 located in Appendix F. Constraints in the vicinity of the Eisenhauer Road crossing consist primarily of adjacent residential property and a school west of the railroad and commercial and industrial property east of the railroad.

In order to maintain connectivity between Eisenhauer Road and Loop 410, the frontage road lanes of Loop 410 would need to be depressed to meet the Eisenhauer Road underpass. Access to adjacent properties east of the railroad could be maintained via access roads alongside the identified Eisenhauer Road underpass with an at-grade u-turn located above the underpass east of the railroad. Access to adjacent properties west of the railroad would be eliminated due to the potential underpass structure and the lack of available right-of-way for access roads.

The grade separation of Eisenhauer Road is estimated to cost $30.3 million with an estimated public benefit of $8.7 million, which is 29 percent of the estimated cost of the grade separation.

Grade Separation of FM 306 on the Austin Subdivision ML 2

FM 306 is currently a two-lane roadway that crosses the UP Austin Subdivision ML 2 in Comal County in the city of New Braunfels. This roadway, with approximately 11,400 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision ML 2.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 2 Constraints Map on sheet 33 of 39 located in Appendix F. Access to adjacent properties and connecting roadways could be maintained via access roads alongside the identified FM 306 overpass with at-grade u-turns located beneath the overpass bridge on each side of the railroad.

The grade separation of FM 306 is estimated to cost $7.3 million with an estimated public benefit of $14 million, which is nearly two times the estimated cost of the grade separation.

Grade Separation of Houston St on the Austin Subdivision ML 2

Houston Street is currently a four-lane roadway west that crosses the UP Austin Subdivision ML 2 in Bexar County in downtown San Antonio just south of the AT&T Center. This roadway, with approximately 14,500 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway underpass would separate vehicular traffic from the Austin Subdivision ML 2.

A preliminary layout of the underpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 2 Constraints Map on sheet 4 of 39 located in Appendix F. Constraints in the vicinity of the Houston Street crossing consist primarily of adjacent residential property and a school west of the railroad and commercial and property, including the AT&T Center and the Freeman Coliseum east of the railroad.

Access to adjacent properties and connecting roadways would be eliminated due to the potential underpass structure and the lack of available right-of-way for frontage roads along the underpass. Rosary Street, which runs parallel to the railroad, could bridge over the potential underpass in order to maintain through traffic along the roadway, although connectivity with Houston Street would be eliminated.

The grade separation of Houston Street is estimated to cost $10.2 million with an estimated public benefit of $3.9 million, which is 38 percent of the estimated cost of the grade separation.

Grade Separation of IH-35 Frontage Roads on the Austin Subdivision ML 2

The IH-35 frontage roads are currently three-lane roadways in each direction that cross the UP Austin Subdivision ML 2 in Bexar County northeast of downtown San Antonio. These frontage roads, with a combined 44,200 daily vehicles crossing the railroad tracks, have been identified as potential candidates for grade separation. The potential three-lane roadway underpass on each side of I-35 would separate vehicular traffic from the Austin Subdivision ML 2.

A preliminary layout of the underpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 2 Constraints Map on sheet 5 of 39 located in Appendix F. Constraints in the vicinity of the IH-35 frontage roads crossings consist of adjacent commercial and industrial property, an oil/gas pipeline, and Fort Sam Houston west of the railroad. Access to adjacent properties and connecting roadways would be eliminated due to the potential underpass structure. Additional access roads may need to be provided for properties that would lose access to the IH-35 frontage roads.

The grade separation of the IH-35 frontage roads is estimated to cost $27.8 million with an estimated public benefit of $19.3 million, which is 69 percent of the estimated cost of the grade separation.

Grade Separation of Leonhardt Road on the Austin Subdivision ML 2

Leonhardt Road is currently a two-lane roadway that crosses the UP Austin Subdivision ML 2 in Bexar County in north San Antonio. This roadway, with approximately 5,900 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. According to FRA data, one accident occurred at the Leonhardt Road crossing from 2002 through 2006. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision ML 2.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 2 Constraints Map on sheet 13 of 39 located in Appendix F. Constraints in the vicinity of the Leonhardt Road crossing with the railroad consist primarily of adjacent residential property as well as the 100-year floodplain.

In order to maintain connectivity between Leonhardt Road and Weidner Road, the lanes of Weidner Road would need to be elevated to meet the Leonhardt Road overpass. Access to adjacent properties and connecting roadways could be maintained via access roads alongside the identified Leonhardt Road overpass with an at-grade u-turn located beneath the overpass bridge east of the railroad.

The grade separation of Leonhardt Road is estimated to cost $8.1 million with an estimated public benefit of $2.1 million, which is approximately 26 percent of the estimated cost of the grade separation.

Grade Separation of Rittiman Road on the Austin Subdivision ML 2

Rittiman Road is currently a four-lane roadway that crosses the UP Austin Subdivision ML 2 in Bexar County in north San Antonio. This roadway, with approximately 27,400 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. According to FRA data, one accident occurred at the Rittiman Road crossing from 2002 through 2006. The potential two-lane roadway underpass would separate vehicular traffic from the Austin Subdivision ML 2.

A preliminary layout of the underpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 2 Constraints Map on sheet 9 of 39 located in Appendix F. Constraints in the vicinity of the Rittiman Road crossing with the railroad consist primarily of adjacent commercial property as well as an oil/gas pipeline.

In order to maintain connectivity between Rittiman Road and Loop 410, the lanes of Loop 410 would need to be depressed to meet the Rittiman Road underpass. Access to adjacent properties and connecting roadways could be maintained via access roads alongside the identified Rittiman Road underpass with at-grade u-turns located beneath the overpass bridge each side of the railroad.

The grade separation of Rittiman Road is estimated to cost $34.3 million with an estimated public benefit of $9.3 million, which is approximately 27 percent of the estimated cost of the grade separation.

Grade Separation of Presa Street on the Austin Subdivision ML 2

Presa Street is currently a two-lane roadway that crosses the UP Austin Subdivision ML 2 in Bexar County in north San Antonio. This roadway, with approximately 10,600 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential two-lane roadway underpass would separate vehicular traffic from the Austin Subdivision ML 2.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 2 Constraints Map on sheet 1 of 39 located in Appendix F. Constraints in the vicinity of the Presa Street crossing with the railroad consist of adjacent residential and commercial property as well as schools and an oil/gas pipeline.

Access to adjacent properties and connecting roadways would be eliminated along the identified Presa Street underpass due to the lack of available right-of-way for access roads alongside the structure. The identified underpass would require the closure of Vitra Street, Panama Avenue, Conrad Street, Boyer Avenue, Lowell Street, and Drexel Avenue at their intersections with Presa Street.

The grade separation of Presa Street is estimated to cost $8.0 million with an estimated public benefit of $3.2 million, which is approximately 40 percent of the estimated cost of the grade separation.

Grade Separation of Toepperwein Road on the Austin Subdivision ML 2

Toepperwein Road is currently a two-lane roadway that crosses the UP Austin Subdivision ML 2 in Bexar County in the city of San Antonio. This roadway, with approximately 6,900 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision ML 2.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 2 Constraints Map on sheet 15 of 39 located in Appendix F. The primary constraints in the vicinity of the potential grade separation for Toepperwein Road consist of adjacent residential and commercial property. Access to adjacent properties and connecting roadways could be maintained via access roads alongside the identified overpass with at-grade u-turns located beneath the overpass bridge on each side of the railroad.

The grade separation of Toepperwein Road is estimated to cost $11.6 million with an estimated public benefit of $2.3 million, which is 20 percent of the estimated cost of the grade separation.

Grade Separation of Walzem Road on the Austin Subdivision ML 2

Walzem Road is currently a four-lane roadway that crosses the UP Austin Subdivision ML 2 in Bexar County in north San Antonio. This roadway, with approximately 29,400 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential two-lane roadway underpass would separate vehicular traffic from the Austin Subdivision ML 2.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Austin Subdivision ML 2 Constraints Map on sheet 11 of 39 located in Appendix F. Constraints in the vicinity of the Walzem Road crossing with the railroad consist of adjacent commercial property, leaking petroleum storage tanks, a school, a shopping center, and an oil/gas pipeline.

In order to maintain connectivity between Walzem Road and Loop 410, the lanes of Loop 410 would need to be depressed to meet the Walzem Road underpass. Access to adjacent properties and connecting roadways could be maintained via access roads alongside the identified Walzem Road underpass with at-grade u-turns located beneath the overpass bridge each side of the railroad.

The grade separation of Walzem Road is estimated to cost $31.6 million with an estimated public benefit of $9.5 million, which is approximately 30 percent of the estimated cost of the grade separation.

Crossing Closures

Crossing Closure of Fairdale Road on the Austin Subdivision ML 2

Fairdale Road is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in San Antonio. Approximately 4,100 vehicles cross the UP at this location daily. Fairdale Road should be considered for closure at the intersection with the UP Austin Subdivision ML 2 in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 2 Constraints Map on sheet 9 of 39 located in Appendix F. Constraints located in the vicinity of this street consist of residential and commercial properties as well as a school.

Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted from the potential crossing closure to Rittiman Road or to Eisenhauer Road, which are included as potential grade separations in this study, to cross the railroad. Right-of-way acquisition of the adjacent properties should not be required since no new construction is required.

The potential crossing closure at Fairdale Road is estimated to cost $50,000 with an estimated public benefit for closing the crossing of approximately $1.1 million.

Crossing Closure of Fratt Road on the Austin Subdivision ML 2

Fratt Road is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in San Antonio. Approximately 10,800 vehicles cross the UP at this location daily. Fratt Road should be considered for closure at the intersection with the UP Austin Subdivision ML 2 in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 2 Constraints Map on sheet 11 of 39 located in Appendix F. Constraints located in the vicinity of this street consist primarily of commercial properties.

Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted from the potential crossing closure to Walzem Road, which is included as a potential grade separation in this study, to cross the railroad. Right-of-way acquisition of the adjacent properties should not be required since no new construction is required.

The potential crossing closure at Fratt Road is estimated to cost $50,000 with an estimated public benefit for closing the crossing of approximately $3.3 million.

Crossing Closure of Hoefgen Avenue on the Austin Subdivision ML 2

Hoefgen Avenue is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in downtown San Antonio. Approximately 2,000 vehicles cross the UP at this location daily. Hoefgen Avenue should be considered for closure at the intersection with the UP Austin Subdivision ML 2 in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 2 Constraints Map on sheet 1 of 39 located in Appendix F. Constraints located in the vicinity of this street consist primarily of residential and commercial properties. Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted from the potential crossing closure to Hackberry Street, which underpasses the railroad. Right-of-way acquisition of the adjacent properties should not be required since no new construction is required.

The potential crossing closure at Hoefgen Avenue is estimated to cost $50,000 with an estimated public benefit for closing the crossing of approximately $500 thousand.

Crossing Closure of Lanark Dr on the Austin Subdivision ML 2

Lanark Drive is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in San Antonio. Approximately 2,500 vehicles cross the UP at this location daily. Lanark Drive should be considered for closure at the intersection with the UP Austin Subdivision ML 2 in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Austin Subdivision ML 2 Constraints Map on sheet 10 of 39 located in Appendix F. Constraints located in the vicinity of this street consist primarily of residential and industrial properties. Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted from the potential crossing closure to Eisenhauer Road, which is included as a potential grade separation in this study, to cross the railroad. Right-of-way acquisition of the adjacent properties should not be required since no new construction is required.

The potential crossing closure at Lanark Drive is estimated to cost $50,000 with an estimated public benefit for closing the crossing of approximately $670 thousand.

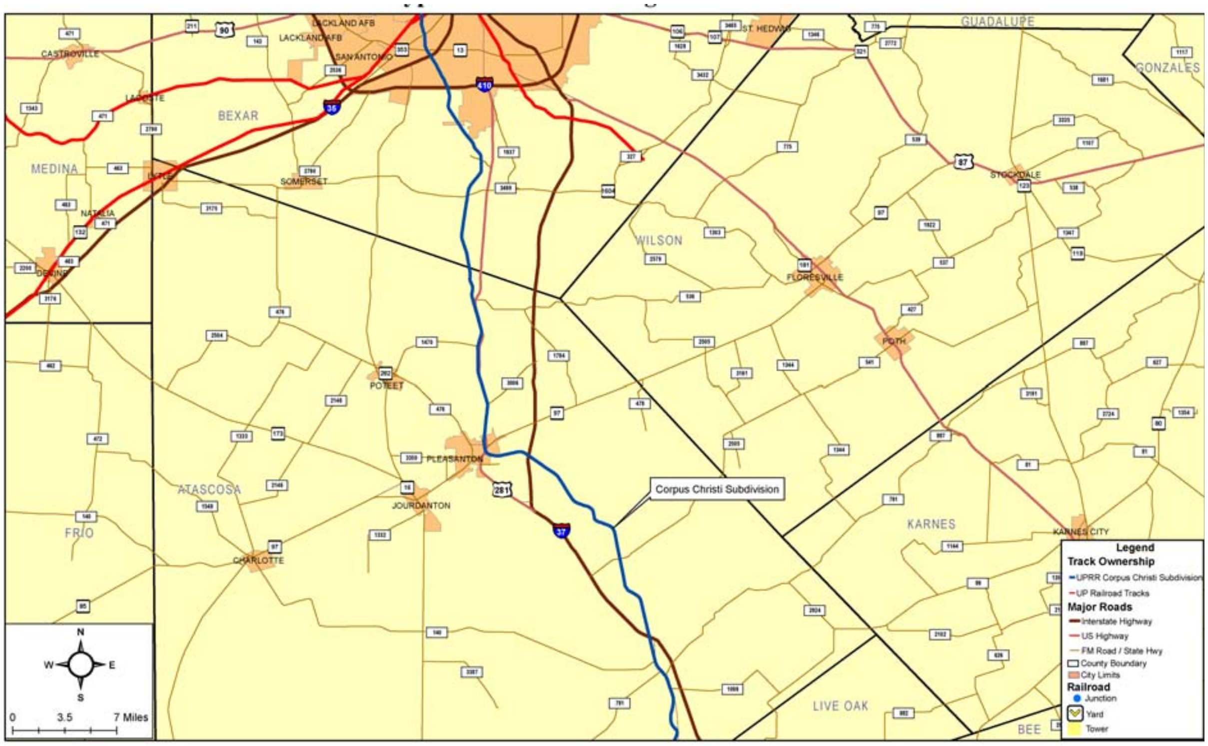
Railroad Improvements

None of the following improvements have been constructed nor are under construction.

Improvement 10 – Extend and connect Fratt and Remount Auto Facility sidings to join Austin Subdivision ML 2

The Fratt and Remount sidings are located on the west side of Austin Subdivision ML 2 and extend from milepost 248.23 to milepost 248.89 and milepost 251.20 to milepost 251.82, respectively, along the Austin Subdivision ML 2. Both sidings are limited in length to meet current freight operations. It is proposed to extend and connect both sidings for a distance of approximately 2.3 miles resulting in a new passing siding. The new siding will connect at the north and south limits to the Austin Subdivision ML 2. They are located northwest of San Antonio and east of Fort Sam Houston.

Corpus Christi Subdivision



The tracks of the Corpus Christi Subdivision were originally constructed by the San Antonio, Uvalde & Gulf Railroad in 1914. The Subdivision originates in San Antonio, Texas at the South San Antonio (SoSan) rail yard and terminates in Corpus Christi, Texas. The Subdivision is approximately 146 miles in total length, approximately 59 of which are in the San Antonio Region study area in Atascosa and Bexar Counties.

The Corpus Christi Subdivision is a single track mainline with limited sidings utilized in a bidirectional manner, with trains dispatched to operate in both directions, averaging between five and 15 trains daily, depending upon location.

Potential improvements along the Corpus Christi Subdivision include grade separations, crossing closures, and rail capacity enhancements, as listed in Table 8-4 with their associated costs.

A breakdown of the order of magnitude cost estimates and the estimated associated public benefits of the identified grade separations are included in Appendix C and Appendix G, respectively.

Corpus Christi Subdivision				
Grade Separations	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)**	**Ratio: Benefit/Cost (20-year)**
2nd Street	3	$ 8,300,000	$ 5,540,000	0.67
Bensdale Dr	3	$ 5,000,000	$ 2,890,000	0.58
Gillette	3	$ 7,100,000	$ 1,710,000	0.24
W Malone	3	$ 12,000,000	$ 9,640,000	0.80
Nogalitos	3	$ 10,100,000	$ 2,900,000	0.29
S. Tx 1604 Loop	3	$ 5,000,000	$ 1,950,000	0.39
Somerset/Southcross	3	$ 20,700,000	$ 5,840,000	0.28
SW Military	3	$ 9,100,000	$ 7,600,000	0.84
Villaret	3	$ 6,900,000	$ 1,910,000	0.28
Crossing Closures	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)***	**Ratio: Benefit/Cost (20-year)**
Hutchins	3	$ 50,000	NA	NA
Mayfield Ave	3	$ 50,000	NA	NA
Petaluma	3	$ 50,000	$ 1,000,000	20.00
Rail Improvements	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)****	**Ratio: Benefit/Cost (20-year)**
#3 - Construct a 9000’ siding track and switches adjacent to the Corpus Christi Subdivision near the lead track to the Toyota Facility	4	$ 4,990,000	NA	NA
#7 - Extend the new Mauermann Siding north and south as a second mainline to SoSan Yard	4	$ 25,190,000	NA	NA
*Public benefit could only be estimated for crossing closures which would be rerouted to a grade separated crossing. However, all crossing closures produce a public benefit of improved safety.				
**No public benefits of individual rail improvements were identified.				
Class 3 Improvements (Separations/Closures)		$ 84,350,000	$ 44,366,000	0.53
Class 4 Improvements (Long-term Improvements)		$ 30,180,000	NA	NA
Total Identified Improvements		$ 114,530,000	$ 44,366,000	0.39

Table 8-4: Corpus Christi Subdivision Improvements

Grade Separations

Grade Separation of Second Street on the Corpus Christi Subdivision

Second Street is currently a four-lane roadway that crosses the UP Corpus Christi Subdivision in Atascosa County in the city of Pleasanton. This roadway, with approximately 19,000 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Corpus Christi Subdivision.

A preliminary layout of the overpass is included in Appendix E. The primary constraints in the vicinity of the potential grade separation consist of adjacent commercial and residential property. Access to adjacent properties and connecting roadways could be maintained via access roads alongside the identified overpass with at-grade u-turns located beneath the overpass bridge on the north side of the railroad and at-grade connections to E Adams Street south of the railroad.

The grade separation of Second Street is estimated to cost $8.3 million with an estimated public benefit of $5.5 million, which is 67 percent of the estimated cost of the grade separation.

Grade Separation of Bensdale Drive on the Corpus Christi Subdivision

Bensdale Drive is currently a four-lane roadway that crosses the UP Corpus Christi Subdivision in Atascosa County in the city of Pleasanton. This roadway, with approximately 8,500 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Corpus Christi Subdivision.

A preliminary layout of the overpass is included in Appendix E. The primary constraints in the vicinity of the potential grade separation consist of adjacent commercial property on the east side of the railroad. Access to First Street could be maintained via San Antonio and Market Streets connecting to the grade separation.

The grade separation of Bensdale Drive is estimated to cost $5.0 million with an estimated public benefit of $2.9 million, which is 58 percent of the estimated cost of the grade separation.

Grade Separation of Gillette Avenue on the Corpus Christi Subdivision

Gillette Avenue is currently a two-lane roadway that crosses the UP Corpus Christi Subdivision in Bexar County in the city of San Antonio. This roadway, with approximately 6,100 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Corpus Christi Subdivision.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Corpus Christi Subdivision Constraints Map on sheet 5 of 17 located in Appendix F.

The primary constraints in the vicinity of the potential grade separation consist of adjacent residential and commercial property as well as a nearby school. Access to adjacent properties and connecting roadways could be maintained via access roads alongside the identified overpass with at-grade u-turns located beneath the overpass bridge on each side of the railroad.

The grade separation of Gillette Avenue is estimated to cost $7.1 million with an estimated public benefit of $1.7 million, which is 24 percent of the estimated cost of the grade separation.

Grade Separation of W Malone Avenue on the Corpus Christi Subdivision

W Malone Avenue is currently a four-lane roadway that crosses the UP Corpus Christi Subdivision and the UP Laredo Subdivision tracks and intersects Frio City Road in Bexar County in the city of San Antonio. This roadway, with approximately 5,900 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Corpus Christi Subdivision.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Corpus Christi Subdivision Constraints Map on sheet 1 of 17 located in Appendix F. The primary constraints in the vicinity of the potential grade separation consist of adjacent commercial property.

The proposed grade separation includes elevating the mainlanes of Malone Avenue to bridge over the railroad and meet with elevated lanes of Fri City Road. Access to adjacent properties and connecting roadways along Malone Avenue could be maintained via access roads alongside the identified overpass with an at-grade u-turn located beneath the overpass bridge east of the railroad. Access to adjacent properties along Frio City Road would be eliminated due to the identified overpass structure.

The grade separation of W Malone Avenue is estimated to cost $12.0 million with an estimated public benefit of $9.6 million, which is 80 percent of the estimated cost of the grade separation.

Grade Separation of Nogalitos Street on the Corpus Christi Subdivision

Nogalitos Street is currently a four-lane roadway that crosses the UP Corpus Christi Subdivision in Bexar County in the city of San Antonio. This roadway, with approximately 9,900 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Corpus Christi Subdivision.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Corpus Christi Subdivision Constraints Map on sheet 2 of 17 located in Appendix F.

The primary constraints in the vicinity of the potential grade separation consist of adjacent industrial and commercial property as well as a nearby school. Access to adjacent properties and connecting roadways could be maintained via access roads alongside the identified overpass with at-grade u-turns located beneath the overpass bridge on each side of the railroad.

The grade separation of Nogalitos Street is estimated to cost $10.1 million with an estimated public benefit of $2.9 million, which is approximately 29 percent of the estimated cost of the grade separation.

Grade Separation of South Texas Loop 1604 on the Corpus Christi Subdivision

South Texas Loop 1604 is currently a two-lane roadway that crosses the UP Corpus Christi Subdivision in Bexar County in the city of Leming. This roadway, with approximately 5,900 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Corpus Christi Subdivision.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Corpus Christi Subdivision Constraints Map on sheet 12 of 17 located in Appendix F. The primary constraints in the vicinity of the potential grade separation consist of adjacent residential property as well as a nearby school. Access to adjacent properties and connecting roadways could be maintained via access roads alongside the identified overpass with at-grade u-turns located beneath the overpass bridge on each side of the railroad.

The grade separation of South Texas Loop 1604 is estimated to cost $5 million with an estimated public benefit of nearly $2, which is approximately 39 percent of the estimated cost of the grade separation.

Grade Separation of Somerset Road and Southcross Blvd on the Corpus Christi Subdivision

Somerset Road and Southcross Boulevard are currently two-lane and four-lane roadways, respectively, that cross the UP Corpus Christi Subdivision in Bexar County in the city of San Antonio. These roadways, with approximately 11,000 daily vehicles crossing the railroad tracks at Somerset Road and 9,700 daily vehicles crossing the railroad tracks at Southcross Boulevard, have been identified as potential candidates for grade separation. The potential roadway overpasses would separate vehicular traffic from the Austin Subdivision ML 1.

A preliminary layout of the overpass structures is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Corpus Christi Subdivision Constraints Map on sheet 2 of 17 located in Appendix F. The primary constraints in the vicinity of the potential grade separation consist of adjacent industrial and commercial property as well as a nearby school.

The grade separation proposed includes elevated lanes of Southcross Boulevard and Somerset Road that bridge over the railroad. Because the two roadways intersect near the railroad crossings, an intersection of the two roadways would be located on a bridge above the ground. Access to adjacent properties along the grade separated roadways could be maintained via access roads alongside the identified overpass structures for Somerset Road and Southcross Boulevard with at-grade u-turns located beneath the overpass bridges on each side of the railroad.

The grade separation of Somerset Road and Southcross Boulevard is estimated to cost $20.7 million with an estimated public benefit of $5.8 million, which is 28 percent of the estimated cost of the grade separation.

Grade Separation of SW Military Drive on the Corpus Christi Subdivision

SW Military Drive is currently a six-lane roadway that crosses the UP Corpus Christi Subdivision in Bexar County in the city of San Antonio. This roadway, with approximately 23,200 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Corpus Christi Subdivision.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Corpus Christi Subdivision Constraints Map on sheet 3 of 17 located in Appendix F. The primary constraints in the vicinity of the potential grade separation consist of adjacent commercial properties. Access to adjacent properties and connecting roadways could be maintained via access roads along the west side of the identified overpass with the use of commercial drives east of the railroad.

The grade separation of SW Military Drive is estimated to cost $9.1 million with an estimated public benefit of $7.6 million, which is 84 percent of the estimated cost of the grade separation.

Grade Separation of Villaret Boulevard on the Corpus Christi Subdivision

Villaret Boulevard is currently a two-lane roadway that crosses the UP Corpus Christi Subdivision in Bexar County in the city of San Antonio. This roadway, with approximately 6,800 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Corpus Christi Subdivision.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Corpus Christi Subdivision Constraints Map on sheet 5 of 17 located in Appendix F. The primary constraints in the vicinity of the potential grade separation consist of adjacent residential property. Access to adjacent properties could be maintained via access roads alongside Villaret Boulevard with at-grade u-turns located beneath the overpass on each side of the railroad.

The grade separation of Villaret Boulevard is estimated to cost $6.9 million with an estimated public benefit of $1.9 million, which is approximately 28 percent of the estimated cost of the grade separation.

Crossing Closures

Crossing Closure of Hutchins Place on the Corpus Christi Subdivision

Hutchins Place is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in south San Antonio. Approximately 600 vehicles cross the UP at this location daily. The crossing should be considered for closure at the intersection with the UP Corpus Christi Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Corpus Christi Subdivision Constraints Map on sheet 4 of 17 located in Appendix F.

Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted from the closed crossing west of the railroad to travel north on Zarzamora Street, then east on the IH-35 frontage road to cross the railroad, then south on Logwood Avenue to reach Hutchins Place on the east side of the railroad. Right-of-way acquisition of the adjacent properties should not be required since no new construction is required.

The crossing closure is estimated to cost $50,000. The estimated public benefit could not be calculated for the closure of Hutchins Place since traffic may be redirected to another at-grade crossing.

Crossing Closure of Mayfield Avenue on the Corpus Christi Subdivision

Mayfield Avenue is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in south San Antonio. Approximately 3000 vehicles cross the UP at this location daily. The crossing should be considered for closure at the intersection with the UP Corpus Christi Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Corpus Christi Subdivision Constraints Map on sheet 2 of 17 located in Appendix F. Located near the crossing is a school as well as hospitals. Access to such facilities and other nearby properties could be maintained via the existing roadway network. Traffic may be rerouted from the closed crossing to the north on Pyron Avenue or to the south on SW Military Drive, which is included as a potential grade separation in this study.

Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closure is estimated to cost $50,000. The estimated public benefit could not be calculated for the closure of Mayfield Avenue since traffic may be redirected to another at-grade crossing.

Crossing Closure of Petaluma Boulevard on the Corpus Christi Subdivision

Petaluma Boulevard is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in south San Antonio. Approximately 2,200 vehicles cross the UP at this location daily. The crossing should be considered for closure at the intersection with the UP Corpus Christi Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Corpus Christi Subdivision Constraints Map on sheet 4 of 17 located in Appendix F. Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted to the adjacent roadway to the south on Gillette Boulevard, which is included as a potential grade separation in this study. Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closure of Petaluma Boulevard is estimated to cost $50,000 with an estimated public benefit of $1 million.

Railroad Improvements

None of the following improvements have been constructed nor are under construction.

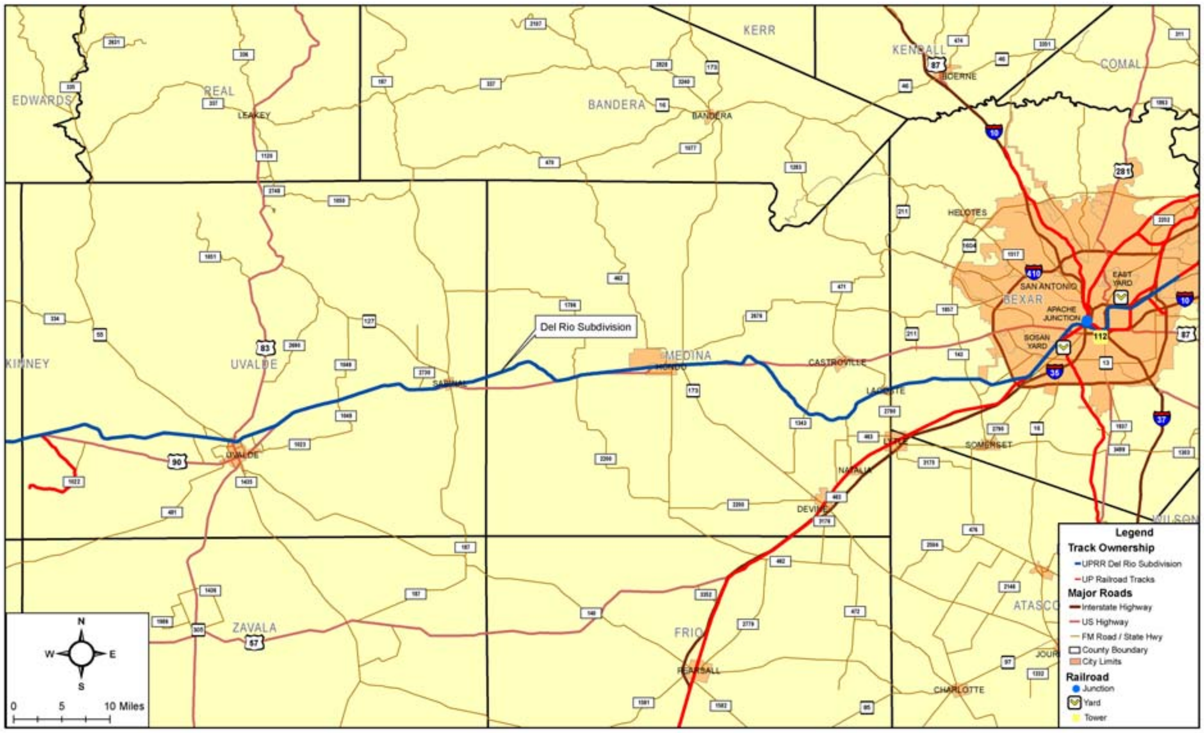
Improvement 3 – Construct a new 9000’ siding track and switches adjacent to the Corpus Christi Subdivision near the lead track to the Toyota Facility (planned UP improvement)

Commonly referred to as the *Mauermann Siding,* this proposed 9000’ siding will be located just north of the switch lead to the newly opened Toyota Facility and on the west side of the Corpus Christi Subdivision. The Toyota Facility is located approximately 13 miles south of central San Antonio. North and South connection tracks from the Toyota lead to the new siding and the Corpus Christi mainline will be constructed.

Improvement 7 – Extend the new *Mauermann Siding* north and south as a second mainline to SoSan Yard

The new 9000’ long *Mauermann Sidng* on the Corpus Christi subdivision would be extended north approximately eight (8) miles and connect to the new switching lead to the north end of SoSan Yard as described in Improvement 2. It would also be extended approximately two miles (2) south from the Toyota switch to a location for a future track connection. This would now provide a second Corpus Christi mainline from the Toyota Facility to SoSan Yard.

Del Rio Subdivision



The tracks of the Del Rio Subdivision were originally constructed by the Galveston, Harrisburg & San Antonio Railway in 1881. The Subdivision originates at the east end of Kirby Yard in northeast San Antonio, which also corresponds to the terminus of the Glidden Subdivision, and ends in Del Rio, Texas with the tracks continuing as the Sanderson Subdivision. The Subdivision is approximately 178 miles in total length, approximately 120 of which are in the San Antonio Region study area in Bexar, Medina, and Uvalde Counties.

The Del Rio Subdivision is a predominately single track mainline with limited locations of double mainline track and numerous sidings utilized in a bidirectional manner, with trains dispatched to operate in both directions, averaging between 20 and 30 trains daily, depending upon location.

Potential improvements along the Del Rio Subdivision include grade separations, crossing closures, and rail capacity enhancements, as listed in Table 8-5 with their associated costs.

A breakdown of the order of magnitude cost estimates and the estimated associated public benefits of the identified grade separations are included in Appendix C and Appendix G, respectively.

Del Rio Subdivision				
Grade Separations	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)**	**Ratio: Benefit/Cost (20-year)**
Avenue M	3	$ 7,600,000	$ 4,290,000	0.56
Avenue U	3	$ 7,500,000	$ 2,610,000	0.35
Ceralvo/Zarzamora	3	$ 24,900,000	$ 9,570,000	0.38
E. Commerce St	3	$ 16,700,000	$ 60,470,000	3.62
Flores St	3	$ 8,800,000	$ 30,420,000	3.46
Florida St	3	$ 14,600,000	$ 6,210,000	0.43
FM 1343	3	$ 5,000,000	$ 2,460,000	0.49
FM 536/Probandt	3	$ 11,200,000	$ 22,860,000	2.04
E. Houston St	3	$ 14,300,000	$ 39,300,000	2.75
N. Pine St	3	$ 5,000,000	$ 7,260,000	1.45
S Presa St	3	$ 10,700,000	$ 33,350,000	3.12
Crossing Closures	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)***	**Ratio: Benefit/Cost (20-year)**
Avenue I	3	$ 50,000	NA	NA
Avenue K	3	$ 50,000	$ 420,000	8.40
Avenue P	3	$ 50,000	$ 620,000	12.40
Avenue Y	3	$ 50,000	NA	NA
Brady Blvd	3	$ 50,000	$ 2,330,000	46.60
Burleson St	3	$ 50,000	NA	NA
Burnet St	3	$ 50,000	$ 2,700,000	54.00
Carolina St	3	$ 50,000	$ 10,870,000	217.40
Center St	3	$ 50,000	$ 1,160,000	23.20
Crockett St	3	$ 50,000	$ 1,500,000	30.00
Dawson St	3	$ 50,000	$ 1,300,000	26.00
Delaware St	3	$ 50,000	$ 1,090,000	21.80
Ellis Bean St	3	$ 50,000	$ 760,000	15.20
Hackberry St	3	$ 50,000	$ 2,590,000	51.80
Hoefgen Ave	3	$ 50,000	$ 2,590,000	51.80
Indiana St	3	$ 50,000	$ 1,120,000	22.40
Iowa St	3	$ 50,000	$ 1,110,000	22.20
Merida St	3	$ 50,000	$ 610,000	12.20
Roosevelt Ave	3	$ 50,000	$ 22,100,000	442.00
Sherman St	3	$ 50,000	NA	NA
Virginia Blvd	3	$ 50,000	$ 1,110,000	22.20

Table 8-5: Del Rio Subdivision Improvements

Rail Improvements	Improvement Classification Level	Estimated Cost	Estimated Public Benefit (20-year)**	Ratio: Benefit/Cost (20-year)
#1 - Construct second mainline Alamo Jct. to Withers Jct.	4	$ 6,520,000	NA	NA
#2 - Construct a second mainline and switches on the Del Rio Subdivision between East Yard and Kirby Yard milepost 203.5 to 201.4	4	$ 6,460,000	NA	NA
#5 - Extend the new second mainline of the Del Rio Subdivision at milepost 201.40 approximately 1.0 miles north to “Seven States Corporate Park”	1	$ 3,370,000	NA	NA
#6 - Construct new switches on the Del Rio Subdivision in the vicinity of Quintana Road for a proposed connection into the north end of SoSan Yard	1	$ 1,310,000	NA	NA
#19 - Construct an additional Del Rio Sub-division main track west and adjacent to the Del Rio Subdivision to Macdona	4	$ 6,040,000	NA	NA
*Public benefit could only be estimated for crossing closures which would be rerouted to a grade separated crossing. However, all crossing closures produce a public benefit of improved safety.				
**No public benefits of individual rail improvements were identified.				
Class 1 Improvements (Near-term Improvements)		$ 4,680,000	NA	NA
Class 3 Improvements (Separations/Closures)		$ 127,350,000	$ 272,780,000	2.14
Class 4 Improvements (Long-term Improvements)		$ 19,020,000	NA	NA
Total Identified Improvements		$ 151,050,000	$ 272,780,000	1.81

Table 8-5 (continued): Del Rio Subdivision Improvements

Grade Separations

Grade Separation of Avenue M on the Del Rio Subdivision

Avenue M is currently a two-lane roadway that crosses the UP Del Rio Subdivision in Medina County in the city of Hondo. This roadway, with approximately 10,100 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. According to FRA data, one accident occurred at the Avenue M crossing from 2002 through 2006. The potential two-lane roadway underpass would separate vehicular traffic from the Del Rio Subdivision.

A preliminary layout of the potential underpass and adjacent property land uses are included in Appendix E. Additional environmental constraints mapping may be required for further analysis.

Access to Avenue M would be eliminated for properties adjacent to the identified underpass structure. Roadways connecting to Avenue M along the identified underpass, such as 17th Street, 18th Street, 20th Street, and 21st Street, would need to be closed at their intersection with Avenue M. Traffic could be rerouted to connect to Avenue M along the adjacent roadways on Avenue K or Avenue N. US 90 could maintain through traffic by bridging over the potential underpass, although this would remove connectivity between Avenue M and US 90. Traffic from Avenue M that currently turns onto US 90 could be rerouted on Avenue P or Avenue K to reach US 90.

The grade separation of Avenue M is estimated to have a cost of $7.6 million with an estimated public benefit of $4.3 million, which is 56 percent of the estimated cost of the grade separation.

Grade Separation of Avenue U on the Del Rio Subdivision

Avenue U is currently a two-lane roadway that crosses the UP Del Rio Subdivision in Medina County in the city of Hondo. This roadway, with approximately 5,700 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential two-lane roadway underpass would separate vehicular traffic from the Del Rio Subdivision.

A preliminary layout of the potential underpass and adjacent property land uses are included in Appendix E. Additional environmental constraints mapping may be required for further analysis.

Access to Avenue U would be eliminated for properties adjacent to the identified underpass structure. Roadways connecting to Avenue U along the identified underpass, such as 17th Street, 18th Street, 20th Street, and 21st Street, would need to be closed at their intersection with Avenue U. Traffic could be rerouted to connect to Avenue U along the adjacent roadways on Avenue T or Avenue V. US 90 could maintain through traffic by bridging over the potential underpass, although this would remove connectivity between Avenue U and US 90. Traffic from Avenue U that currently turns onto US 90 could be rerouted on Avenue P or Avenue Y to reach US 90.

The grade separation of Avenue U is estimated to have a cost of $7.5 million with an estimated public benefit of $2.6 million, which is 35 percent of the estimated cost of the grade separation.

Grade Separation of Zarzamora Street and Ceralvo Street on the Del Rio Subdivision

Zarzamora Street and Ceralvo Street are currently four-lane and two-lane roadways, respectively, that cross the UP Del Rio Subdivision in Bexar County in the city of San Antonio. Approximately 22,000 and 5,400 daily vehicles cross the railroad at Zarzamora Street and Ceralvo Street, respectively. These roadways have been identified as potential candidates for grade separations in order to minimize the public safety risk associated with the at-grade crossings. According to FRA data, two accidents occurred at the Ceralvo/Zarzamora crossing from 2002 through 2006.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Del Rio Subdivision Constraints Map on sheet 19 of 31 located in Appendix F. The primary constraints in the vicinity of the potential grade separation consist of adjacent commercial and residential property. Access to adjacent properties could be maintained via access roads alongside Zarzamora Street and Ceralvo Street with at-grade u-turns located beneath the overpass on each side of the railroad.

The grade separations of Zarzamora Street and Ceralvo Street is estimated to have a combined cost of $24.9 million with an estimated public benefit of $9.6 million, which is 38 percent of the estimated cost of the grade separation.

Grade Separation of Commerce Street on the Del Rio Subdivision

Commerce Street is currently a four-lane roadway that crosses the UP Del Rio Subdivision in Bexar County in the city of San Antonio. This roadway, with approximately 20,500 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway underpass would separate vehicular traffic from the Del Rio Subdivision.

A preliminary layout of the underpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Del Rio Subdivision Constraints Map on sheet 23 of 31 located in Appendix F. The primary constraints in the vicinity of the potential grade separation consist of adjacent commercial properties and a historic district.

Access to Commerce Street would be eliminated for properties adjacent to the identified underpass structure. Roadways connecting to Commerce Street along the identified underpass would need to be closed at their intersection with Commerce Street, except for Cherry Street, which would bridge over the potential underpass. Traffic east of the railroad could be rerouted on Hackberry Street to connect with Commerce Street, while traffic west of the railroad could be rerouted on the US 281 frontage road to connect with Commerce Street.

The grade separation of Commerce Street is estimated to have a cost of $16.7 million with an estimated public benefit of $60.5 million, which is approximately 3.6 times the estimated cost of the grade separation.

Grade Separation of Flores Street on the Del Rio Subdivision

Flores Street is currently a two-lane roadway that crosses the UP Del Rio Subdivision in Bexar County in downtown San Antonio. This roadway, with approximately 12,300 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. According to FRA data, one accident occurred at the Flores Street crossing with the Del Rio Subdivision from 2002 through 2006. The potential two-lane roadway underpass would separate vehicular traffic from the Del Rio Subdivision.

A preliminary layout of the underpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Del Rio Subdivision Constraints Map on sheet 21 of 31 located in Appendix F. Constraints in the vicinity of the potential grade separation include adjacent commercial property, an oil/gas pipeline, and a school.

Access to Flores Street would be eliminated for properties adjacent to the identified underpass structure. Roadways connecting to Flores Street along the identified underpass, such as Fest Street, LaChapelle Street, Cassiano Street, Lone Star Boulevard, Stribling Street, and St. Francis Avenue, would need to be closed at their intersection with Flores Street.

The grade separation of Flores Street is estimated to have a cost of $8.8 million with an estimated public benefit of $30.4 million, which is nearly 3.5 times the estimated cost of the grade separation.

Grade Separation of Florida Street on the Del Rio Subdivision

Florida Street is currently a two-lane roadway that crosses the UP Del Rio Subdivision in Bexar County in downtown San Antonio. This roadway, with approximately 2,500 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. According to FRA data, one accident occurred at the Florida Street crossing with the Del Rio Subdivision from 2002 through 2006. The potential two-lane roadway underpass would separate vehicular traffic from the Del Rio Subdivision.

A preliminary layout of the underpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Del Rio Subdivision Constraints Map on sheet 22 of 31 located in Appendix F. Constraints in the vicinity of the potential grade separation include adjacent commercial and residential property and leaking petroleum storage tanks.

Access to Florida Street would be eliminated for properties adjacent to the identified underpass structure. Mesquite Street, which connects to Florida Street, would need to be closed at the intersection with Florida Street. Traffic could be rerouted to the east on Hackberry Street to access Florida Street. Cherry Street could maintain through traffic by bridging over the potential Florida Street underpass.

The grade separation of Florida Street is estimated to have a cost of $14.6 million with an estimated public benefit of $6.2 million, which is 43 percent of the estimated cost of the grade separation.

Grade Separation of FM 1343 on the Del Rio Subdivision

FM 1343 is currently a two-lane roadway that crosses the UP Del Rio Subdivision in Medina County in Castroville. This roadway, with approximately 3,500 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. According to FRA data, one accident occurred at the FM 1343 crossing with the Del Rio Subdivision from 2002 through 2006. The potential two-lane roadway overpass would separate vehicular traffic from the Del Rio Subdivision.

Connectivity between FM 1343 and Francisco Road would be eliminated due to the identified overpass structure and may require the construction of an additional access road between the two roadways. A preliminary layout of the overpass is included in Appendix E, although additional constraints mapping may be required.

The grade separation of FM 1343 is estimated to have a cost of $5 million with an estimated public benefit of $2.5 million, which is 49 percent of the estimated cost of the grade separation.

Grade Separation of Probandt/FM 536 on the Del Rio Subdivision

Probandt Street (also called FM 536) is currently a four-lane roadway that crosses the UP Del Rio Subdivision in Bexar County in downtown San Antonio. This roadway, with approximately 12,200 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway underpass would separate vehicular traffic from the Del Rio Subdivision.

A preliminary layout of the underpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Del Rio Subdivision Constraints Map on sheet 21 of 31 located in Appendix F. Constraints in the vicinity of the potential grade separation consist of adjacent residential, commercial, and industrial properties, a historic district, and an oil/gas pipeline.

Access to Probandt Street would be eliminated for properties adjacent to the identified underpass structure. St. Francis Avenue, Lone Star Boulevard, and Simon Street, which connect to Probandt Street, would need to be closed at the intersection with Probandt Street. South of the railroad, traffic could be rerouted on Helena Street to access Probandt Street. North of the railroad, traffic could be rerouted on Clay Street to access Probandt Street.

The grade separation of Probandt Street is estimated to have a cost of $11.2 million with an estimated public benefit of $22.9 million, which is more than two times the estimated cost of the grade separation.

Grade Separation of Houston Street on the Del Rio Subdivision

Houston Street is currently a two-lane roadway that crosses the UP Del Rio Subdivision in Bexar County in the city of San Antonio. This roadway, with approximately 14,500 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential two-lane roadway underpass would separate vehicular traffic from the Del Rio Subdivision.

A preliminary layout of the underpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Del

Rio Subdivision Constraints Map on sheet 23 of 31 located in Appendix F. The primary constraints in the vicinity of the potential grade separation consist of adjacent commercial properties and historic sites.

Access to Houston Street would be eliminated for properties adjacent to the identified underpass structure, although access to connecting roadways would be maintained. Roadways connecting to Houston Street along the identified underpass would require reconstruction in order to connect to the depressed lanes of the underpass.

The grade separation of Houston Street is estimated to have a cost of $14.3 million with an estimated public benefit of $39.3 million, which is 2.75 times the estimated cost of the grade separation.

Grade Separation of N. Pine Street on the Del Rio Subdivision

N. Pine Street is currently a two-lane roadway that crosses the UP Del Rio Subdivision and transitions to a four-lane roadway as it bridges over IH-35 in Bexar County in downtown San Antonio. This roadway, with approximately 3,000 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Del Rio Subdivision.

A preliminary layout of the potential overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Del Rio Subdivision Constraints Map on sheet 24 of 31 located in Appendix F. Constraints in the vicinity of the potential grade separation include adjacent residential and commercial properties as well as a rail yard.

Access to Pine Street would be eliminated for properties adjacent to the potential overpass structure. Roadways connecting to Pine Street along the identified underpass, such as Panam Expressway as well as the existing Pine Street bridge over the IH-35 mainlanes would require reconstruction in order to connect to the elevated lanes of the identified potential overpass.

The grade separation of Pine Street is estimated to have a cost of $5 million with an estimated public benefit of $7.3 million, which is 45 percent greater than the estimated cost of the grade separation.

Grade Separation of S. Presa Street on the Del Rio Subdivision

S. Presa Street is currently a two-lane roadway that crosses the UP Del Rio Subdivision in Bexar County in downtown San Antonio. This roadway, with approximately 10,600 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. According to FRA data, three accidents occurred at the Presa Street crossing with the Del Rio Subdivision from 2002 through 2006. The potential two-lane roadway underpass would separate vehicular traffic from the Del Rio Subdivision.

A preliminary layout of the potential underpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Del Rio Subdivision Constraints Map on sheet 22 of 31 located in Appendix F. Constraints in the vicinity of the potential grade separation include adjacent residential and commercial properties, an oil/gas pipeline, and multiple nearby schools.

Access to Presa Street would be eliminated for properties adjacent to the identified underpass structure due to the lack of available right-of-way for access roads alongside the potential underpass. Roadways connecting to Presa Street along the identified underpass, such as Lowell Street, Drexel Avenue, Groveton Street, Boyer Avenue, Panama Avenue, and Vitra Street, would need to be closed at their intersection with Presa Street. Traffic could be rerouted to cross the railroad on Mary Street and could access Presa Street from Lotus Avenue or Whittier Street.

The grade separation of Presa Street is estimated to have a cost of $10.7 million with an estimated public benefit of $33.4 million, which is more than 3 times the estimated cost of the grade separation.

Crossing Closures

Crossing Closures of Avenues I, K, and P on the Del Rio Subdivision

Avenues I, K, and P are each currently two-lane roadways that cross the railroad at-grade in Medina County in the city of Hondo. Approximately 700 daily vehicles cross the railroad at Avenue I and Avenue P, while approximately 1,100 daily vehicles cross the railroad at Avenue K. The crossings should be considered for closure at the intersections with the UP Del Rio Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing. According to FRA data, one accident occurred at the Avenue I as well as the Avenue P crossings from 2002 through 2006.

The location of the potential crossing closures as well as the alternative routes and associated distances are identified in Appendix E. Additional constraints mapping may be required at this location. Access to area properties could be maintained via the existing roadway network. Traffic could be rerouted from the closed crossings along 16th Street or 22nd Street to cross the railroad on Avenue M, which is included as a potential grade separation in this study. Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closures are each estimated to cost $50,000 with an estimated public benefit of $420 thousand and $620 thousand for Avenue K and Avenue P, respectively. The public benefit for the closure of the Avenue I crossing could not be calculated since traffic may be rerouted from that crossing to the adjacent Avenue E crossing, which could remain at-grade.

Crossing Closure of Avenue Y on the Del Rio Subdivision

Avenue Y is currently a two-lane roadway that crosses the railroad at-grade in Medina County in the city of Hondo. Approximately 2,100 vehicles cross the UP at this location daily. The crossing should be considered for closure at the intersection with the UP Del Rio Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closures as well as the alternative routes and associated distances are identified in Appendix E. Additional constraints mapping may be required at this location. Access to area properties could be maintained via the existing roadway network. Traffic could be rerouted from the closed crossing to the east on Avenue U, which is included as a potential grade separation in this study, or to the west on 19th Street/Castro Avenue. Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closure is estimated to cost $50,000. The public benefit could not be calculated for this closure since traffic may be rerouted to another at-grade crossing.

Crossing Closure of Brady Boulevard on the Del Rio Subdivision

Brady Boulevard is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in San Antonio, just north of Highway 90. Approximately 3,300 vehicles cross the UP at this location daily. The crossing should be considered for closure at the intersection with the UP Del Rio Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing. According to FRA data, three accidents have occurred at the Brady Boulevard crossing from 2002 through 2006.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Del Rio Subdivision Constraints Map on sheet 19 of 31 located in Appendix F. The primary constraints in the vicinity of the potential crossing closure consist of adjacent residential property. Access to area properties could be maintained via the existing roadway network. Traffic could be rerouted from the closed crossing to the north on Ceralvo Street, which is included as a potential grade separation in this study. Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of approximately $2.3 million.

Crossing Closures of Burnet St, Dawson St, Crockett St, and Center St on the Del Rio Subdivision

Burnet, Dawson, Crockett, and Center Streets are each currently two-lane roadways that cross the railroad at-grade in Bexar County in downtown San Antonio, just east of IH 37. Approximately 700 vehicles cross the UP at each of these locations daily. The crossings should be considered for closure at the intersections with the UP Del

Rio Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossings. According to FRA data, one accident has occurred at the Crockett Street crossing from 2002 through 2006.

The location of the potential crossing closures as well as the alternative routes and associated distances are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Del Rio Subdivision Constraints Map on sheets 23 and 24 of 31 located in Appendix F. The primary constraints in the vicinity of the potential crossing closures consist of adjacent residential and commercial property as well as historic sites. Access to area properties could be maintained via the existing roadway network. Traffic could be rerouted from the potentially closed Burnet and Dawson Street crossings to Nolan Street, which is an existing grade separation to cross the railroad. Traffic could be rerouted from the potentially closed Crockett and Center Street crossings to Houston Street or Commerce Street, which are included as potential grade separations as part of this study to cross the railroad.

The crossing closures are each estimated to cost $50,000. The estimated public benefit for the closure of the Burnet Street crossing is $2.7 million, while the estimated public benefit for the Dawson Street closure is $1.3 million, the estimated public benefit for the Crockett Street closure is $1.5 million, and the estimated public benefit for the Center Street closure is $1.2 million.

Crossing Closures of Burleson, Hackberry, and Sherman Streets on the Del Rio Subdivision

Burleson Street is currently a two-lane roadway at which approximately 1,600 daily vehicles cross the railroad at-grade in Bexar County in downtown San Antonio, while Hackberry Street is currently a four-lane roadway at which approximately 1,500 daily vehicles cross the railroad, and Sherman Street is currently a two-lane roadway at which approximately 1,400 daily vehicles cross the railroad. The crossings should be considered for closure at the intersection with the UP Del Rio Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossings. According to FRA data, two accidents occurred at the Sherman Street crossing from 2002 through 2006.

The location of the potential crossing closures as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Del Rio Subdivision Constraints Map on sheet 24 of 31 located in Appendix F. Located near the crossing are residential and commercial properties as well as a rail yard. Access to the nearby properties could be maintained via the existing roadway network.

Traffic could be rerouted from the closed Burleson and Sherman Street crossings to Pine Street, which is included as a potential grade separation in this study, or to Lamar Street to cross the railroad. Traffic could be rerouted from the closed Hackberry Street crossing to Pine Street, which is the adjacent roadway to the east.

Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closures are estimated to cost $50,000 with an estimated public benefit for the closure of the Hackberry Street crossing of approximately $2.6 million. The public benefit for the closures of Burleson and Sherman Streets could not be calculated since traffic may be rerouted to another at-grade crossing.

Crossing Closures of Carolina St and Hoefgen Ave on the Del Rio Subdivision

Carolina Street and Hoefgen Avenue are each currently two-lane roadways that cross the railroad at-grade in Bexar County in downtown San Antonio, just east of IH 37. Approximately 4,300 vehicles cross the UP at Carolina Street daily, while approximately 700 vehicles cross the UP at Hoefgen Avenue daily. The crossings should be considered for closure at the intersections with the UP Del Rio Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossings. According to FRA data, four accidents have occurred at Hoefgen Avenue crossing from 2002 through 2006.

The location of the potential crossing closures as well as the alternative routes and associated distances are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Del Rio Subdivision Constraints Map on sheets 22 of 31 located in Appendix F. The primary constraints in the vicinity of the potential crossing closures consist of adjacent residential and commercial property. Access to area properties could be maintained via the existing roadway network. Traffic could be rerouted from the potentially closed crossings to Westfall Avenue Street, which is an existing grade separation, or to Florida Street, which is included as a potential grade separation as part of this study, to cross the railroad.

The crossing closures are each estimated to cost $50,000. The estimated public benefit for the closure of the Carolina Street crossing is $10.9 million, while the estimated public benefit for the Hoefgen Avenue closure is $2.6 million.

Crossing Closures of Delaware St, Indiana St, Virginia St, and Iowa St on the Del Rio Subdivision

Delaware, Indiana, Virginia, and Iowa Streets are each currently two-lane roadways that cross the railroad at-grade in Bexar County in downtown San Antonio, just east of IH 37. Approximately 700 vehicles cross the UP at each of these locations daily. The crossings should be considered for closure at the intersections with the UP Del Rio Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossings.

The location of the potential crossing closures as well as the alternative routes and associated distances are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Del Rio Subdivision Constraints Map on sheets 22 of 31 located in Appendix F. The primary constraints in the vicinity of the potential crossing closures consist of adjacent residential and commercial property. Access to area properties could be maintained via the existing roadway network. Traffic could be rerouted from the potentially closed Delaware and Indiana Street crossings to Florida Street, which is included as a potential grade separation as part of this study, to cross the railroad. Traffic could be rerouted from the potentially closed Virginia and Iowa Street crossings to Durango Boulevard, which is an existing grade separation over the railroad.

The crossing closures are each estimated to cost $50,000. The estimated public benefit for the closure of the crossings at Delaware Street, Indiana Street, Virginia Street and Iowa Street is $1.1 million for each crossing.

Crossing Closure of Ellis Bean Street on the Del Rio Subdivision

Ellis Bean Street is currently a two lane roadway that crosses the railroad at-grade in Bexar County in downtown San Antonio. Approximately 700 vehicles cross the UP at this location daily. The crossing should be considered for closure at the intersection with the UP Del Rio Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Del Rio Subdivision Constraints Map on sheet 21 of 31 located in Appendix F. Located near the crossing are residential and commercial properties as well as a school. Access to the school and other nearby properties could be maintained via the existing roadway network. Traffic could be rerouted from the closed crossing to the west on Flores Street, which is included as a potential grade separation in this study. Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of approximately $760 thousand.

Crossing Closure of Merida Street on the Del Rio Subdivision

Merida Street is currently a two lane roadway that crosses the railroad at-grade in Bexar County in San Antonio. Approximately 700 vehicles cross the UP at this location daily. The crossing should be considered for closure at the intersection with the UP Del Rio Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing. According to FRA data, one accident has occurred at the Merida Street crossing from 2002 through 2006.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Del Rio Subdivision Constraints Map on sheet 19 of 31 located in Appendix F. Located near the crossing are residential properties as well as multiple schools. Access to the schools and other nearby properties could be maintained via the existing roadway network. Traffic could be rerouted from the closed crossing to the south on Ceralvo Street, which is included as a potential grade separation in this study. Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of approximately $610 thousand.

Crossing Closure of Roosevelt Avenue on the Del Rio Subdivision

Roosevelt Avenue is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in downtown San Antonio. Approximately 7,900 vehicles cross the UP at this location daily. The crossing should be considered for closure at the intersection with the UP Del Rio Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Del Rio Subdivision Constraints Map on sheet 22 of 31 located in Appendix F. Located near the crossing are residential and commercial properties as well as multiple schools and a park. Access to the schools and other nearby properties could be maintained via the existing roadway network. Traffic could be rerouted from the closed crossing to the adjacent roadway to the west on St. Mary Street, which is grade separated from the railroad. Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of approximately $22.1 million.

Railroad Improvements

None of the following improvements have been constructed nor are under construction.

Improvement 1 – Construct a second mainline Alamo Jct. to Withers Jct. (planned UP improvement)

The installation of a second mainline is proposed from milepost 218.8 to milepost 220.8 on the Del Rio Subdivision, including new switch installations. This segment of railroad currently operates with a single mainline. The second mainline will be constructed from the south end of SoSan Yard to a point approximately two miles south along the west side of the Del Rio Subdivision. This second mainline will increase fluidity of rail traffic in western San Antonio. This project is located in southwestern San Antonio and south of the former Kelly USAF Base and SoSan Yard. The project extends to the southwest to just east of Interstate Loop 410.

Improvement 2 – Construct a second mainline and switches on the Del Rio Subdivision between East Yard and Kirby Yard

An extension to the north of the second mainline is proposed between milepost 201.4 and 203.5 on the Del Rio Subdivision. The construction of the new track will continue on the east side of the existing Del Rio Subdivision mainline to Kirby Interlocking at the north end of the yard. Through trains will now have a second main track on which to operate. Trains would now have a direct route and traffic entering/leaving Kirby Yard and East Yard would not have cross-over moves.

Located in east-central San Antonio to Kirby, this improvement is located between IH 35 and State Highway 78 to the north and south and between New Braunfels Avenue on the west and Forest Road in Kirby, to the east.

Improvement 5 – Extend the new second mainline of the Del Rio Subdivision at milepost 201.40 approximately 1.0 miles north to "Seven States Corporate Park"

At KIRBY interlocking and milepost 201.40, it is proposed to extend the new second mainline approximately one mile north (now on the Glidden subdivision). This new track would include the limits of the switch to the Seven Springs Corporate Park.

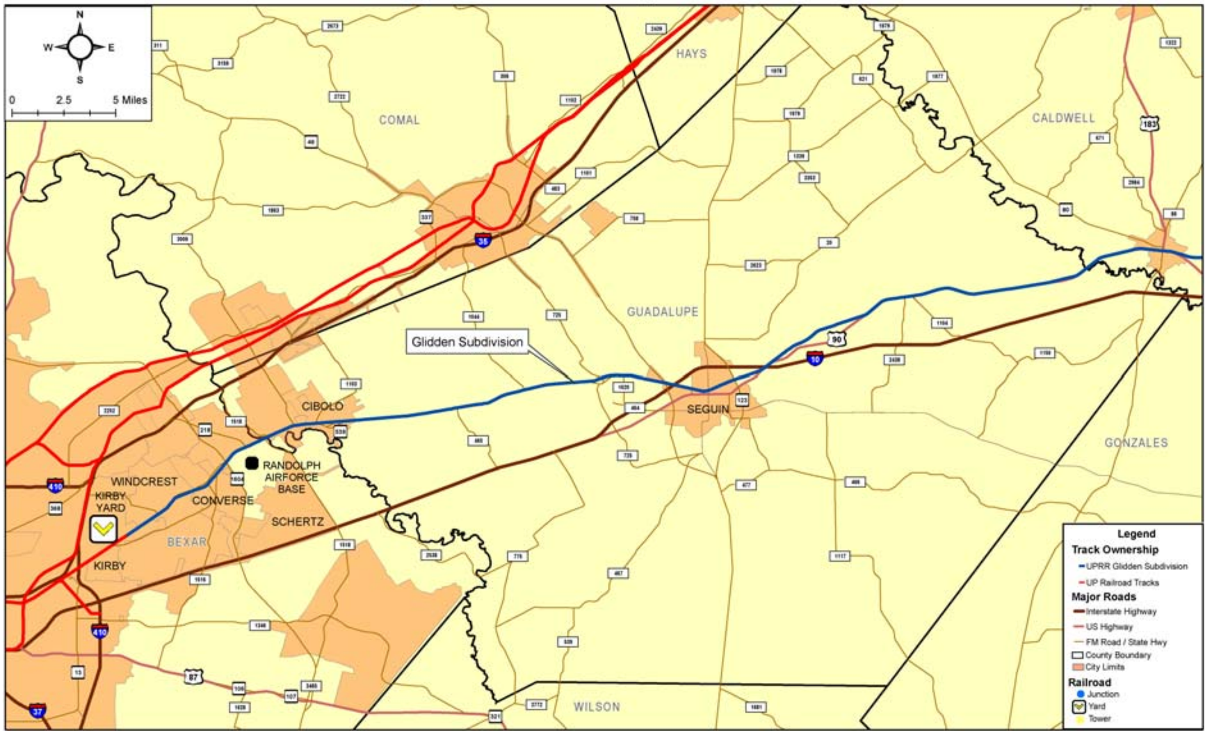
Improvement 6 – Construct new switches on the Del Rio Subdivision in the vicinity of Quintana Road for a proposed connection into the north end of SoSan Yard

At approximately milepost 215.90 on the Del Rio Subdivision, it is proposed to construct switches connecting Del Rio number 1 to Del Rio number 2 at the north end of SoSan Yard.

Improvement 19 - Construct an additional Del Rio Sub-division main track west and adjacent to the Del Rio Subdivision to Macdona

With the anticipated increase in traffic, it is proposed to construct a second new main track approximately 1.5 miles in length to expedite train movements between Macdona (milepost 223.60) and Alamo Jct. (milepost 220.10) on the Del Rio Subdivision.

Glidden Subdivision



The tracks of the Glidden Subdivision were originally constructed by the Galveston, Harrisburg, & San Antonio Railway in 1877. The Subdivision originates in Houston, Texas and ends in San Antonio at the east end of Kirby Yard with the tracks continuing southward as the Del Rio Subdivision. The Subdivision is approximately 201 miles in total length, approximately 45 of which are in the San Antonio Region study area in Guadalupe and Bexar Counties.

The Glidden Subdivision is a single track mainline with sidings utilized in a bidirectional manner, with trains dispatched to operate in both directions, averaging between 20 and 30 trains daily, depending upon location.

Potential improvements along the Glidden Subdivision include grade separations, crossing closures, and rail capacity enhancements, as listed in Table 8-6 with their associated costs.

A breakdown of the order of magnitude cost estimates and the estimated associated public benefits of the identified grade separations are included in Appendix C and Appendix G, respectively.

Glidden Subdivision				
Grade Separations	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)**	**Ratio: Benefit/Cost (20-year)**
Austin St	3	$ 5,300,000	$ 9,280,000	1.75
FM 1103	3	$ 11,100,000	$ 5,960,000	0.54
FM 3009	3	$ 12,300,000	$ 20,060,000	1.63
Hwy 218/Pat Booker	3	$ 87,600,000	$ 19,320,000	0.22
Rittiman Rd	3	$ 10,100,000	$ 18,140,000	1.80
Schertz Pkwy	3	$ 10,600,000	$ 4,900,000	0.46
Toepperwein Rd	3	$ 19,800,000	$ 7,580,000	0.38
Walzem Rd	3	$ 9,100,000	$ 17,840,000	1.96
Crossing Closures	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)***	**Ratio: Benefit/Cost (20-year)**
Guadalupe St	3	$ 50,000	$ 440,000	8.80
Randolphe Rd	3	$ 50,000	NA	NA
Rail Improvements	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)****	**Ratio: Benefit/Cost (20-year)**
#15 - Upgrade and extend Converse storage track (Glidden Sub. East of Kirby Yard) to a 2 mile long siding	4	$ 4,910,000	NA	NA
*Public benefit could only be estimated for crossing closures which would be rerouted to a grade separated crossing. However, all crossing closures produce a public benefit of improved safety.				
**No public benefits of individual rail improvements were identified.				
Class 3 Improvements (Separations/Closures)		$ 166,000,000	$ 103,520,000	0.62
Class 4 Improvements (Long-term Improvements)		$ 4,910,000	NA	NA
Total Identified Improvements		$ 170,910,000	$ 103,520,000	0.61

Table 8-6: Glidden Subdivision Improvements

Grade Separations

Grade Separation of Austin Street on the Glidden Subdivision

Austin Street is currently a two-lane roadway that crosses the UP Glidden Subdivision in Guadalupe County in the city of Seguin. This roadway, with approximately 11,200 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Glidden Subdivision.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Glidden Subdivision Constraints Map on sheet 25 of 30 located in Appendix F. The primary constraints in the vicinity of the potential grade separation consist of adjacent residential, commercial, and industrial property. Access to adjacent properties could be maintained via access roads alongside Austin Street with at-grade u-turns located beneath the overpass on each side of the railroad.

The grade separation of Austin Street is estimated to cost $5.3 million with an estimated public benefit of nearly $9.3 million, which is 75 percent greater than the estimated cost of the grade separation.

Grade Separation of FM 1103 on the Glidden Subdivision

FM 1103 is currently a two-lane roadway that crosses the UP Glidden Subdivision Guadalupe County in the city of Cibolo. This roadway, with approximately 6,100 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. According to FRA data, one accident occurred at the FM 1103 crossing with the Del Rio Subdivision from 2002 through 2006. The potential two-lane roadway underpass would separate vehicular traffic from the Glidden Subdivision.

A preliminary layout of the underpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Glidden Subdivision Constraints Map on sheet 10 of 30 located in Appendix F. The primary constraint in the vicinity of the potential grade separation consists of adjacent commercial property. Since no properties currently access FM 1103 or FM 78 along the portions of the roadways that are identified to be grade separated, access to adjacent properties and connecting roadways would be maintained. The mainlanes of Highway 78 would need to be depressed to meet the FM 1103 underpass lanes and maintain connectivity between the two roads.

The grade separation of FM 1103 and depressed lanes for Highway 78 is estimated to cost $11.1 million with an estimated public benefit of nearly $6 million, which is approximately 54 percent of the estimated cost of the grade separation.

Grade Separation of FM 3009 on the Glidden Subdivision

FM 3009 is currently a four-lane roadway that crosses the UP Glidden Subdivision and intersects FM 78 in Guadalupe County in the city of Cibolo. This roadway, with approximately 16,500 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. According to FRA data, three accidents occurred at the FM 3009 crossing with the Del Rio Subdivision from 2002 through 2006. The potential four-lane roadway overpass would separate vehicular traffic from the Glidden Subdivision.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Glidden Subdivision Constraints Map on sheet 9 of 30 located in Appendix F. The primary constraints in the vicinity of the potential grade separation consist of adjacent residential property and the location of the 100-year floodplain. Access to adjacent properties could be maintained via access roads alongside FM 3009 as well as Highway 78 with an at-grade u-turn located beneath the overpass north of the railroad. The mainlanes of Highway 78 would need to be elevated to meet the FM 3009 overpass lanes and maintain connectivity between the two roads.

The grade separation of FM 3009 and elevated lanes for Highway 78 is estimated to cost $12.3 million with an estimated public benefit of $20.1 million, which is approximately 63 percent greater than the estimated cost of the grade separation.

Grade Separation of Highway 218/Pat Booker Road on the Glidden Subdivision

Highway 218 is currently a five-lane roadway that crosses the UP Glidden Subdivision in Bexar County in the city of Universal City. This roadway, with approximately 23,200 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential five-lane roadway overpass would separate vehicular traffic from the Glidden Subdivision.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Glidden Subdivision Constraints Map on sheet 7 of 30 located in Appendix F. The primary constraint in the vicinity of the potential grade separation consists of adjacent commercial and residential property. Access to adjacent properties could be maintained via at-grade access roads alongside FM 78 and Highway 218.

The grade separation of Highway 218/Pat Booker Road is estimated to cost $87.6 million with an estimated public benefit of nearly $19.3 million, which is 22 percent of the estimated cost of the grade separation.

Grade Separation of Rittiman Road on the Glidden Subdivision

Rittiman Road is currently a four-lane roadway that crosses the UP Glidden Subdivision in Bexar County in the city of Kirby. This roadway, with approximately 22,100 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Glidden Subdivision.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Glidden Subdivision Constraints Map on sheet 1 of 30 located in Appendix F. The primary constraint in the vicinity of the potential grade separation consists of adjacent commercial property. Access to adjacent properties could be maintained via access roads alongside Rittiman Road with an at-grade u-turn located beneath the overpass east of the railroad.

The grade separation of Rittiman Road is estimated to cost $10.1 million with an estimated public benefit of nearly $18.18 million, which is 80 percent greater than the estimated cost of the grade separation.

Grade Separation of Schertz Parkway on the Glidden Subdivision

Schertz Parkway is currently a two-lane roadway that crosses the UP Glidden Subdivision and intersects FM 78 in Guadalupe County in the city of Cibolo. This roadway, with approximately 7,300 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. According to FRA data, three accidents occurred at the Schertz Parkway crossing with the Del Rio Subdivision from 2002 through 2006. The potential two-lane roadway overpass would separate vehicular traffic from the Glidden Subdivision.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Glidden Subdivision Constraints Map on sheet 6 of 30 located in Appendix F. The primary constraint in the vicinity of the potential grade separation consists of adjacent residential and commercial property. Access to adjacent properties could be maintained via access roads alongside Schertz Parkway as well as Highway 78 with an at-grade u-turn located beneath the overpass west of the railroad. The mainlanes of Highway 78 would need to be elevated to meet the Schertz Parkway overpass lanes and maintain connectivity between the two roads.

The grade separation of Schertz Parkway and elevated lanes for Highway 78 is estimated to cost $10.6 million with an estimated public benefit of nearly $4.9 million, which is approximately 46 percent of the estimated cost of the grade separation.

Grade Separation of Toepperwein Rd on the Glidden Subdivision

Toepperwein Road is currently a two-lane roadway that crosses the UP Glidden Subdivision and intersects Gribb Sprawl Road in Bexar County in the city of Converse. This roadway, with approximately 8,700 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. According to FRA data, one accident occurred at the Toepperwein Road crossing with the Del Rio Subdivision from 2002 through 2006. The potential two-lane roadway overpass would separate vehicular traffic from the Glidden Subdivision.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Glidden Subdivision Constraints Map on sheet 5 of 30 located in Appendix F. Located near the crossing are residential and commercial properties and a firehouse. Access to adjacent properties could be maintained via access roads alongside Toepperwein Road as well as Gribb Sprawl Road with at-grade u-turns located beneath the overpass each side of the railroad. The mainlanes of Gribb Sprawl Road would need to be elevated to meet the Toepperwein Road overpass lanes and maintain connectivity between the two roads.

The grade separation of Toepperwein Road and elevated lanes for Gribb Sprawl Road is estimated to cost $19.8 million with an estimated public benefit of nearly $7.6 million, which is approximately 38 percent of the estimated cost of the grade separation.

Grade Separation of Walzem Rd on the Glidden Subdivision

Walzem Road is currently a two-lane roadway that crosses the UP Glidden Subdivision and intersects Gribbs Sprawl Road in Bexar County in the city of Kirby. This roadway, with approximately 17,600 daily vehicles crossing the railroad tracks, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Glidden Subdivision.

A preliminary layout of the overpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Glidden Subdivision Constraints Map on sheet 2 of 30 located in Appendix F. Access to adjacent properties could be maintained via access roads alongside Walzem Road as well as Gribbs Sprawl Road with an at-grade u-turn located beneath the overpass west of the railroad. The mainlanes of Gribbs Sprawl Road would need to be elevated to meet the Walzem Road overpass lanes and maintain connectivity between the two roads.

The grade separation of Walzem Road and elevated lanes for Gribb Sprawl Road is estimated to cost $9.1 million with an estimated public benefit of nearly $17.8 million, which is nearly two times the estimated cost of the grade separation.

Crossing Closures

Crossing Closure of Guadalupe Street on the Glidden Subdivision

Guadalupe Street is currently a two lane roadway that crosses the railroad at-grade in Guadalupe County and Seguin. Approximately 800 vehicles cross the UP at this location daily. The crossing should be considered for closure at the intersection with the UP Glidden Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Glidden Subdivision Constraints Map on sheet 25 of 30 located in Appendix F. Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted to adjacent roadways to the east to Austin Street, which is included as a potential grade separation. Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of approximately $440 thousand.

Crossing Closure of Randolph Avenue on the Glidden Subdivision

Randolph Avenue is currently a four lane roadway that crosses the railroad at-grade in Guadalupe County and Cibolo. Approximately 700 vehicles cross the UP at this location daily. The crossing should be considered for closure at the intersection with the UP Glidden Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Glidden Subdivision Constraints Map on sheet 8 of 30 located in Appendix F. Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified. Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted to adjacent roadways to the north to Schertz Parkway or south to 1st Street.

The crossing closure is estimated to cost $50,000. The estimated public benefit could not be calculated for the closure of Randolph Avenue since traffic may be redirected to another at-grade crossing.

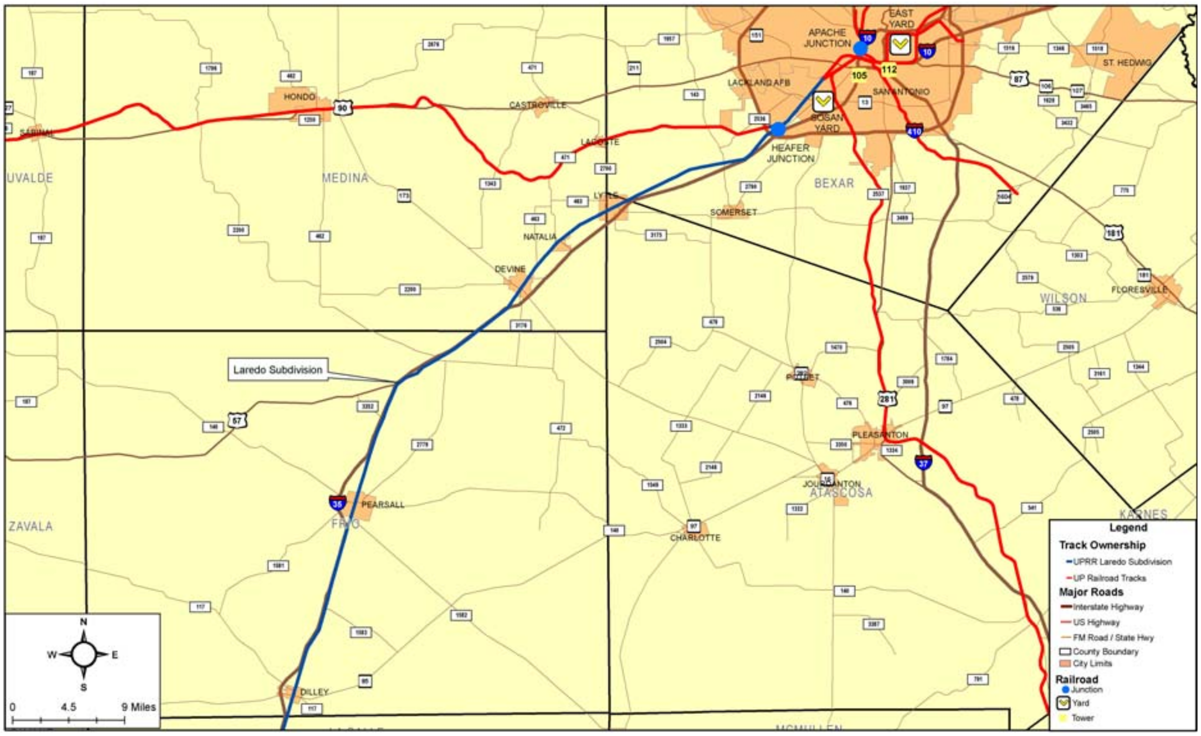
Railroad Improvements

None of the following improvements have been constructed nor are under construction.

Improvement 15 - Upgrade and extend Converse storage track (Glidden Subdivision East of Kirby Yard) to a 2 mile long siding

The Converse storage track, milepost 196.40 to milepost 196.94 is located in Converse approximately 10 miles northwest of downtown San Antonio on the Glidden Subdivision. It is proposed to extend its current half mile approximate length westward to milepost 198.44 to create an approximate 2 mile long siding.

Laredo Subdivision



The tracks of the Laredo Subdivision were originally constructed in 1882 by the International & Great Northern Railroad. The Subdivision originates in San Antonio at the terminus of the Austin Subdivision ML 2 and travels south where it ends at the US/Mexico border in Laredo, Texas. The Subdivision is approximately 152 miles in total length, approximately 71 of which are in the San Antonio Region study area in Bexar, Atascosa, Medina, and Frio Counties. The Laredo Subdivision is a single track mainline with sidings utilized in a bidirectional manner, with trains dispatched to operate in both directions, averaging between 10 and 20 trains daily, depending upon location.

Potential improvements along the Laredo Subdivision include grade separations, crossing closures, and rail capacity enhancements, as listed in Table 8-7 with their associated costs. A breakdown of the order of magnitude cost estimates and the estimated associated public benefits of the identified grade separations are included in Appendix C and Appendix G, respectively.

Laredo Subdivision				
Grade Separations	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)**	**Ratio: Benefit/Cost (20-year)**
Brazos St	3	$ 22,400,000	$ 9,620,000	0.43
Comal St	3	$ 9,200,000	$ 3,500,000	0.38
CR 4201	3	$ 20,500,000	$ 4,750,000	0.23
FM 2790/Lytle	3	$ 10,000,000	$ 1,380,000	0.14
FM 471	3	$ 7,700,000	$ 1,000,000	0.13
SH 173	3	$ 13,300,000	$ 2,950,000	0.22
Zarzamora St	3	$ 18,600,000	$ 37,360,000	2.01
Crossing Closures	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)***	**Ratio: Benefit/Cost (20-year)**
Benton St	3	$ 50,000	NA	NA
Coker	3	$ 50,000	NA	NA
College	3	$ 50,000	NA	NA
Drake Ave	3	$ 50,000	NA	NA
Frio St	3	$ 50,000	$ 650,000	13.00
Galbreath	3	$ 50,000	NA	NA
Harriman Pl	3	$ 50,000	$ 8,490,000	169.80
Medina St	3	$ 50,000	$ 260,000	5.20
Railroad St/Somers	3	$ 50,000	NA	NA
Rail Improvements	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit (20-year)****	**Ratio: Benefit/Cost (20-year)**
#8 - Construct new Laredo Subdivision mainline track approximately 1.0 miles from SoSan Yard west to Heafer Junction	4	$ 2,740,000	NA	NA
#14 - Upgrade/extend Pearsall storage track (Laredo Sub.) to a 2.9 mile siding	4	$ 6,010,000	NA	NA
*Public benefit could only be estimated for crossing closures which would be rerouted to a grade separated crossing. However, all crossing closures produce a public benefit of improved safety.				
**No public benefits of individual rail improvements were identified.				
Class 3 Improvements (Separations/Closures)		$ 102,150,000	$ 69,960,000	0.68
Class 4 Improvements (Long-term Improvements)		$ 8,750,000	NA	NA
Total Identified Improvements		$ 110,900,000	$ 69,960,000	0.63

Table 8-7: Laredo Subdivision Improvements

Grade Separations

Grade Separation of Brazos St on the Laredo Subdivision

Brazos Street is currently a two-lane roadway that crosses the UP Laredo Subdivision and the Del Rio Subdivision in Bexar County just southwest of downtown San Antonio. Approximately 6,100 daily vehicles cross the Laredo

Subdivision and 8,400 daily vehicles cross the Del Rio Subdivision on Brazos Street, which has been identified as a potential candidate for grade separation in order to minimize the public safety risk associated with the at-grade crossings. According to FRA data, two accidents occurred at the Brazos Street crossing with the Del Rio Subdivision from 2002 through 2006.

A preliminary layout of the underpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Laredo Subdivision Constraints Map on sheet 19 of 19 located in Appendix F. The primary constraints located near the Brazos Street crossing consist of adjacent commercial and residential property.

Access to Brazos Street for adjacent properties and connecting roadways south of the crossing with the Laredo Subdivision would be maintained via access roads alongside the identified underpass. Access to adjacent properties north of the crossing with the Laredo Subdivision could be eliminated due to the identified underpass structure and the lack of available right-of-way for access roads. In order to minimize impacts to properties, roadways such as Merida Street and Saltillo Street could bridge over the identified Brazos Street underpass to access the commercial properties east of Brazos Street.

The grade separation of Brazos Street is estimated to cost $22.4 million with an estimated public benefit of $9.6 million, which is 43 percent of the estimated cost of the grade separation.

Grade Separation of Comal St on the Laredo Subdivision

Comal Street is currently a two-lane roadway that crosses the UP Laredo Subdivision in Frio County in the city of Pearsall. Approximately 9,700 daily vehicles cross the Laredo Subdivision t, which has been identified as a potential candidate for grade separation in order to minimize the public safety risk associated with the at-grade crossing. According to FRA data, one accident occurred at the Comal Street crossing with the Del Rio Subdivision from 2002 through 2006.

A preliminary layout of the underpass is included in Appendix E. Additional constraints mapping may be required for this location. Access to Comal Street for adjacent properties and connecting roadways west of the crossing with the Laredo Subdivision would be maintained via access roads alongside the identified underpass. Access to adjacent properties east of the crossing with the Laredo Subdivision could be eliminated due to the identified underpass structure and the lack of available right-of-way for access roads.

The grade separation of Comal Street is estimated to cost $9.2 million with an estimated public benefit of $3.5 million, which is 38 percent of the estimated cost of the grade separation.

Grade Separation of CR 4201 on the Laredo Subdivision

CR 4201 is currently a two-lane roadway that crosses the UP Laredo Subdivision in Frio County in the city of Pearsall. Approximately 17,400 daily vehicles cross the Laredo Subdivision on CR 4201, which has been identified as a potential candidate for grade separation in order to minimize the public safety risk associated with the at-grade crossings. A preliminary layout of the underpass is included in Appendix E. Additional environmental constraints mapping may be required for further analysis.

Access to CR 4201 for adjacent properties and connecting roadways west of the crossing with the Laredo Subdivision would be maintained via access roads alongside the identified underpass. Access to adjacent properties east of the crossing with the Laredo Subdivision could be maintained via frontage roads connecting to CR 4201 beyond the location of the potential underpass.

The grade separation of CR 4201 is estimated to cost $20.5 million with an estimated public benefit of $4.8 million, which is 23 percent of the estimated cost of the grade separation.

Grade Separation of FM 2790 on the Laredo Subdivision

FM 2790 is currently a two-lane roadway that crosses the UP Laredo Subdivision in Atascosa County in the city of Lytle. Approximately 5,000 daily vehicles cross the Laredo Subdivision on FM 2790, which has been identified as a potential candidate for grade separation in order to minimize the public safety risk associated with the at-grade crossings.

A preliminary layout of the overpass is included in Appendix E. Additional constraints mapping may be required for this location. In order to maintain connectivity between FM 2790 and Main Street, the lanes of Main Street would need to be elevated to meet the identified overpass lanes of FM 2790. Access to FM 2790 as well as Main Street for adjacent properties and connecting roadways would be maintained via access roads alongside the identified underpass.

The grade separation of FM 2790 and Main Street is estimated to cost $10 million with an estimated public benefit of $1.4 million, which is 14 percent of the estimated cost of the grade separation.

Grade Separation of FM 471 on the Laredo Subdivision

FM 471 is currently a two-lane roadway that crosses the UP Laredo Subdivision in Medina County in the city of Natalia. Approximately 1,800 daily vehicles cross the Laredo Subdivision on FM 471, which has been identified as a potential candidate for grade separation in order to minimize the public safety risk associated with the at-grade crossings. According to FRA data, one accident occurred at the FM 471 crossing from 2002 through 2006.

A preliminary layout of the underpass is included in Appendix E. Additional environmental constraints mapping may be required for further analysis. Access to

FM 471 for adjacent properties and connecting roadways could be maintained via access roads alongside the identified underpass for potentially landlocked properties.

The grade separation of FM 471 is estimated to cost $7.7 million with an estimated public benefit of $1 million, which is 13 percent of the estimated cost of the grade separation.

Grade Separation of SH 173 on the Laredo Subdivision

SH 173 is currently a four-lane roadway that crosses the UP Laredo Subdivision in Medina County in the city of Devine. Approximately 10,200 daily vehicles cross the Laredo Subdivision on SH 173 and the roadway has been identified as a potential candidate for a grade separation in order to minimize the public safety risk associated with the at-grade crossing.

A preliminary layout of the proposed underpass is included in Appendix E. Additional constraints mapping may be required for further analysis. Access to SH 173 for adjacent properties would be eliminated along the identified underpass structure due to the lack of available right-of-way for access roads. Roadways currently connecting to SH 173 such as SH 132, Transportation Drive, and Fullerton Drive would bridge over the depressed lanes of the identified SH 173 underpass. Other roadways such as Sayers Drive, Upson Drive, and Rossville Road would need to be closed at the existing crossings with SH 173.

The grade separation of SH 173 is estimated to cost $13.3 million with an estimated public benefit of nearly $3 million, which is 22 percent of the estimated cost of the grade separation.

Grade Separation of Zarzamora St on the Laredo Subdivision

Zarzamora Street is currently a four-lane roadway that crosses the UP Laredo Subdivision in Bexar County just southwest of downtown San Antonio. Approximately 21,000 daily vehicles cross the Laredo Subdivision on Zarzamora Street and this roadway has been identified as a potential candidate for a grade separation in order to minimize the public safety risk associated with the at-grade crossing.

A preliminary layout of the underpass is included in Appendix E, while the environmental constraints and adjacent property land uses are identified in the Laredo Subdivision Constraints Map on sheet 18 of 19 located in Appendix F. The primary constraints located near the Zarzamora Street crossing consist of adjacent commercial and residential property. Access to Zarzamora Street for adjacent properties would be eliminated along the identified underpass structure due to the lack of available right-of-way for access roads. In order to maintain access to Zarzamora Street, Kirk Street and Frio City Road would need to be reconstructed as depressed lanes to connect with the identified underpass.

The grade separation of Zarzamora Street is estimated to cost $18.6 million with an estimated public benefit of nearly $37.4 million, which is over two times the estimated cost of the grade separation.

Crossing Closures

Crossing Closure of Benton and Somers Streets on the Laredo Subdivision

Benton and Somers Streets are each currently two-lane roadways that cross the railroad at-grade in Atascosa County in the city of Lytle. Approximately 300 vehicles cross the UP at both of these locations daily. The crossings should be considered for closure at the intersections with the UP Laredo Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E. Additional constraints mapping may be required for further analysis. Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted to the adjacent roadway to the west on Prairie Street to cross the railroad. Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closures are each estimated to cost $50,000; however, the public benefit could not be calculated for the closures of Benton and Somers Streets since traffic may be rerouted to another at-grade crossing.

Crossing Closure of Coker Street on the Laredo Subdivision

Coker Street is currently a two-lane roadway that crosses the railroad at-grade in Medina County in the city of Devine. Approximately 300 vehicles cross the UP at this location daily. The crossing should be considered for closure at the intersection with the UP Laredo Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E. Additional constraints mapping may be required for further analysis. Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted to the adjacent roadway to the south on Dilley Street to cross the railroad. Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closure is estimated to cost $50,000; however, the public benefit could not be calculated for the closure of Coker Street since traffic may be rerouted to another at-grade crossing.

Crossing Closure of College and Galbreath Streets on the Laredo Subdivision

College and Galbreath Streets are each currently two-lane roadways that cross the railroad at-grade in Medina County in the city of Devine. Approximately 400 vehicles and 300 vehicles cross the UP at College and Galbreath Streets daily. The crossings should be considered for closure at the intersections with the UP Laredo Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closures as well as the alternative route and associated distance are identified in Appendix E. Additional constraints mapping may be required for further analysis. Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted to Herring Street, which is located between the two potential closures, to cross the railroad. Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closures are each estimated to cost $50,000; however, the public benefit could not be calculated for the closures of College and Galbreath Streets since traffic may be rerouted to another at-grade crossing.

Crossing Closure of Drake Avenue on the Laredo Subdivision

Drake Avenue is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in San Antonio. Approximately 700 vehicles cross the UP at this location daily. The crossing should be considered for closure at the intersection with the UP Laredo Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Laredo Subdivision Constraints Map on sheet 18 of 19 located in Appendix F. Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted to the adjacent roadway to the north on Cumberland Street to cross the railroad. Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closure is estimated to cost $50,000; however, the public benefit could not be calculated for the closure of Drake Avenue since traffic may be rerouted to another at-grade crossing.

Crossing Closure of Frio and Medina Streets on the Laredo Subdivision

Frio and Medina Streets are each currently two-lane roadways that cross the railroad at-grade in Frio County in the city of Pearsall. Approximately 2,300 daily vehicles and 700 daily vehicles cross the UP at Frio and Medina Streets, respectively. The crossings should be considered for closure at the intersections with the UP Laredo

Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closures as well as the alternative route and associated distance are identified in Appendix E. Additional constraints mapping may be required for further analysis. Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted to cross the railroad on the adjacent street to the north on Comal Street, which is included as a potential grade separation in this study. Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closures of Frio and Medina Streets are each estimated to cost $50,000 with estimated public benefits of $650 thousand and $260 thousand, respectively.

Crossing Closure of Harriman Place on the Laredo Subdivision

Harriman Place is currently a two-lane roadway that crosses the railroad at-grade in Bexar County in San Antonio. Approximately 5,500 vehicles cross the UP at this location daily. The crossing should be considered for closure at the intersection with the UP Laredo Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative route and associated distance are identified in Appendix E, while the environmental constraints and adjacent property uses are identified in the Laredo Subdivision Constraints Map on sheet 18 of 30 located in Appendix F. Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted to adjacent roadways to the west on Zarzamora Street, which is included as a potential grade separation to cross the railroad. Right-of-way acquisition of the adjacent properties should not be required since no new construction is identified.

The crossing closure is estimated to cost $50,000 with an estimated public benefit of approximately $8.5 million.

Railroad Improvements

None of the following improvements have been constructed nor are under construction.

Improvement 8 - Construct a new Laredo Subdivision mainline track approximately 1.0 miles from SoSan Yard west to Heafer Junction

To provide further operational enhancements into and out of the south end of SoSan Yard, it is proposed to construct a second new mile long main line and switches on the Laredo Subdivision to Heafer Jct. This second track would begin at milepost 264.65 to milepost 265.78 at Heafer Jct. on the Laredo Subdivision.

Improvement 14 - Upgrade/extend Pearsall storage track (Laredo Sub.) to a 2.9 mile siding

Pearsall storage track, milepost 312.48 to milepost 313.10, is located on the west side of the Laredo Subdivision. Track upgrades and an increase of approximately 2.28 miles to the north in siding length are proposed. Pearsall is located approximately 50 miles southwest of San Antonio.

Lockhart Subdivision

The tracks of the Lockhart Subdivision were originally constructed in 1887 by the Taylor, Bastrop, and Houston Railway Company. The Subdivision is approximately 52 miles in total length between Smithville, Texas and San Marcos, Texas. The Lockhart is a single track mainline with limited sidings utilized primarily for westbound traffic, averaging between 10 and 20 trains daily. Potential improvements along the Lockhart Subdivision include four rail capacity enhancements as listed in Table 8-8 with their associated costs.

Lockhart Subdivision				
Rail Improvements	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit****	**Ratio: Benefit/Cost**
#16 - Install full CTC between Taylor, Smithville, and San Marcos	4	$ 21,670,000	NA	NA
#20 - Construct one new siding west of Lockhart	4	$ 5,040,000	NA	NA
#21 - Upgrades to Lockhart (curve modifications and line swings)	2	$ 10,080,000	NA	NA
#22 - Construct 3 new sidings between Lockhart and Smithville	4	$ 15,060,000	NA	NA
**No public benefits of individual rail improvements were identified.				
Class 2 Improvements (Mid-range Improvements)		$ 10,080,000	NA	NA
Class 4 Improvements (Long-term Improvements)		$ 41,770,000	NA	NA
Total Identified Improvements		$ 51,850,000	NA	NA

Table 8-8: Lockhart Subdivision Improvements

Railroad Improvements

None of the following improvements have been constructed nor are under construction.

Improvement 16 - Install full CTC between Taylor, Smithville, and San Marcos

To expedite train movements and increase capacity, it is proposed to upgrade to a full computerized train control (CTC) system on the Lockhart Subdivision between San Marcos milepost 51.90 and Smithville milepost 0.00 and on the Waco Subdivision between Taylor milepost 918.90 and Smithville milepost 969.40. Today, the Lockhart Subdivision track chart indicates track warrant control beginning in San

Marcos (milepost 51.90) to the interlocking signal at approximately milepost 40.50 where ABS begins. ABS continues to the interlocking signal at approximately milepost 34.40, and changes back to track warrant control to Smithville (milepost 0.0). The Waco Subdivision track chart indicates track warrant control beginning in Smithville (milepost 969.40) to the interlocking signal at approximately milepost 921.40 where ABS begins. ABS continues through Taylor to Birge at the San Antonio/Ft. Worth Division limit (milepost 918.80).

Improvement 20 - Construct one new siding west of Lockhart

There is an existing siding on the east side of the Lockhart Subdivision at Lockhart. It has milepost limits of 36.55 to 38.54, north to south towards Reedville. To expedite train movements and increase capacity, it is proposed to construct an additional siding, milepost 40.80 to 42.80 and approximately two miles long

Improvement 21 - Upgrades to Lockhart

Track upgrades are proposed for the Lockhart area, on the Lockhart Subdivision. Lockhart is located at approximately milepost 36.60 and the improvements would include curve modifications and line swings. These improvements would result in increased timetable speeds. Table 8-9 below identifies 11 milepost locations (unshaded) for the proposed improvements.

PROPOSED CURVE REDUCTIONS LOCKHART SUBDIVISION								
	Existing Curve			Proposed Curve				
Milepost	Degree	Central Angle	Length	Degree	Central Angle	Length	Change in Length (ft)	Maximum Shift (ft)
22.67	2	35.63	1782	1.4833	35.63	2402	621	50
23.50	4	52.98	1325	1.4833	52.98	3572	2247	285
23.95	2.07	15.45	746	1.4833	15.45	1042	295	10
24.80	2.45	20.67	844	1.4833	20.67	1394	550	25
25.75	2	12.55	628	1.4833	12.55	846	219	6
26.35	4	55.00	1375	1.4833	55.00	3708	2333	310
27.10	4	42.03	1051	1.4833	42.03	2834	1783	173
27.55	3	24.05	802	1.4833	24.05	1621	820	44
30.65	1.6722	40.67	2432	1.4833	40.67	2742	310	29
33.30	2.5	24.53	981	1.4833	24.53	1654	673	37
35.03	2.49	27.12	1089	1.4833	27.12	1828	739	45
35.30	4	63.65	1591	1.4833	63.65	4291	2700	430
35.95	4	30.00	750	1.4833	30.00	2023	1273	86
36.40	2	27.45	1373	1.4833	27.45	1851	478	29
36.85	2.99	23.05	771	1.4833	23.05	1554	783	40
44.65	2	30.03	1502	1.4833	30.03	2025	523	35
45.45	2	22.02	1101	1.4833	22.02	1485	384	19
50.70	3	25.07	836	1.4833	25.07	1690	854	48
51.15	2	17.01	851	1.4833	17.01	1147	296	11

Shaded cells indicate proposed curve reductions which results in either overlap of adjacent curves or inadequate tangent distance between adjacent curves

Table 8-9: Lockhart Subdivision Curves

Improvement 22 - Construct three new sidings between Lockhart and Smithville

Located on the Lockhart Subdivision between milepost 36.60 and 0.00, it is proposed to construct three passing sidings, milepost 1.90 to 3.90, milepost 18.4 to

20.3 and milepost 29.0 to 31.0, each approximately two miles long. This is intended as stand alone improvements to the Lockhart Subdivision.

Waco Subdivision

The tracks of the Waco Subdivision were originally constructed in 1887 by the Taylor, Bastrop & Houston Railway Company. The Subdivision runs between Smithville and Birge, Texas for a total length of approximately 51 miles. The Waco Subdivision is a single track mainline with numerous sidings utilized in a bidirectional manner, with trains dispatched to operate in both directions, averaging five trains weekly. Potential improvements along the Waco Subdivision include five rail capacity enhancements as listed in Table 8-10 with their associated costs.

Waco Subdivision				
Rail Improvements	**Improvement Classification Level**	**Estimated Cost**	**Estimated Public Benefit****	**Ratio: Benefit/Cost**
#23 - Construct 2 new sidings between Smithville and Phelan	4	$ 9,620,000	NA	NA
#24 - Upgrades to Phelan (curve modifications and line swings)	2	$ 4,170,000	NA	NA
#25 - Construct one new siding between Phelan and Elgin	2	$ 5,040,000	NA	NA
#26 - Upgrades to Elgin by Extending Siding (consider 12.3 mile line change)	4	$ 1,590,000	NA	NA
#27 - Construct one new siding between Elgin and Taylor	4	$ 5,040,000	NA	NA
**No public benefits of individual rail improvements were identified.				
Class 2 Improvements (Mid-range Improvements)		$ 9,210,000	NA	NA
Class 4 Improvements (Long-term Improvements)		$ 16,250,000	NA	NA
Total Identified Improvements		$ 25,460,000	NA	NA

Table 8-10: Waco Subdivision Improvements

Railroad Improvements

None of the following improvements have been constructed nor are under construction.

Improvement 23 - Construct 2 new sidings between Smithville and Phelan

Located on the Waco Subdivision, Smithville and Phelan are located at milepost 969.40 and 948.90, respectively. There is one existing siding in Phelan, running from milepost 949.98 to milepost 948.27, a distance of approximately 1.7 miles on the west side of the Waco Subdivision. To increase fluidity of train movements, it is proposed to construct two passing sidings located on the east side of the Waco Subdivision with milepost limits of 952.30 to 954.10 and 958.00 to 960.00. This improvement would allow for sufficient locations for train meets through the area.

Improvement 24 - Upgrades to Phelan

Track upgrades are proposed for the Phelan area on the Waco Subdivision. Phelan is located at approximately milepost 948.90. These upgrades include curve modifications and line swings. Table 8-11 below identifies the seven (7) mileposts locations (unshaded) for the proposed improvements. This information is based on simple curves and does not take spirals into consideration. It does, however, provide an approximate look at the magnitude of the track changes required for the curve reductions. As the size of the maximum track shift increases, so do the impacts to adjacent properties and the need for additional right of way.

PROPOSED CURVE REDUCTIONS WACO SUBDIVISION								
	Existing Curve			Proposed Curve				
Milepost	Degree of Curve	Central Angle	Length (FT)	Degree of Curve	Central Angle	Length (FT)	Change in Length (FT)	Maximum Centerline Shift (FT)
919.60	3	14.55	485	1.4833	14.55	981	496	16
920.30	3	49.68	1656	1.4833	49.68	3349	1693	199
921.00	4	25.42	636	1.4833	25.42	1714	1078	61
921.75	2	15.18	759	1.4833	15.18	1023	264	9
927.50	3	38.17	1272	1.4833	38.17	2573	1301	114
928.10	3	20.90	697	1.4833	20.90	1409	712	33
941.60	3	16.00	533	1.4833	16.00	1079	545	19
942.20	4	58.78	1470	1.4833	58.78	3963	2493	359
943.00	4	49.52	1238	1.4833	49.52	3339	2101	246
943.45	3	50.33	1678	1.4833	50.33	3393	1715	205

Shaded cells indicate proposed curve reductions which results in either overlap of adjacent curves or inadequate tangent distance between adjacent curves

Table 8-11: Waco Subdivision Curves

Improvement 25 - Construct 1 new siding between Phelan and Elgin

Located on the Waco Subdivision, Phelan and Elgin are located at milepost 948.90 and 936.40, respectively. The existing Phelan and Elgin sidings have milepost limits of 948.27 to 949.98 and 935.62 to 936.92, respectively. It is proposed to construct an additional passing siding approximately two miles long between milepost 940.60 and 942.60 on the east side of the Waco Subdivision to allow for train meets.

Improvement 26 - Upgrades to Elgin by Extending Siding

Located at milepost 936.40 on the Waco Subdivision, track upgrades are proposed to expedite train movements. It is proposed to extend the existing Elgin siding approximately 0.70 mile to the south to create a 2 mile siding. Future consideration would be given to a new 12.3 mile line change around the west side of Elgin.

Improvement 27 - Construct 1 new siding between Elgin and Taylor.

There is an existing siding in Elgin milepost 935.62 to 936.92 on the west side of the Waco Subdivision. It is proposed to construct a second siding in Taylor, milepost 926.00 to 928.00, also on the west side. This second siding will allow additional fluidity for train movements, specifically for train meets.

Possible San Antonio Bypass

While a precise location of a possible San Antonio bypass has not been identified, conceptual alternatives have been developed in order to obtain order of magnitude estimates for mileage, necessary bridge structures, and roadway-rail crossing grade separations. While every roadway that may cross the possible bypass was not evaluated, 14 roadways and two rail crossings were analyzed that may warrant consideration for grade separation in the event that a San Antonio bypass is constructed. This analysis was conceptual in nature and did not include detailed cost estimates. The cost estimates shown in Table 8-12 are order of magnitude estimates based on the number of lanes of the roadway and the general level of complexity of the crossing. Brief descriptions as well as conceptual layouts for six of the grade separations are included in the following section and Appendix E.

Street Name	City Name	AADT	Estimated Cost	20-Year Benefit (2007 dollars)	Benfit/ Cost Ratio
Laredo Subdivision Rail Crossing	San Antonio	n/a	$8,000,000	$0	0.00
IH 35 (Mainlanes and frontage roads)	San Antonio	44,500	$16,000,000	$37,390,000	2.34
FM 2790 (Somerset Road)	San Antonio	5,200	$8,000,000	$2,890,000	0.36
SH 16	San Antonio	19,400	$8,000,000	$10,980,000	1.37
Corpus Christi Sub Rail Crossing	San Antonio	n/a	$8,000,000	$0	0.00
US HWY 281	Cassin	14,000	$12,000,000	$6,790,000	0.57
IH 37 (Mainlanes and frontage roads)	Buena Vista	49,000	$16,000,000	$38,440,000	2.40
Loop 1604	Buena Vista	5,000	$8,000,000	$2,860,000	0.36
US HWY 181	Saspamco	18,400	$12,000,000	$8,720,000	0.73
FM 3432 (Sulphur Springs Road)	La Vernia	3,300	$8,000,000	$1,650,000	0.21
US HWY 87	Adkins	10,500	$12,000,000	$4,600,000	0.38
FM 1346	St. Hedwig	1,900	$5,000,000	$990,000	0.20
IH 10 (Mainlanes and frontage roads)	Santa Clara	36,500	$16,000,000	$22,730,000	1.42
FM 78	McQueeney	5,500	$8,000,000	$2,650,000	0.33
SH 46	McQueeney	13,900	$10,000,000	$6,270,000	0.63
SH 123	Geronimo	14,000	$8,000,000	$6,340,000	0.79
Total:			**$163,000,000**	**$153,300,000**	**0.94**

Table 8-12: Possible San Antonio Bypass Grade Separations

Grade Separations

Grade Separation of Possible San Antonio Bypass with Interstate 35 and the Laredo Subdivision

The possible San Antonio bypass would cross both I-35 and the Laredo Subdivision in Bexar County southwest from the city of San Antonio. This segment of the possible San Antonio bypass has been identified as a potential candidate for grade separation.

A preliminary layout of an elevated structure for the possible San Antonio bypass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the San Antonio bypass Constraints Map on sheets 2 and 3 of 63 located in Appendix F. The primary constraints located in the vicinity of the possible San Antonio bypass at the crossing with I-35 and the

Laredo Subdivision are adjacent parks, open areas, agricultural production land, and the 100-year floodplain. The location of the 100-year floodplain may require additional drainage design considerations for this grade separation. Acquisition of right of way along the possible San Antonio Bypass alignment may be required.

Grade Separation of Possible San Antonio Bypass with Texas 16

The possible San Antonio bypass would cross I-37 in Bexar County south of San Antonio. This segment of the San Antonio bypass has been identified as a potential candidate for grade separation.

A preliminary layout of an elevated structure for the possible San Antonio bypass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the San Antonio Bypass Constraints Map on sheets 6 and 7 of 63 located in Appendix F. The primary constraints located in the vicinity of the possible San Antonio bypass crossing with I-37 are adjacent agricultural production land and the 100-year floodplain. The location of the 100-year floodplain may require additional drainage design considerations for this grade separation. Applewhite Road east of SH 16 may be impacted by the possible track alignment. A new roadway reroute alongside the possible track alignment may be required to make Applewhite Road continuous and accessible for local properties. Acquisition of right of way along the possible San Antonio bypass alignment and Applewhite Road reroute may be required.

Grade Separation of Possible San Antonio Bypass with US 281

The possible San Antonio bypass would cross US 281 in Bexar County southeast of San Antonio. This segment of the San Antonio bypass has been identified as a potential candidate for grade separation.

A preliminary layout of an elevated structure for the possible San Antonio bypass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the San Antonio Bypass Constraints Map on sheets 11 thru 13 of 63 located in Appendix F. The primary constraints located in the vicinity of the possible San Antonio bypass crossing with I-37 are adjacent agricultural production land and the 100-year floodplain. The location of the 100-year floodplain may require additional drainage design considerations for this grade separation. Acquisition of right of way along the possible San Antonio Bypass alignment may be required.

Grade Separation of Possible San Antonio Bypass with Interstate 37

The possible San Antonio bypass would cross I-37 in Bexar County southeast from the city of San Antonio. This segment of the San Antonio bypass has been identified as a potential candidate for grade separation.

A preliminary layout of an elevated structure for the possible San Antonio bypass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the San Antonio Bypass Constraints

Map on sheet 16 of 63 located in Appendix F. The primary constraints located in the vicinity of the possible San Antonio bypass crossing with I-37 are adjacent parks, open areas, agricultural production land, and commercial properties. Liedecke Rd, west of I- 37, may also be impacted by the possible track alignment. A new roadway reroute alongside the possible track alignment may be required to make Liedecke Rd continuous and accessible for local properties. Acquisition of right of way along the possible San Antonio Bypass alignment and Liedecke Rd reroute may be required.

Grade Separation of Possible San Antonio Bypass with US 181

The possible San Antonio bypass would cross US 181 in Wilson County southeast of San Antonio. This segment of the San Antonio bypass has been identified as a potential candidate for grade separation.

A preliminary layout of an elevated structure for the possible San Antonio bypass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the San Antonio Bypass Constraints Map on sheets 24 and 25 of 63 located in Appendix F. The primary constraints located in the vicinity of the possible San Antonio bypass crossing with I- 37 are adjacent parks, open areas, agricultural production land, and the 100-year floodplain. The location of the 100-year floodplain may require additional drainage design considerations for this grade separation. Stuart Road/CR 350 and Tower Road, east of US 181, may be impacted by the possible track alignment. A new roadway reroute alongside the possible track alignment may be required to make these roadways continuous and accessible for local properties. Acquisition of right of way along the possible San Antonio bypass alignment and new roadway reroute may be required.

Grade Separation of Possible San Antonio Bypass with Interstate 10/US 90

The possible San Antonio bypass would cross I-10/US 90 in Guadalupe County southwest from the city of Seguin. This segment of the San Antonio bypass has been identified as a potential candidate for grade separation.

A preliminary layout of an elevated structure for the possible San Antonio bypass is included in the figures in Appendix E, while the environmental constraints and adjacent property land uses are identified in the San Antonio Bypass Constraints Map on sheets 42 and 43 of 63 located in Appendix F. Caffey Road south of I-10/US 90, and Bolton Road, north of I-10/US 90, may be impacted by the possible track alignment. New roadway reroutes alongside the possible track alignment may be required to make the two roadways continuous and accessible for local properties. Acquisition of right of way along the possible San Antonio Bypass alignment and new roadway reroutes may be required.

SECTION 9: AUSTIN DISTRICT

Existing UP Austin Subdivision

The Austin Subdivision originates in Hearne, Texas and passes through Taylor, Georgetown, Round Rock, Austin, San Marcos, and New Braunfels before it terminates in San Antonio just south of the Bexar County Jail. The rail line continues southward to Laredo, and becomes the Laredo Subdivision. The Laredo Subdivision segment services the Toyota Facility via SoSan Yard and the Corpus Christi Subdivision. The Austin Subdivision is approximately 171 miles in total length and is predominately a single track line with sidings; although, double track segments exist from San Marcos to Craig Junction (near Garden Ridge, Texas) for a distance of approximately 27 miles.

Northeast of San Antonio near Craig Junction, the two mainlines separate into different subdivisions (ML 1 and ML 2). ML 1 is the former Missouri Pacific Railroad track that continues toward San Antonio from Austin, while ML 2 is the former Missouri-Kansas-Texas Railroad alignment that continues toward San Antonio from Smithville via Lockhart and San Marcos. Trains operate in both directions on the Austin Subdivision, averaging between 15 and 40 trains daily, depending upon location.

This section centers on an analysis of the existing UP Austin Subdivision identifying roadway/rail grade crossing impacts and alternatives, along with the feasibility associated with potential infrastructure improvements, for grade separations and crossing closures, within the TxDOT Austin and San Antonio Districts. The analysis also includes defining the existing rail infrastructure's physical characteristics and identifying current rail operations such as average daily train counts and average trains speeds on the railroad.

Freight Rail Operations

The existing freight rail operations on the UP Austin Subdivision between Hearne and San Antonio were modeled in RTC in what is referred to as the base case scenario, which also includes the other existing rail lines between Hearne and San Antonio such as the Waco, Giddings, Lockhart, Glidden, Del Rio, and Laredo Subdivisions.

Figure 9-1 shows the rail lines as they appear on the RTC computer screen. The RTC diagram "folds" the lines internally to make best use of the computer screen space. Mainline, siding, yard, and selected industrial tracks were coded into RTC with attributes that impact train operations, including allowable operating speed, distance, grade, switch type, and other features.

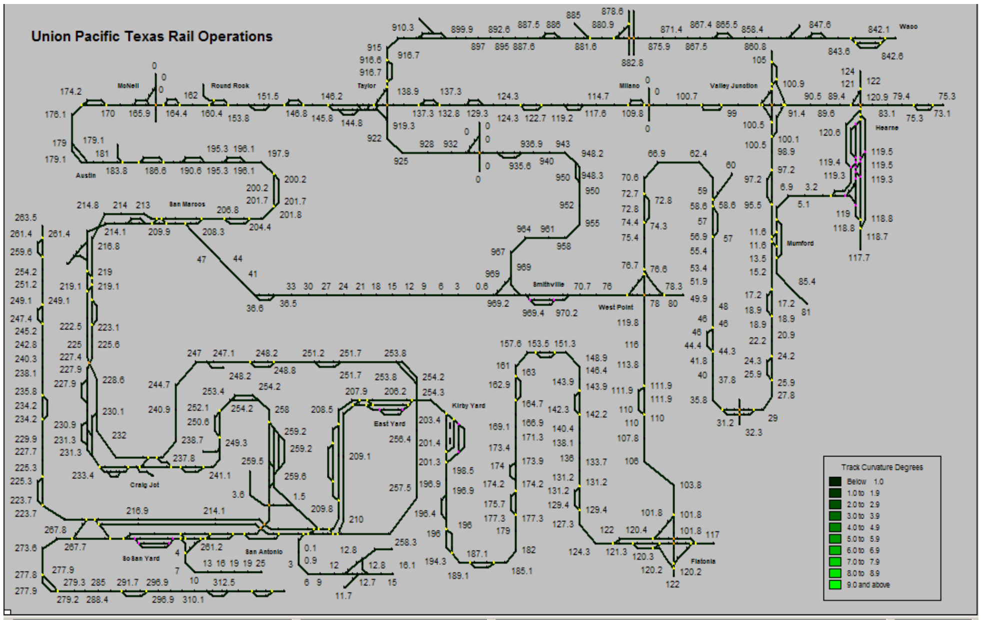


Figure 9-1: RTC Base Case Network

The RTC simulation model produces summary data including the following performance measures for each of three groups of trains (passenger, expedited freight, and other freight):

- Train Count - provides the train volume over a specified time period
- Average Speed - includes dwell time at stations, yards, and en-route work locations
- Meet-Pass Delay Percentage - represents the percentage of delay time incurred by trains to meet and pass on a single track
- Delay Minutes per 100 Train Miles - assesses total delay to all trains for all reasons

The base case was simulated for a four-week period for the railroad subdivisions within the study area and included an average of 103 trains per day operating throughout the entire network. Summary simulation results are shown in Table 9-1.

RTC Performance Measure	Base Case Results
Trains Operated (28 days)	2,891
Train Miles (28 Days)	359,028
Total Run Time Hours (Avg. Daily Hours)	496.2
Delay Time Hours (Avg. Daily Hours)	86.6
Delay Percentage	17.50%
Delay Minutes/100 Train Miles	40.52
Average Speed	25.8
Fuel (gallons)	2,956,784
Gallons/Train Mile	8.2

Table 9-1: RTC Performance Measure Results for Base Case Scenario

Existing rail traffic on the Austin Subdivision between San Marcos and Valley Junction (near Hearne) is heaviest in the north and eastbound directions. The Austin Subdivision is typically the preferred route for northbound freight from San Antonio. Many of the trains headed south and westbound from Hearne use the Giddings, Smithville, and Lockhart Subdivisions between Valley Junction and San Marcos, or the Giddings, Glidden, and Del Rio Subdivisions from Valley Junction and San Antonio. These directional flows help minimize meets between trains on each route, and inherently allow for additional line capacity. Daily trains, including through-freight, passenger, and local service trains on the Austin Subdivision as well as average train speed and length, by segment, are shown in Table 9-2.

Location	Daily Trains	Avg. Speed (mph)	Avg. Length (feet)
East of Taylor	23	34	5269
Taylor to Round Rock	30	20	4785
Round Rock to San Marcos	27	22	5174
San Marcos to Craig Jct, ML 1	36	27	5184
San Marcos to Craig Jct, ML 2	38	8	5856
Craig Junction to San Antonio, ML 1	27	18	4999
Craig Junction to San Antonio, ML 2	10	28	6794

Table 9-2: Daily Train Counts (including through-freight, passenger, and local service trains) on the Austin Subdivision

While the majority of the traffic on the Austin Subdivision is comprised of through-freight trains, which may potentially be rerouted to a possible bypass route, there are also passenger and local service trains that use the subdivision. The segment from Taylor to Round Rock serves two daily Amtrak trains, two daily manifest trains (to and from Corbyn), and local traffic comprised of local service trains, rock trains, a few engines moving between Taylor and Round Rock or McNeil, and an occasional coal train that has local stops between Taylor and Adams. The segment from Round Rock to Austin also has local service trains that include the daily Amtrak and manifest trains, occasional coal trains, and a daily local train that operates from Taylor to Austin. The segment from Austin to San Marcos is used by the daily Amtrak and manifest trains, occasional coal trains, and a local train that operates between New Braunfels and Buda.

The Austin Subdivision between San Marcos and Hunter serves daily Amtrak and manifest trains, occasional coal trains, a local train to Buda, and rock trains to and from Hunter. The rock trains, which now operate north through Austin, may be diverted at San Marcos to use the possible bypass route. Between Hunter and New Braunfels the local traffic includes Amtrak and manifest trains, occasional coal trains, a local train to Buda, an additional local train working between New Braunfels and Hunter, and a few rock trains between West Point and Ogden/Dittlinger.

Local traffic between New Braunfels and Ogden will be similar to that north of New Braunfels, with an additional local train that works between New Braunfels and

Corbyn/Dittlinger/Ogden. Lastly, local traffic south of Ogden Junction/Craig Junction is split between the two Austin Subdivision mainline tracks. Local traffic includes additional rock trains and local trains that operate between the Dittlinger area and San Antonio. The daily Amtrak trains can use either track, and some rock trains will be able to use either track as well.

Along with daily train counts, the RTC model calculates fuel consumption based on the specific operation of each train over the network, and totals the fuel usage for all trains run during the simulation. During the simulation, the total fuel consumption for all trains on the Austin Subdivision between Hearne and San Antonio was reported as shown in Table 9-3.

	Gallons	Train Miles	Miles	Gallons per Mile
Austin Sub	2,639,917	328,632	171.7	8.03

Table 9-3: Average Fuel Consumption Statistics for the Austin Subdivision

As shown in Table 9-2, the average speed over the Austin Subdivision between Hearne and San Antonio ranges from 20 to 34 miles per hour. The maximum allowable speeds along the subdivision with the theoretical run times of the trains are shown in Table 9-4 for the existing Austin Subdivision between milepost 143.12 (east of Taylor) and milepost 260.40 (Tower 105 in San Antonio). A 50 mile per hour maximum train speed was used to calculate the theoretical trip times.

Timetable Speed Restrictions								
MP	MP	DISTANCE	SPEED (MPH)			TIME (SEC)		
From	To	(Miles)	PSGR	FREIGHT	Max	PSGR	FREIGHT	Max
144.3	144.9	0.6	15	15	15	144	144	144
145.9	146.7	0.8	40	40	40	72	72	72
146.7	147.7	1	60	45	45	60	80	80
160.0	161.8	1.8	60	60	50	108	108	130
165.9	166.0	0.1	25	25	25	14	14	14
166.9	171.0	4.1	60	60	50	246	246	295
171.0	174.3	3.3	60	35	35	198	339	339
174.3	178.2	3.9	50	35	35	281	401	401
178.2	179.6	1.4	40	35	35	126	144	144
179.6	179.8	0.2	15	15	15	48	48	48
179.8	186.1	6.3	35	35	35	648	648	648
190.5	192.0	1.5	60	55	50	90	98	108
192.0	195.0	3	65	60	50	166	180	216
201.6	203.2	1.6	55	50	50	105	115	115
205.3	207.6	2.3	55	50	50	151	166	166
207.6	211.1	3.5	30	30	30	420	420	420
224.5	229.2	4.7	30	30	30	564	564	564
229.2	232.0	2.8	60	50	50	168	202	202
232.0	235.6	3.6	60	60	50	216	216	259
240.3	240.7	0.4	60	60	50	24	24	29
242.8	244.3	1.5	60	60	50	90	90	108
247.4	248.6	1.2	60	60	50	72	72	86
248.6	256.1	7.5	45	45	45	600	600	600
256.1	257.4	1.3	40	40	40	117	117	117
257.4	258.5	1.1	30	30	30	132	132	132
258.5	260.4	1.9	20	20	20	342	342	342
Maximum Unrestricted Subdivision Speed								
142.1	260.4	56.9	70	60.0	50.0	2925	3413	4095
TOTAL TIME (MINUTES)						**135.4**	**149.9**	**164.6**

Table 9-4: Austin Subdivision Timetable Speeds and Theoretical Run Times
(based on a 50 mph maximum train speed)

Highway/ Rail Grade Crossing Impacts Analysis

Potential improvements along the Austin Subdivision within the Austin District's Williamson, Travis, and Hays Counties, include grade separations and crossing closures as listed in Tables 9-5 and 9-6 and are described in the following section.

Street Name	City Name	AADT	Accidents (2002-2006)	Estimated Cost	20-Year Benefit (2007 dollars)	Benfit/ Cost Ratio
AQUARENA SPRINGS/ LOOP 82 and POST ROAD	SAN MARCOS	20,400	0	$14,800,000	$14,180,000	0.96
BANISTER LANE	AUSTIN	4,800	0	$6,600,000	$2,790,000	0.42
BUGG LANE	SAN MARCOS	8,400	0	$6,100,000	$8,800,000	1.44
BURNET STREET	ROUND ROCK	6,900	0	$14,300,000	$5,490,000	0.38
CENTER STREET/ FM 150	KYLE	5,000	0	$5,200,000	$3,370,000	0.65
CM ALLEN PKWY and SH 12	SAN MARCOS	37,900	0	$22,200,000	$41,620,000	1.87
DITTMAR ROAD	AUSTIN	20,400	0	$5,000,000	$20,980,000	4.20
DUVAL ROAD	AUSTIN	17,700	0	$11,200,000	$12,530,000	1.12
FM 1626	MANCHACA	14,700	0	$5,900,000	$12,470,000	2.11
FM 1660	HUTTO	4,600	2	$12,200,000	$5,170,000	0.42
FM 685	HUTTO	12,200	1	$13,500,000	$10,230,000	0.76
GUADALUPE STREET/LOOP 82	SAN MARCOS	17,900	0	$6,500,000	$25,220,000	3.88
IH 35 NB and SB FRONTAGE ROADS	ROUND ROCK	49,800	1	$22,300,000	$51,870,000	2.33
KOHLERS XING/ CR 171	KYLE	7,200	0	$5,000,000	$5,160,000	1.03
LBJ DRIVE	SAN MARCOS	16,500	0	$7,000,000	$22,080,000	3.15
MATTHEWS LANE	AUSTIN	5,700	1	$11,600,000	$4,480,000	0.39
NORTH MAIN ST./LOOP 4	BUDA	13,300	0	$6,400,000	$10,730,000	1.68
OLTORF STREET	AUSTIN	16,800	0	$12,300,000	$11,790,000	0.96
QUICK HILL ROAD (CR 172)	ROUND ROCK	11,400	1	$14,300,000	$9,290,000	0.65
RED BUD LANE	ROUND ROCK	6,200	0	$14,000,000	$4,750,000	0.34
SOUTH MAIN ST/LOOP 4	BUDA	13,400	0	$5,200,000	$10,910,000	2.10
STASSNEY LANE	AUSTIN	25,000	0	$8,200,000	$19,590,000	2.39
WONDER WORLD DRIVE	SAN MARCOS	13,900	0	$8,200,000	$17,380,000	2.12
TOTAL:				$238,000,000	$331,780,000	1.39

Table 9-5: Potential Grade Separations

Street Name	City Name	AADT	Accidents (2002-2006)	Estimated Cost	20-Year Benefit (2007 dollars)	Benfit/ Cost Ratio
PEACH STREET	BUDA	600	0	$50,000	$260,000	5.20
JIM CAGE RD/ FM 1660	HUTTO	600	0	$50,000	$330,000	6.60
MARY STREET	AUSTIN	3,900	0	$50,000	$2,530,000	50.60
SLOAN STREET	TAYLOR	600	0	$50,000	$270,000	5.40
TOTAL:				$200,000	$3,390,000	16.95

Table 9-6: Potential Crossing Closures

The study team analyzed at-grade crossings in the region and evaluated the crossings based on roadway and rail alignments, vehicular and train traffic counts, and crossing accident information. Every crossing in the region has not been evaluated; rather the analysis of grade crossings was limited to those locations which the traffic data analysis (average traffic volumes of vehicles and trains) and RTC modeling results warranted further review. The identification of grade separations or closures should not be misconstrued as a final listing, but rather as a list of improvements, which may ultimately require additional analysis and additions as well.

Grade separations consist of roadway overpasses and underpasses that separate vehicular traffic from rail traffic, minimizing the safety exposure and noise associated with the roadway/rail interface. The roadways identified as potential grade separations are listed in Table 9-5 with associated average annual daily traffic volumes (AADT), average daily train volumes, number of crossing accidents within the past five years, estimated public benefits over a 20-year period, estimated costs, and benefit/cost ratios.

Crossing closures minimize the safety hazards associated with the vehicle/train interface by closing a roadway at the point where the roadway traverses the railroad. A crossing closure would require an alternate route for vehicular through-traffic. The crossing closures are listed with calculated associated public benefits that result from redirecting traffic to a grade separated structure. The roadways identified as potential closures are listed in Table 9-6 with associated AADT's, number of crossing accidents within the past five years, estimated public benefits, estimated costs, and benefit/cost ratios.

Each identified improvement was analyzed with respect to existing conditions, estimated implementation costs, and associated estimated public and private benefits. The existing conditions identified for the locations of potential improvements include descriptions of adjacent property land use and estimated value, environmental constraints, traffic flow volumes for both vehicular and rail traffic, and traffic accident statistics for the crossing.

The estimated implementation costs for each improvement are order of magnitude costs based on preliminary planning. The costs included in this study represent an estimate of probable costs prepared in good faith and with reasonable care. The Study Team has no control over the costs of construction labor, materials, or equipment, nor over competitive bidding or negotiating methods and does not make any commitment or assume any duty to assure that bids or negotiated prices will not vary from these estimates. The costs are subject to inflation, and in some cases will be calculated using county appraisal district values for right-of-way acquisition, which may vary significantly from the actual cost of acquisition of property.

Anticipated public benefits include reductions in vehicular delay times at existing at-grade crossings, reductions in vehicle and locomotive fuel consumption, improvements in air quality, improvements in public safety, improvements in mobility for vehicular and freight traffic due to changes in train operations from improvements; reductions in noise and vibration from rerouting of trains; and improved freight mobility from more efficient routes. The estimated public benefits were determined by using a grade crossing impedance model as described in section 10. Existing at-grade crossings along the Austin Subdivision in Hays, Travis, and Williamson Counties are shown in Figure 9-2.

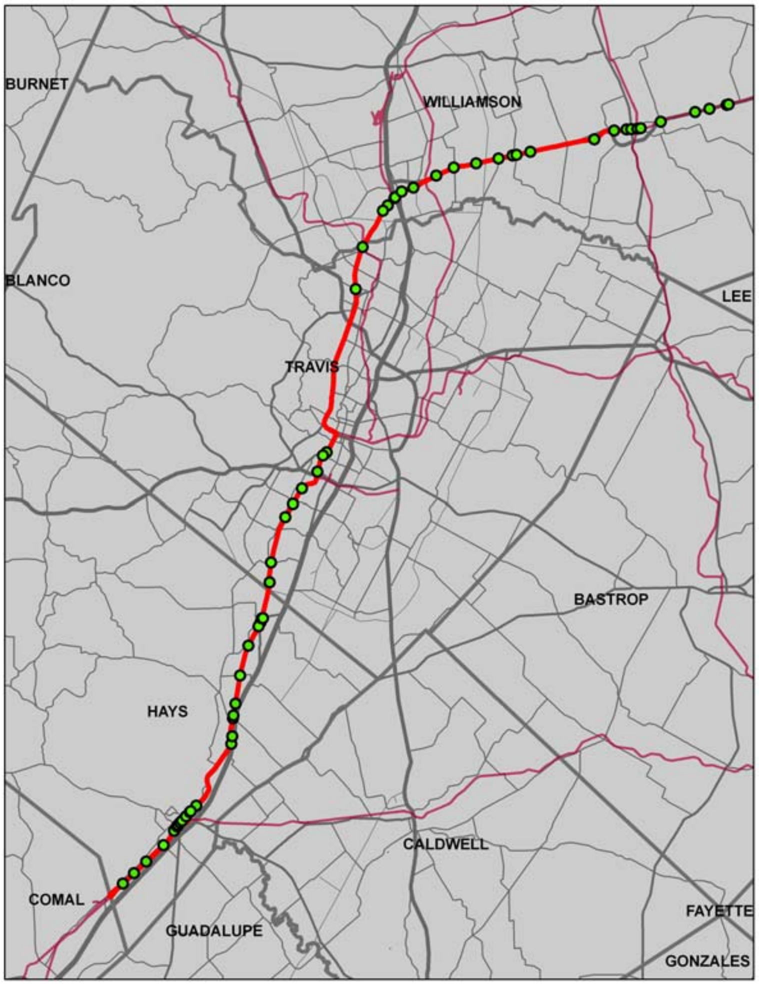


Figure 9-2: Public Grade Crossing Locations along the Austin Subdivision

The benefit of the grade separations and crossing closures identified in this section is a total of more than $335 million reduction in costs incurred at crossings along the Austin Subdivision (within the Austin District boundaries) over a 20 year period, which equates to a 90 percent reduction in costs.

The identified potential grade separations and crossing closures primarily provide benefit to the public in the form of reduced delays and improved safety, but also may provide a benefit to the railroads.

Potential benefits that may be realized by the railroads as a result of the identified improvements may include improvements in train operating efficiency (including reductions in train delays) that could result by increasing the number of locations where trains would be permitted to temporarily stop and not block existing highway/rail crossings, improvements in train run-times, as well as reductions in the railroads exposure to at-grade crossing accidents.

The grade separations and closures identified in this analysis are individually detailed in the following discussions, while a breakdown of the order of magnitude cost estimates and the estimated associated public benefits of the identified potential grade separations are included in Appendix C and Appendix G, respectively.

Grade Separations

Grade Separation of Loop 82 (Aquarena Springs Drive) and Post Road

Loop 82 is currently a four-lane road that crosses the UP Austin Subdivision in Hays County in the city of San Marcos. Post Road is currently a two-lane road that crosses the UP Austin Subdivision approximately 600 ft from the Loop 82 crossing of the rail line and intersects Loop 82 approximately 500 ft from the crossing. Loop 82, with approximately 11,400 vehicles crossing the railroad tracks daily and Post Road, with approximately 9,000 vehicles crossing the railroad tracks daily have been identified as potential candidates for grade separation. Due to the close proximity of the two crossings and the intersection of the two roadways, the potential four-lane and two-lane roadway overpasses would have to be constructed in conjunction with one another to separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of Loop 82 and Post Road consist of adjacent commercial property, residential property, agricultural property, the Texas State University football stadium and the Texas State University golf course. Access to adjacent properties could be maintained via access roads alongside Loop 82 and Post Road. The intersection of Loop 82 and Post Road would be maintained on the east side of the rail line. An at-grade intersection, with a u-turn, would be provided beneath the overpass on the west side of the rail line to provide access to Laurel Ridge Road from Loop 82 and Post Road.

The grade separation of Loop 82 and Post Road is estimated to cost $14.8 million. The estimated public benefit calculated for the grade separation of Loop 82 and Post Road is approximately $14.2 million, which is approximately 96 percent of the estimated cost of the grade separations.

Grade Separation of Banister Lane

Banister Lane is currently a two-lane road that crosses the UP Austin Subdivision in Travis County in the city of Austin. This roadway, with approximately 4,800 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of Banister Lane consist of adjacent commercial and residential property. Access to adjacent properties could be maintained via access roads alongside Banister Lane along with at-grade u-turns located beneath the overpass on each side of the railroad.

The grade separation of Banister Lane is estimated to cost $6.6 million. The estimated public benefit calculated for the grade separation of Banister Lane is approximately $2.8 million, which is approximately 42 percent of the estimated cost of the grade separation.

Grade Separation of Bugg Lane (Bobcat Drive/Charles Austin Drive)

Bugg Lane is currently a two-lane road that crosses the UP Austin Subdivision in Hays County in the city of San Marcos. This roadway, with approximately 8,400 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of Bugg Lane consist of adjacent commercial and Texas State University property. Some access to adjacent properties could be maintained via access roads alongside Bugg Lane; however, there may be some impact to buildings at the adjacent Riverside Apartments. Additionally, parking along the road may be eliminated. At-grade u-turns could be located beneath the overpass on each side of the railroad to provide access to adjacent properties.

The grade separation of Bugg Lane is estimated to cost $6.1 million. The estimated public benefit calculated for the grade separation of Bugg Lane is approximately $8.8 million, which is approximately 44 percent greater than the estimated cost of the grade separation.

Grade Separation of Burnet Street

Burnet Street is currently a two-lane roadway where it crosses the UP Austin Subdivision in Williamson County in the city of Round Rock. This roadway, with approximately 6,900 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of Burnet Road consist of adjacent residential and commercial property. Access to adjacent properties south of the railroad could be maintained via access roads alongside Burnet Road along with an at-grade u-turn located beneath the overpass on the south side of the railroad. Access to properties directly adjacent to the identified overpass structure north of the railroad would be eliminated, and the cost of such properties was included in the cost estimate for the grade separation.

The grade separation of Burnet Road is estimated to cost $14.3 million. The estimated public benefit calculated for the grade separation of Burnet Road is approximately $5.5 million, which is approximately 38 percent of the estimated cost of the grade separation.

Grade Separation of FM 150 (Center Street)

FM 150 is currently a four-lane road that crosses the UP Austin Subdivision in Hays County in the city of Kyle. This roadway, with approximately 5,000 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of FM 150 consist of adjacent commercial property. Access to adjacent properties could be maintained via existing side streets and drives. North Front Street and the I-35 frontage road would remain open beneath the overpass. North Main Street would be closed with a turnaround area provided on each side of FM 150.

The grade separation of FM 150 is estimated to cost $5.2 million. The estimated public benefit calculated for the grade separation of FM 150 is approximately $3.4 million, which is approximately 65 percent of the estimated cost of the grade separation.

Grade Separation of CM Allen Pkwy and SH 12

CM Allen Parkway is currently a four-lane road that crosses the UP Austin Subdivision (MLs 1 and 2) in Hays County in the city of San Marcos. SH 12 is currently a four-lane road that crosses the UP Austin Subdivision (MLs 1 and 2) as well as the UP Lockhart Subdivision approximately 900 ft from the CM Allen Parkway crossing of the Austin Subdivision ML 1 and intersects CM Allen approximately 800 ft from the crossing. CM Allen Pkwy, with approximately 13,700 vehicles crossing the railroad tracks daily and SH 12, with approximately 24,200 vehicles crossing the railroad tracks daily have been identified as potential candidates for grade separation. Due to the close proximity of the two crossings and the intersection of the two roadways, the potential four-lane roadway overpasses would have to be constructed in conjunction with one another to separate vehicular traffic from the UP Austin and Lockhart Subdivisions.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of CM Allen and SH 12 consist of adjacent commercial property west of Austin Subdivision ML 1 and east of Austin Subdivision ML 2 as well as a public library, activity/recreation center, and San Marcos City Hall located in between the two Austin Subdivision mainlines. Access to properties in between the two Austin Subdivision Mainlines, including the City Hall, could be maintained via access roads alongside SH 12 that cross beneath the overpass and provide access to Bugg Lane; however, access to SH 12 would be eliminated for such properties due to the location of the identified overpass structure. Connectivity between CM Allen and SH 12 would be maintained, although the intersection would no longer be at-grade. However, access to SH 12 east of Austin Subdivision ML 2 and the Lockhart Subdivision from Thorpe Lane, Long Street, and Cheatham Street would be eliminated due to the location of the identified overpass structure, and such traffic would need to be rerouted to other roadways.

The grade separation of CM Allen and SH 12 is estimated to cost $14 million with an estimated public benefit of approximately $41.6 million, which is 87 percent greater than the estimated cost of the grade separations.

Grade Separation of Dittmar Road

Dittmar Road is currently a two-lane roadway that crosses the UP Austin Subdivision in Travis County in the city of Austin. This roadway, with approximately 20,400 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of Dittmar Road consist of adjacent residential property; however, since the adjacent properties do not directly access Dittmar Road at the location of the identified overpass, access to adjacent properties should not be impacted.

The grade separation of Dittmar Road is estimated to cost $5 million. The estimated public benefit calculated for the grade separation of Dittmar Road is approximately $21 million, which is more than four times the estimated cost of the grade separation.

Grade Separation of Duval Road

Duval Road is currently a four-lane roadway that crosses the UP Austin Subdivision in Travis County in the city of Austin. This roadway, with approximately 17,700 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential four-lane roadway underpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of Duval Road consist of adjacent residential property, including single family homes as well and multi family residences such as apartment homes. Access to adjacent properties east of the railroad could be maintained via access roads alongside Duval Road along with an at-grade u-turn located above the underpass on the east side of the railroad. Access to properties directly adjacent to the identified underpass structure west of the railroad would be eliminated, and the cost of such properties was included in the cost estimate for the grade separation.

The grade separation of Duval Road is estimated to cost $11.2 million. The estimated public benefit calculated for the grade separation of Duval Road is approximately $12.5 million, which is approximately 12 percent greater than the estimated cost of the grade separation.

Grade Separation of FM 1626

FM 1626 is currently a two-lane roadway that crosses the UP Austin Subdivision in Travis County in the city of Manchaca. This roadway, with approximately 14,700 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of FM 1626 consist of adjacent commercial and residential property. Access to adjacent properties could be maintained via access roads alongside FM 1626 along with at-grade u-turns located beneath the overpass on each side of the railroad.

The grade separation of FM 1626 is estimated to cost $5.9 million. The estimated public benefit calculated for the grade separation of FM 1626 is approximately $12.5 million, which is more than two times the estimated cost of the grade separation.

Grade Separation of FM 1660

FM 1660 is currently a two-lane roadway that crosses the UP Austin Subdivision in Williamson County in the city of Hutto. This roadway, with approximately 4,600 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision. Due to the proximity of the intersection between FM 1660 and US 79 to the railroad, the mainlanes of US 79 would need to be elevated to meet the FM 1660 overpass in order to maintain connectivity between the roadways.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of FM 1660 consist of adjacent commercial, industrial and residential (single family and multi-family) properties. Access to adjacent properties along FM 1660 south of the railroad would be would be eliminated; however, such properties would maintain access to other adjacent roadways as alternate routes. Access to adjacent properties along the identified lanes of US 79 would be eliminated and were accounted for in the cost estimate for the grade separation. The construction of access roads alongside the overpass may not be justified in order to maintain adjacent property access due to right-of-way constraints that would require the construction of such access roads within the boundaries of adjacent properties. The identified overpass would require the closure of Park Avenue at the intersection with US 79, resulting in the alternate routing of traffic to Jim Cage Road to access US 79.

The grade separation of FM 1660 is estimated to cost $12.2 million. The estimated public benefit calculated for the grade separation of FM 1660 is approximately $5.2 million, which is approximately 42 percent of the estimated cost of the grade separation.

Grade Separation of FM 685

FM 685 is currently a four-lane roadway that crosses the UP Austin Subdivision in Williamson County in the city of Hutto. This roadway, with approximately 12,200 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Austin Subdivision and would create a grade separated intersection with US 79. While the mainlanes of US 79 would remain at-grade, entrance and exit ramp lanes could be elevated to meet the elevated lanes of FM 685 in order to minimize impacts to through-traffic on US 79.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of FM 685 consist of adjacent industrial properties well as Hutto High School. Access to adjacent properties along FM 685 north of the railroad could be maintained via access roads alongside the grade separation that would provide access at locations beyond the extent of the elevated lanes/ramp, where the existing lanes will remain at-grade. There are no properties currently accessing FM 685 south of the railroad along the identified overpass. Access to adjacent properties along the elevated entrance and exit ramps on US 79 should not be impacted significantly by the identified grade separation.

The grade separation of FM 685 is estimated to cost $13.5 million. The estimated public benefit calculated for the grade separation of FM 685 is approximately $10.2 million, which is approximately 76 percent of the estimated cost of the grade separation.

Grade Separation of Guadalupe Street

Guadalupe Street is currently a two-lane roadway south of the railroad that widens into a three-lane roadway north of the railroad that crosses the UP Austin Subdivision in Hays County in the city of San Marcos. This roadway, with approximately 17,900 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of Guadalupe Street consist of adjacent commercial and residential property. Access to adjacent properties could be maintained via access roads alongside Guadalupe Street along with at-grade u-turns located beneath the overpass on each side of the railroad.

The grade separation of Guadalupe Street is estimated to cost $6.5 million. The estimated public benefit calculated for the grade separation of Guadalupe Street is approximately $25.2 million, which is approximately 3.9 times the estimated cost of the grade separation.

Grade Separation of IH-35 Frontage Roads and McNeil Rd

The IH-35 frontage roads are currently three-lane roadways in each direction that cross the UP Austin Subdivision ML 1 in Williamson County northwest of downtown Austin. McNeil Road is a two-lane roadway in each direction that parallels the Austin Subdivision and crosses the IH-35 frontage roads as well as the Capital Metro owned Central Subdivision rail line. The frontage roads, with a combined 49,800 daily vehicles crossing the railroad tracks, have been identified as potential candidates for grade separation. The potential three-lane roadway underpass on each side of IH-35 would separate vehicular traffic from the Austin Subdivision. McNeil Road is also identified as a potential underpass structure to separate vehicular traffic from the Capital Metro Central Subdivision and join the IH-35 frontage roads for connectivity on the east-west direction.

A preliminary layout of the underpass is included in Appendix E, along with environmental constraints and adjacent property land uses. Constraints in the vicinity of the IH-35 frontage roads and McNeil Road crossings consist of adjacent commercial, industrial, and residential property. Access to adjacent properties could be maintained via access roads alongside the IH-35 frontage roads along with at-grade u-turns located beneath the existing IH-35 mainlanes overpass and above the identified potential underpass frontage lanes on each side of the railroad. Additional access roads on the northwest quadrant would be needed for vehicles to access the southbound IH-35 frontage road.

The grade separation of the IH-35 frontage roads and McNeil Road is estimated to cost $20.7 million with an estimated public benefit of $51.9 million, which is more than 2.3 times the estimated cost of the grade separation.

Grade Separation of Kohler's Crossing/ CR 171

County Road (CR) 171 is currently a two-lane roadway that crosses the UP Austin Subdivision in Hays County in the city of Kyle. This roadway, with approximately 7,200 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E. The property adjacent to the identified grade separation consists of agricultural land with no direct access or connecting roadways to CR 171 along the identified location of the overpass. As a result, access to adjacent properties should not be impacted by the grade separation, and since the overpass may be able to be constructed inside the existing right-of-way of the roadway, no additional right-of-way would need to be acquired.

The grade separation of CR 171 is estimated to cost $5 million. The estimated public benefit calculated for the grade separation of CR 171 is approximately $5.2 million, which is three percent greater than the estimated cost of the grade separation.

Grade Separation of LBJ Drive

LBJ Drive is currently a two-lane roadway south of the railroad that widens into a three-lane roadway north of the railroad that crosses the UP Austin Subdivision in Hays County in the city of San Marcos. This roadway, with approximately 16,500 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of LBJ Drive consist of adjacent commercial and residential property. Access to adjacent properties could be maintained via access roads alongside LBJ Drive along with at-grade u-turns located beneath the overpass on each side of the railroad.

The grade separation of LBJ Drive is estimated to cost $7 million. The estimated public benefit calculated for the grade separation of LBJ Drive is approximately $22.1 million, which is approximately 3.2 times the estimated cost of the grade separation.

Grade Separation of Matthews Lane

Matthews Lane is currently a two-lane roadway that crosses the UP Austin Subdivision in Travis County in the city of Austin. This roadway, with approximately 5,700 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway underpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the underpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of Matthews Lane consist of adjacent residential property. Access to adjacent properties east of the railroad could be maintained via access roads alongside Matthews Lane along with an at-grade u-turn located above the underpass on the east side of the railroad. Access to properties directly adjacent to the identified underpass structure west of the railroad would be eliminated, and the cost of such properties was included in the cost estimate for the grade separation.

The grade separation of Matthews Lane is estimated to cost $11.6 million. The estimated public benefit calculated for the grade separation of Matthews Lane is approximately $4.5 million, which is approximately 39 percent of the estimated cost of the grade separation.

Grade Separation of North Loop 4 (North Main Street)

North Loop 4 is currently a two-lane road that crosses the UP Austin Subdivision in Hays County in the city of Buda. This roadway, with approximately 13,300 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of North Loop 4 consist of adjacent commercial and residential property. Access to adjacent properties could be maintained via access roads alongside North Loop 4. An at-grade u-turn could be provided on the east side of the railroad with a roadway connecting the north side access road to Railroad Street beneath the overpass. A roadway connecting Garison Road to North Main Street could be provided underneath the overpass on the west side.

The grade separation of North Loop 4 is estimated to cost $6.4 million. The estimated public benefit calculated for the grade separation of North Loop 4 is approximately $10.7 million, which is approximately 68 percent greater than the estimated cost of the grade separation.

Grade Separation of South Loop 4 (South Main Street)

South Loop 4 is currently a two-lane road that crosses the UP Austin Subdivision in Hays County in the city of Buda. This roadway, with approximately 13,400 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of South Loop 4 consist of adjacent commercial, agricultural and residential property. Access to adjacent properties could be maintained via access roads alongside South Loop 4. An at-grade u-turn could be provided on the west side of South Loop 4. A roadway connecting the south access road of South Loop 4 could be provided underneath the overpass along with an at-grade u-turn.

The grade separation of South Loop 4 is estimated to cost $5.2 million. The estimated public benefit calculated for the grade separation of South Loop 4 is approximately $10.9 million, which is approximately 2.1 times the estimated cost of the grade separation.

Grade Separation of Oltorf Street

Oltorf Street is currently a four-lane road that crosses the UP Austin Subdivision in Travis County in the city of Austin. This roadway, with approximately 16,800 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of Oltorf Street consist of adjacent commercial, industrial and residential property. Access to adjacent properties could be maintained via access roads alongside Oltorf Street along with at-grade u-turns located beneath the overpass on each side of the railroad.

The grade separation of Oltorf Street is estimated to cost $12.3 million. The estimated public benefit calculated for the grade separation of Oltorf Street is approximately $11.8 million, which is approximately 96 percent of the estimated cost of the grade separation.

Grade Separation of Quick Hill Road/ CR 172

Quick Hill Road is currently a four-lane roadway that crosses the UP Austin Subdivision in Williamson County in the city of Round Rock. This roadway, with approximately 11,400 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of Quick Hill Road consist of adjacent commercial, residential, and industrial property as well as a school located a few blocks away. Access to adjacent properties along Quick Hill Road could be maintained via access roads alongside the grade separation along with an at-grade u-turn located beneath the overpass east of the railroad.

Due to the close proximity of the intersection between Quick Hill Road and McNeil Road to the railroad, the lanes of McNeil Road would also need to be elevated to meet the Quick Hill Road overpass lanes. The residential properties adjacent to McNeil Road along the identified grade separated lanes do not currently have direct access or any connecting roadways to McNeil Road. As a result, access to adjacent properties should not be impacted by the grade separation.

The grade separation of Quick Hill Road is estimated to cost $14.3 million. The estimated public benefit calculated for the grade separation of Quick Hill Road is approximately $9.3 million, which is approximately 65 percent of the estimated cost of the grade separation.

Grade Separation of Red Bud Lane

Red Bud Lane is currently a two-lane roadway that crosses the UP Austin Subdivision in Williamson County in the city of Round Rock. This roadway, with approximately 6,200 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision and would create a grade separated intersection with US 79. While the mainlanes of US 79 would remain at-grade, entrance and exit ramp lanes could be elevated to meet the elevated lanes of Red Bud Lane.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of Red Bud Lane consist of adjacent residential and commercial property, including a large retail store. Access to adjacent properties could be maintained via access roads alongside Stoney Point Road (a continuation of Red Bud Lane north of the railroad) along with an at-grade u-turn located beneath the overpass on the north side of the railroad. There are minimal properties currently accessing Red Bud Lane south of the railroad, thereby not justifying the cost of access roads alongside the overpass. However, any properties with access eliminated by the overpass would need to be provided an alternative access route (as shown in the layout) or accounted for in the cost estimate of the grade separation. Access to adjacent properties along the elevated entrance and exit ramps on US 79 should not be impacted significantly by the identified grade separation.

The grade separation of Red Bud Lane is estimated to cost $14 million. The estimated public benefit calculated for the grade separation of Red Bud Lane is approximately $4.8 million, which is approximately 34 percent of the estimated cost of the grade separation.

Grade Separation of Stassney Lane

Stassney Lane is currently a four-lane roadway that crosses the UP Austin Subdivision in Travis County in the city of Austin. This roadway, with approximately 25,000 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential four-lane roadway overpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of Stassney Lane consist of adjacent commercial property as well as Crockett High School located at the corner of Manchaca Road and Stassney Lane. Access to adjacent properties could be maintained via access roads alongside Stassney Lane along with at-grade u-turns located beneath the overpass on each side of the railroad.

The grade separation of Stassney Lane is estimated to cost $8.2 million. The estimated public benefit calculated for the grade separation of Stassney Lane is approximately $19.6 million, which is approximately 2.4 times the estimated cost of the grade separation.

Grade Separation of Wonder World Drive

Wonder World Drive is currently a two-lane road that crosses the UP Austin Subdivision in Hays County in the city of San Marcos. This roadway, with approximately 13,900 vehicles crossing the railroad tracks daily, has been identified as a potential candidate for grade separation. The potential two-lane roadway overpass would separate vehicular traffic from the Austin Subdivision.

A preliminary layout of the overpass is included in the figures in Appendix E, along with environmental constraints and adjacent property land uses. The constraints located in the vicinity of Wonder World Drive consist of adjacent commercial, industrial and public property. Access to adjacent properties could be maintained via access roads alongside Wonder World Drive along with at-grade u-turns located beneath the overpass on each side of the railroad.

The grade separation of Wonder World Drive is estimated to cost $8.2 million. The estimated public benefit calculated for the grade separation of Wonder World Drive is approximately $17.4 million, which is approximately 2.1 times the estimated cost of the grade separation.

Crossing Closures

Crossing Closure of Peach Street

Peach Street is currently a two-lane roadway that crosses the railroad at-grade in Hays County in the city of Buda. Approximately 600 vehicles cross the UP at this location daily. Peach Street should be considered for closure at the intersection with the UP Austin Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative routes, associated distances, environmental constraints, and adjacent land uses are identified in Appendix E. Constraints located in the vicinity of this street consist primarily of residential properties as well as a nearby fire station. Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted from the potential crossing closures to North Main Street, which is included in this report as a potential grade separation, to cross the railroad.

The potential crossing closures is estimated to cost $50,000 with an estimated public benefit of $260,000.

Crossing Closure of West Mary Street

Mary Street is currently a two-lane roadway that crosses the railroad at-grade in Travis County in the city of Austin. Approximately 3,900 vehicles cross the UP at this location daily. Mary Street should be considered for closure at the intersection with the UP Austin Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative routes, associated distances, environmental constraints, and adjacent land uses are identified in Appendix E. Constraints located in the vicinity of this street consist primarily of commercial and residential properties. Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted from the potential crossing closures to Oltorf Street, which is included in this report as a potential grade separation, to cross the railroad.

The potential crossing closures is estimated to cost $50,000 with an estimated public benefit of $2.5 million.

Crossing Closure of Jim Cage Rd

Jim Cage Road is currently a two-lane roadway that crosses the railroad at-grade in Williamson County in the city of Hutto. Approximately 600 vehicles cross the UP at this location daily. Jim Cage Road should be considered for closure at the intersection with the UP Austin Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative routes, associated distances, environmental constraints, and adjacent land uses are identified in Appendix E. Constraints located in the vicinity of this street consist primarily of residential properties as well as a nearby fire station and school. Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted from the potential crossing closures to FM 1660, which is included in this report as a potential grade separation, to cross the railroad.

The potential crossing closures is estimated to cost $50,000 with an estimated public benefit of $330,000.

Crossing Closure of Sloan St

Sloan Street is currently a two-lane roadway that crosses the railroad at-grade in Williamson County in the city of Taylor. Approximately 600 vehicles cross the UP at this location daily. Sloan Street should be considered for closure at the intersection with the UP Austin Subdivision in order to reduce public safety hazards currently associated with the existing at-grade crossing.

The location of the potential crossing closure as well as the alternative routes and associated distances are identified in Appendix E. Access to adjacent properties could be maintained via the existing roadway network. Traffic could be rerouted from the potential crossing closures to US, which is an existing grade separation, to cross the railroad.

The potential crossing closures is estimated to cost $50,000 with an estimated public benefit of $270,000.

Possible Austin Bypass

While a precise location of a possible Austin bypass has not been identified, conceptual alternatives have been developed in order to obtain order of magnitude estimates for mileage, necessary bridge structures, and roadway-rail crossing grade separations. While every roadway that may cross the possible bypass was not evaluated, eight roadways were identified that may warrant consideration for grade separation in the event that an Austin bypass is constructed. This analysis was conceptual in nature and did not include detailed cost estimates. The cost estimates shown in Table 9-8 are order of magnitude estimates based on the number of lanes of the roadway and the general level of complexity of the crossing.

Street Name	City Name	AADT	Estimated Cost	20-Year Benefit (2007 dollars)	Benfit/ Cost Ratio
SH 80	Prairie Lea	5,300	$8,000,000	$2,720,000	0.34
US HWY 183	Lockhart	14,900	$6,000,000	$9,530,000	1.59
FM 20	Lockhart	5,500	$6,000,000	$2,820,000	0.47
FM 812	Cedar Creek	4,600	$8,000,000	$2,190,000	0.27
SH 21	Cedar Creek	8,200	$8,000,000	$3,960,000	0.50
SH 71	Cedar Creek	28,700	$12,000,000	$15,070,000	1.26
US HWY 290	Littig	26,700	$12,000,000	$13,600,000	1.13
SH 95 (Main Street)	Taylor	6,300	$8,000,000	$2,960,000	0.37
Total:			**$68,000,000**	**$52,850,000**	**0.78**

Table 9-8: Possible Austin Bypass Grade Separations

SECTION 10: EVALUATION METHODOLOGY

The improvements selected to be analyzed were based on the results of both freight rail operations modeling (RTC) and truck freight movement modeling (SAM), and are intended to improve freight movement efficiency. Additional improvements and/or recommendations were received from various discussions with stakeholder groups, such as the UP, the BNSF, the Austin-San Antonio Intermunicipal Commuter Rail District, the Port Authority of San Antonio, the San Antonio Transportation Association, the San Antonio Mobility Coalition, the San Antonio Chamber of Commerce, and discussions with San Antonio Mayor Hardberger and Bexar County Judge Wolff.

The potential improvements determined from the sources listed above have been analyzed to determine the effects on efficiency, mobility, and safety for both rail operations as well as vehicular and pedestrian traffic in the San Antonio region. This analysis began with the identification of the existing conditions, and included estimates of the construction cost, estimated implementation timeframe, and estimated public and private benefits for the identified improvements.

The existing conditions for the locations of potential improvements incorporated a review of property land uses and estimated values, environmental constraints, traffic flow volumes for both vehicular and rail traffic, and traffic accident statistics.

The estimated costs for each improvement are order of magnitude costs that were determined based on preliminary planning. The costs included in this study represent an estimate of probable costs prepared in good faith and with reasonable care. The study team has no control over the costs of construction labor, materials, or equipment, nor over competitive bidding or negotiating methods and does not make any commitment or assume any duty to assure that bids or negotiated prices will not vary from these estimates. The costs are subject to inflation and in some cases are calculated using county appraisal district values for right-of-way acquisition, which may vary from the actual cost of property acquisition.

The implementation timeframe for each improvement was estimated based on the additional analysis, design, environmental mitigation, and funding that would be required prior to implementation. Improvement classifications based on implementation timeframes were determined for the potential improvements and have been classified at this time into the following categories:

1. Level 1 Improvement - Identified near-term railroad improvements
2. Level 2 Improvement - Identified mid-range railroad improvements
3. Level 3 Improvement - All grade crossing closures and separations
4. Level 4 Improvement - Identified long-range improvements such as double tracking of or adding infrastructure capacity to existing line segments
5. Level 5 Improvement - Identified long-range improvements such as possible new corridors/bypass routes

Public Benefits

Anticipated public benefits of the potential improvements include reduced impedance at roadway-rail grade crossings, benefits associated with the potential for implementation of a commuter rail system, and property tax revenue benefits.

Grade Crossing Impedance

The costs related to the interaction of vehicular and train traffic at roadway-railroad crossings was evaluated and public benefits associated with identified improvements within the 12-county San Antonio region as well as the Austin Subdivision through Hays, Travis, and Williamson Counties were estimated. This analysis included calculating changes in vehicle emission volumes, delay times, operating costs, and accident costs directly related to trains blocking roadway crossings. Public benefits of identified railroad infrastructure improvements and grade crossing improvements such as crossing closures or the construction of grade separation structures were estimated as the reduction of the public cost burden associated with the existing at-grade crossings in the region.

As Figure 10-1 illustrates, the grade crossing analysis model was developed by collecting railroad and roadway data that characterize existing conditions at more than 600 existing at-grade crossings in the study region. Railroad input data included daily train volumes, average train lengths and speeds, and the number of tracks at each crossing. Roadway input data included average daily traffic, vehicle classification type, number of lanes, and accident history. These parameters were used to calculate a base cost associated with train-vehicle interactions under existing conditions as prescribed by the Federal Railroad Administration (FRA).

The model measured the impact of specific infrastructure planning cases by calculating a second set of results that reflected proposed network modifications. New railroad train volumes and speeds were incorporated into the model based on RTC simulation of the modified San Antonio network. This approach allowed for the public benefit of each planning case to be measured as a reduction in the total cost of the base case (no-build network).

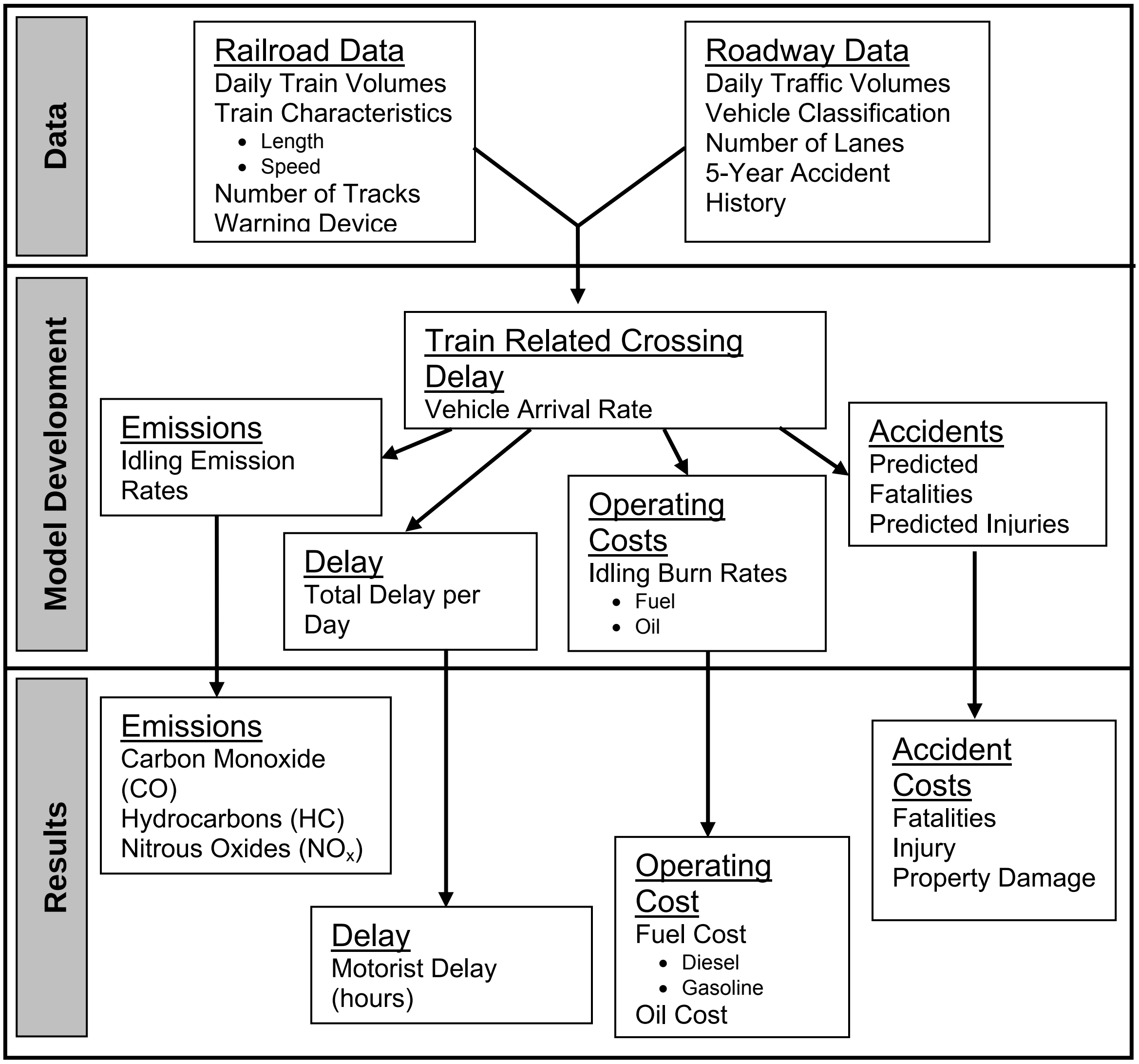


Figure 10-1: Procedure Flow Chart

Railroad and roadway data specific to each at-grade roadway-railroad crossing within the San Antonio District, shown in Figure 10-2, were obtained through TxDOT, Bexar County Metropolitan Planning Organization, and the FRA. Figure 10-3 shows the at-grade crossings along the Austin Subdivision north of the San Antonio District in Hays, Travis, and Williamson Counties.

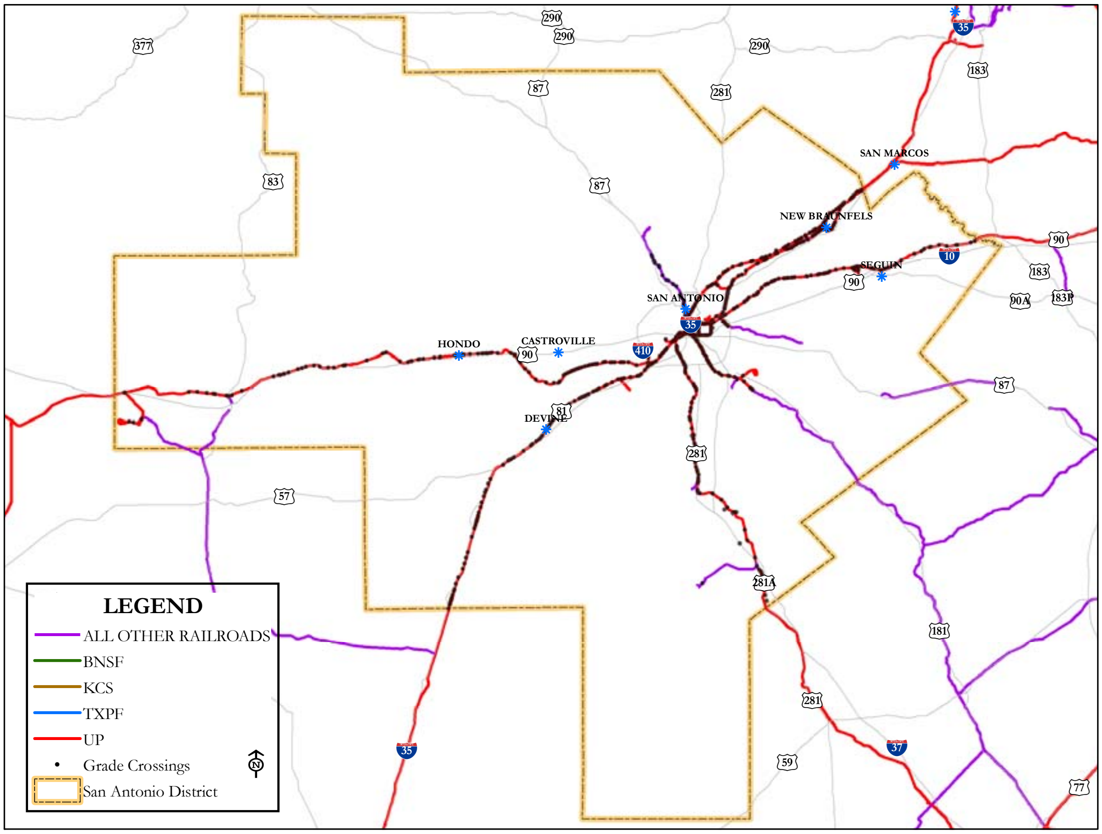


Figure 10-2: Grade Crossing Locations within the San Antonio District

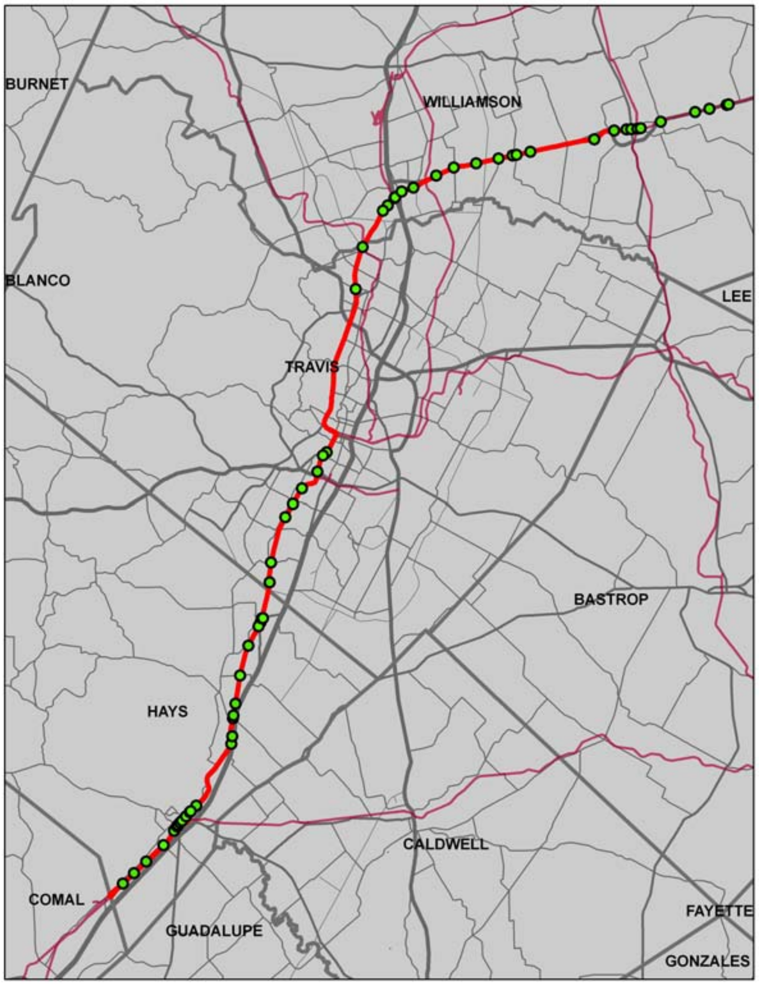


Figure 10-3: Public Grade Crossing Locations along the Austin Subdivision in Hays, Travis, and Williamson Counties

The model calculated annual public costs incurred at each at-grade crossing due to train-vehicle interactions. Public costs were estimated for vehicle emission volumes, delay times, operating costs, and accidents. The model projected these current year costs over a 20-year project duration based on a 2.75 percent annual rate of growth in both vehicle traffic and train volumes.

Vehicular delay within the study area occurs when grade crossings are occupied by one of three distinct train classes: freight trains, switching trains, or passenger trains. The estimated train length of each train class was matched with a representative train speed to determine the average grade crossing block time per train. These block times were multiplied by the average number of daily trains per class, then aggregated to yield an average crossing block time per day for each crossing within a rail subdivision. Corresponding train volumes were generated by the RTC simulation, which emulated existing train operations in the study area.

Average vehicle arrival rates were calculated by aggregating data specific to three vehicle classes: passenger cars, busses, and tractor-trailer trucks. Equivalent passenger car equivalency rates were used to aggregate arrival rates of each vehicle class at grade crossings blocked by trains in order to translate the data into estimates of vehicle delay per occupied crossing.

Emission costs were measured as the volume changes in carbon monoxide (CO), hydrocarbon (HC), and nitrous oxide (NO_x) produced by vehicles while idling at blocked crossings. Decreases in emissions during deceleration and increases in emissions during acceleration were not considered, resulting in a conservative total cost estimate. Emission costs per crossing closure were estimated by multiplying average idle time, the number of trains per day; and idle emission rates specific to each vehicle class to yield total CO, HC, and NO_x emissions. Finally, the public cost, or environmental impact, of these emissions was calculated by multiplying the emission volumes by the respective unit cost of each pollutant.

Operating costs measure the extra fuel and oil consumed by vehicles delayed at a railroad crossing. As with delay calculations, these operating costs were based strictly on vehicle idle times and did not include the consumption of fuel and oil directly related to vehicular deceleration and acceleration. Vehicle idle times at each blocked crossing were converted to operating costs by multiplying these estimates by the burn rates and average costs of both fuel and oil.

The severity of predicted accidents at each grade crossing was estimated using Department of Transportation (DOT) formulas adopted by the FRA. The assumption of vehicle accident rates were based on warning device type, numbers of trains, number of tracks, number of roadway lanes, roadway surface condition, vehicle traffic volumes, and five-year crash histories. The predicted numbers of accidents were incorporated into DOT formulas that estimate fatality, injury-only, and property damage-only rates. These rates were then multiplied by the cost of each accident type as reported in the 2005 National Safety Council statistics.

The anticipated 20-year costs were used to assess the benefit of using grade crossing closures and the construction of grade separation structures as potential at-grade crossing improvements. Since only 30 percent of traffic can be expected to re-route to a grade separation following a grade crossing closure, vehicle impedance costs were also assumed to decrease by only 30 percent as a result of this remedial measure. The remaining 70 percent of traffic was assumed to re-route to adjacent at-grade crossings. On the other hand, the installation of a grade separation structure was obviously assumed to reduce impedance costs by 100 percent.

The Net Present Value shown as the public benefit is the cumulative projected cost-burden over a 20 year period. Net present value (NPV) is a standard method for financial evaluation of long-term projects. The NPV is the value of the improvement projected 20 years into the future in terms of today's dollars. This can be assessed as the savings associated with a grade separation or, as traffic levels change with changes to roadways and rail, the net savings to the public of each improvement being evaluated. The calculated values of public cost burdens associated with each roadway-rail crossing in the region can be found in Appendix G.

Locomotive Emissions

The diversion of through trains to a bypass will modify the run time and delay time of existing rail operations due to changes in travel distance, network capacity, and operating speeds. The results of RTC simulation were used to translate these changes in run time and delay time to an expected change in locomotive emissions. Table 10-1 lists emission rates for hydrocarbons (HC), carbon monoxide (CO), nitrous oxides (NOx), and particulate matter (PM) according to each throttle position of a locomotive.[1]

Throttle Position	HC (g/hr)	CO (g/hr)	NO_x (g/hr)	PM_{10} (g/hr)
Brake	1400	1849	1335	622
Idle	478	492	309	228
1	226	361	1299	131
2	192	464	3000	140
3	361	1197	7267	427
4	294	2772	14014	336
5	595	3895	25584	348
6	748	5872	33600	499
7	826	3302	39766	585
8	984	3034	47027	697

Table 10-1: Locomotive Emissions per Throttle Position.

Scientific studies have valued the cost of emissions listed in Table 10-1 over a range of prices. The public benefit analysis estimates the cost of locomotive emissions using median reported values compiled from a survey of these studies, as listed in Table 10-2.

Pollutant	Cost $/ton
HC	1400
CO	520
NO_x	1060
PM_{10}	2800

Table 10-2: External Cost of Emissions.

Based on the costs of emissions in Table 10-2, the locomotive emission rates in Table 10-1 were converted to hourly emissions costs, as shown in Table 10-3. Total hourly costs per throttle position are presented for a single locomotive and for a train consisting of two locomotives.

[1] Painter, T.D. and Barkan, C.P.L., Prospects for Dynamic Brake Energy Recovery on North American Freight Locomotives, Proceedings of the 2006 Joint Rail Conference, April 4-6, Atlanta, GA.

Throttle Position	HC ($/hr)	CO ($/hr)	NOx ($/hr)	PM_{10} ($/hr)	Total ($/engine-hr)	Total ($/train-hr)
Brake	2.16	1.06	1.56	1.92	6.69	13.39
Idle	0.74	0.28	0.36	0.70	2.08	4.17
1	0.35	0.21	1.52	0.40	2.48	4.95
2	0.30	0.27	3.50	0.43	4.50	8.99
3	0.56	0.69	8.48	1.32	11.04	22.08
4	0.45	1.59	16.36	1.04	19.44	38.87
5	0.92	2.23	29.87	1.07	34.09	68.18
6	1.15	3.36	39.22	1.54	45.28	90.56
7	1.27	1.89	46.42	1.80	51.39	102.78
8	1.52	1.74	54.90	2.15	60.30	120.61

Table 10-3: Locomotive and Train Emission Costs per Throttle Position.

The annual change in emission costs assumes that train delay time is primarily spent in the idle position, while train run time is spent at an average of throttle positions 1 through 8. Table 10-4 lists the total benefit associated with each planning case, based on changes in the delay and run times produced by RTC simulation. The results of this analysis show that the total annual benefit from reduced locomotive emissions for the San Antonio bypass and the combined Austin-San Antonio bypass is $0.27 million and $1.34 million, respectively. Operations over the Austin bypass alone results in an annual public cost beyond that of existing conditions of $1.32 million for Austin B1 and $1.11 million for Austin B2.

Locomotive Throttle Position	Avoided Emissions Costs ($/year)			
	San Antonio	Austin B1	Austin B2	SA-Austin
Idle	257	42,439	39,229	32,051
1	19,698	94,517	92,709	113,131
2	35,772	171,641	168,359	205,444
3	87,864	421,586	413,525	504,614
4	154,659	742,080	727,891	888,226
5	271,238	1,301,443	1,276,559	1,557,750
6	360,289	1,728,728	1,695,674	2,069,185
7	408,921	1,962,073	1,924,557	2,348,485
8	479,834	2,302,324	2,258,303	2,755,745
Idle	257	42,439	39,229	32,051
Run (ave)	227,285	1,090,549	1,069,697	1,305,322
Total	227,542	1,132,988	1,108,926	1,337,374

Table 10-4: Public Benefit of Locomotive Emissions Reduction.

Existing Rail Corridor Value (Commuter Rail)

Commuter rail service between Austin and San Antonio has been desired for some time, and relocation of through-trains to a possible bypass would allow for these plans to materialize. The relocation of freight rail operations would lessen grade crossing impedance, provide an alternative to vehicular travel, and capture the benefits of transit-oriented development.

Assuming that the construction of a rail bypass between Taylor and Seguin would give the state ownership of the existing rail lines, the old facilities could potentially be used for commuter rail service, significantly adding to the estimated public benefit of the possible bypass. The value of this asset has been determined using previously estimated costs of developing this commuter system.[2] Table 10-5 lists the itemized costs for the case where a new track dedicated to commuter service is constructed, and the case where commuter service is shared with freight rail operations on the existing line. The asset value to the state is the difference in these costs, reflecting the benefit of acquiring a facility with track devoted to commuter rail operations. Table 10-5 shows the current value (2007 dollars) of this facility is approximately $285 million.

Ownership of the corridor would also allow the state to sell or lease portions of the 100-foot railroad right-of-way for the location of utilities or other non-intrusive facilities. A market price that reflects the unique potential of rail corridor property values has been based on relevant estimations in the recent past. Estimates for a discontinued rail corridor in East Memphis have ranged from $63.8 to $69.1 million per square mile,[3] while that for property in Milwaukee has been sold at $52.0 million per square mile.[4] The property value of the existing Austin-San Antonio corridor assumes a market price of $50.0 million per square mile, or approximately $106 million in total value.

[2] Austin-San Antonio Commuter Rail Feasibility Study, Texas Department of Transportation, 1999.
[3] The Most Expensive Real Estate in Memphis?, Memphis Business Quarterly, Spring, 2007.
[4] Mequon Developer Buys Railroad Corridor for Business Park, The Business Journal of Milwaukee, April 20, 2007.

Item	1998 Costs ($ million)		
	New Track	Shared Track	Existing Asset Value
Track	116	47	69
Bridges	46	0	46
Passenger Stations	20	20	0
Signaling	48	21	27
Maintenance Shop & Yard	7	7	0
Grade Crossings	37	37	0
Right-of-Way	27	2	25
Trains	66	66	0
Testing & Start-up	2	1	1
Design & Management	49	22	27
Agency Costs	7	3	4
Contingency	50	24	26
Total	475	250	225
2007 Value ($ million)			284.76

Table 10-5: Commuter Rail Facility Value

Vehicle Reduction Benefits

The FHWA has estimated the costs of highway travel for different vehicle classifications.[5] Each of the categories shown in Table 10-6 was identified as a cost incurred by the public sector when vehicles use the highway system. The dollar amounts listed for 2000 in Table 10-6 are FHWA-reported costs associated with pavement wear, congestion, etc. The 2007 costs are adjustments of the FHWA finding to reflect current values, based on differences in 2000 and 2007 Consumer Price Index (CPI) values provided by the Federal Reserve Bank.

In the case of commuter rail service, the costs per car-mile shown in Table 10-6 represent the benefit of displacing vehicles from the roadway network with the implementation of commuter rail service on the existing rail corridor. Table 10-7 incorporates ridership projections from the state's commuter rail study into the determination of a corresponding number of displaced vehicles, assuming an average of 1.2 occupants per vehicle. Analysis of these benefits over a 20-year period uses the 1.54 percent growth in ridership assumed in the commuter rail study to forecast increases in the $3.96 million avoided public cost shown in Table 10-7.

[5] Addendum to the 1997 Federal Highway Cost Allocation Study, Final Report, U.S. Department of Transportation, Federal Highway Administration, May 2000.

Public Cost	($/car-mi)	
	2000	2007
Pavement	0.001	0.0012
Congestion	0.077	0.0922
Crash	0.0119	0.0143
Air pollution	0.0133	0.0159
Noise	0.0009	0.0011
Total	0.1041	0.1247

Table 10-6: FHWA Marginal Costs of Passenger Vehicles

Commuter Station Segment	1st Year Passengers	Segment Distance (miles)	Trip Length (passenger-miles)	Displaced Vehicles (car-miles)	1st Year Avoided Public Cost ($)
Georgetown & Round Rock	157,700	8.5	1,333,800	1,111,500	138,600
Round Rock & McNeil Jct	394,200	6.8	2,680,200	2,233,500	278,500
McNeil & US 183	370,700	4.5	1,675,700	1,396,400	174,100
US 183 & RM 2222	387,800	3.1	1,194,300	995,200	124,100
RM 2222 & Austin CBD	490,000	5.4	2,646,100	2,205,100	275,000
Austin CBD & Ben White	458,100	3.0	1,374,200	1,145,200	142,800
Ben White & San Marcos	502,800	27.0	13,575,900	11,313,200	1,410,900
San Marcos & New Braunfels	289,800	17.5	5,070,700	4,225,600	527,000
New Braunfels & Selma	232,200	16.0	3,715,700	3,096,400	386,200
Selma & San Antonio Airport	277,000	9.0	2,492,700	2,077,300	259,100
San Antonio Airport & CBD	262,100	7.0	1,842,200	1,535,200	191,500
San Antonio CBD & Kelly	123,600	4.0	490,600	408,800	51,000
Total	3,945,800	111.8	38,092,100	31,743,400	3,958,800

Table 10-7: Avoided Public Costs of Commuter Rail Travel

Property Tax Revenue Benefits

Economic studies have shown that property values near commuter stations along the Dallas Area Rapid Transit (DART) light rail system are at least 25 percent higher than properties unrelated to rail service.[6] The economic impact of commuter rail on the existing Austin-San Antonio rail corridor was evaluated for the Austin-San Antonio Intermunicipal Commuter Rail District assuming 50 percent “net new” property tax revenues associated with station-area development.[7] For the purpose of comparison, forecasts of added property tax revenue in the current analysis are based on:

1. Station-area property values prepared by Capitol Market Research for the 2006 year.[8]
2. Taxable property values collected from the Tax Assessor-Collector’s office for each county along the existing rail corridor for the 2006 year.

[6] Weinstein, B.L. and Clower, T.L., *DART Light Rail’s Effect on Taxable Property Valuations and Transit-Oriented Development*, January 2003.
[7] Final Financial & Economic Benefits Report, Austin-San Antonio Commuter Rail Project, Austin-San Antonio Intermunicipal Commuter Rail District, March 2007.
[8] Economic Impact Analysis Executive Summary, Austin-San Antonio Commuter rail Project, Austin-San Antonio Intermunicipal Commuter Rail District, April 2006.

Table 10-8 lists the 2006 value of property surrounding commuter rail stations proposed for an Austin-San Antonio commuter rail system. The increase in tax revenue at these locations was estimated assuming an average tax rate of 2.20 percent and an increase in property value of 25 percent, resulting in a net base year increase in tax revenue of $2.45 million.

Area Tax Base	
Station Location	Taxable Property Value in 2006 ($)
Georgetown	$2,432,882
Round Rock	$37,248,059
McNeil Road	$1,107,190
Braker Lane	$67,166,533
35th Street	$43,358,457
Seaholm	$142,736,610
Slaughter Lane	$41,796,175
Kyle-Buda	$610,449
San Marcos	$36,296,335
New Braunfels	$18,479,540
Schertz	$6,624,636
Loop 1604	$5,182,294
Loop 410	$17,324,833
San Antonio CBD	$23,360,365
Kelly USA	$1,468,300
Total	$445,192,658
Commuter Rail Impact (2006 $)	
Property Tax Rate	2.20%
Property Value Increase	25.00%
Added Tax Revenue	$2,448,560

Table 10-8: Additions to Property Tax Revenue using Austin-San Antonio Commuter Rail District Data

Table 10-9 lists the taxable property values for the five counties along the existing rail corridor, as reported by the Tax Assessor-Collector's office of each county. The increase in tax revenue in these counties was estimated assuming that 0.25 percent of county properties would be affected by development along the commuter line. The estimate also assumes an average tax rate of 2.20 percent and an increase in property value of 25 percent, resulting in a net base year increase in tax revenue of $2.56 million.

The net present value analysis shown in Appendix G includes a net base increase in property tax revenue using an average ($2.50 million) of the results shown in Tables 10-8 and 10-9. Station-area property values presented by Capitol Market Research projected an average annual growth of 9.63 percent over 25 years in its economic impact analysis, while the current net present value calculations assume the base year $2.50 million increase in property tax revenues grows at 7.50 percent annually.

County Tax Base		
County	Taxable Property Value in 2006 ($)	Land Size (sq. miles)
San Antonio	$66,000,000,000	1247
Comal	$12,000,000,000	562
Hays	$8,219,469,587	678
Travis	$74,193,296,448	989
Williamson	$25,655,237,959	1124
Total	$186,068,003,994	4,600
Average Value ($/sq. mile)	$40,449,566	
Commuter Rail Impact (2006 $)		
Affected Property	0.25%	
Affected Tax Base ($)	$465,170,010	
Property Tax Rate	2.20%	
Property Value Increase	25.00%	
Added Tax Revenue	$2,558,435	

Table 10-9: Additions to Property Tax Revenue using County Tax Assessor-Collector Data

Private Benefits

The private benefits of rail improvements are generally associated with improved operating and maintenance conditions, as reflected by savings in time and cost. A sufficiently designed facility will also reduce the railroad's exposure to grade crossing incidents and eliminate the related damages to property.

Establishing an associated dollar value to what may be considered the private benefit resulting from railroad infrastructure improvements, upgrades, or operating changes is difficult in its own right, and is additionally complex without the availability of detailed economic analyses and benefit/cost studies.

The private benefit values were estimated based on calculated delay hours per day operated over the San Antonio region rail network for each planning case. Additional benefits that may be realized by the railroads as a result of the modeled improvements, but not explicitly quantified, may include:

- Reduced exposure to roadway-rail crossings
- Improved train operating efficiency
- Reduced train delays
- Improved train run-times
- Reduced public exposure in general

Operating Cost Savings

Benefits to the private sector are based on the degree to which operational performance measures such as train mileage, run time, and delay time for each planning case change relative to those of the base case. Each performance measure has been translated to an economic value using the following unit costs:

- Train mileage = $51.23/mile
- Run time or delay time = $407.19/hour
- Fuel = $3.33/gallon[9]

The train mileage cost of $51.23/mile is a representative industry cost that reflects rail operating expense per train mile. The run and delay time cost of $407.19/hour assumes a 60:40 ratio of yard-to-line haul operating times within San Antonio, where expected yard operating expenses are $285.82 per hour and line haul operating expenses are $589.24 per hour.

Projecting this annualized cost 20 years into the future with an annual 3 percent rate of inflation, the NPV of this private burden was then calculated, and used as an indicator of the private benefit that may be associated with the results of the planning cases discussed in section 7.

Track Maintenance Cost Savings

Class 1 railroads spend approximately $46,000 per mile each year maintaining track at current conditions.[10] This cost is based on the maintenance needs of rail infrastructure that, in general, has been in place for considerable time. For new track, such as the potential Austin-San Antonio rail bypass, significant savings are realized in early years due to the absence of accumulated wear that comes with freight operations over time. This feasibility analysis assumes the maintenance cost savings schedule shown in Table 10-10.

Track Maintenance		
Year	Savings (%)	Annual Cost/Mile
1	97	$1,380
2	93	$3,220
3	88	$5,520
4	81	$8,740
5	72	$12,880
6	61	$17,940
7	43	$26,220
8	35	$29,900
9	19	$37,260
10	2	$45,080
11	0	$46,000

Table 10-10: Savings Schedule for New Track
Source: Testimony of Dr. Allan M. Zarembski, before the United States Senate

9 Houston Spot Diesel Prices, Argus Rail Business, Vol. 14,16, April 21, 2008.
10 Testimony of Dr. Allan M. Zarembski, President of ZETA-TECH, before the United States Senate Committee on Commerce, Science and Transportation, Surface Transportation and Merchant Marine Subcommittee.

Construction of a rail bypass that results in the elimination of through-freight operations along the Austin-San Antonio corridor will likely be accompanied by the state's assumption of rights and obligations associated with ownership of the old facility. In this case, UP will avoid further maintenance costs on the old facility and assume maintenance costs on the possible bypass. Since the total length of each facility is different, the change in UP's maintenance cost can be determined as follows:

$$\Delta_{\cos t} = \left[d_{bypass}\left(1 - \%_{savings}\right) - d_{exist}\right]\left(\cos t / mile\right)$$

Where,
Δ_{cost} = change in private railroad maintenance costs
d_{bypass} = bypass length
d_{exsit} = length of the existing line
$\%_{savings}$ = percent of maintenance cost saved in any year

Assuming an Austin-San Antonio bypass length of 145 miles and a 129-mile length for the existing line, the equation above indicates that the savings rate threshold for any maintenance cost savings is:

$$\%savings = 1 - \frac{d_{exist}}{d_{bypass}} = 1 - \frac{129}{145} = 11\%$$

A savings rate threshold of 11 percent indicates that the railroad will realize maintenance cost savings through year 9 according to the schedule shown in Table 10-10. This finding is reflected in the 20-year analysis of the possible Austin-San Antonio bypass in Appendix G. Similar results are obtained for a possible Austin-only bypass using a d_{exist} of 72 miles and a d_{bypass} of 77 miles (6.5 percent threshold) and a possible San Antonio-only bypass using a d_{exist} of 57 miles and a d_{bypass} of 68 miles (16 percent threshold). The equations above reflect the fact that UP can realize positive savings in maintenance over a greater number of years as the difference in length between the existing line and the possible bypass decreases.

Grade Crossing Accident Savings

Property damages due to grade crossing accidents have been found to average $100,000 per incident.[11] Approximately eight grade crossing accidents occur each year in the counties encompassing the possible Austin-San Antonio bypass study area, suggesting that a new rail facility can play a role in the elimination of accidents and related property damage.[12] Assuming that the construction of a rail bypass will reduce the number of grade crossings by 85 percent, and that this reduction will eliminate one half of the annual grade crossing incidents, damages to property can be reduced by approximately $400,000 per year.

[11] Rail Safety Cost Factors, Washington State Department of Transportation, 2004.
[12] Safety Data, Office of Safety, Federal Railroad Administration, October, 2004.

SECTION 11: THE NEXT STEPS

Building upon the information contained within this report, the potential improvements, realignments, or relocations of the existing railway infrastructure have been analyzed to determine the efficiencies of through-freight rail operations and improvements associated with roadway user mobility and safety within the region. The private benefits generated for the respective modeling cases have been reviewed by UP. The railroad's concurrence to the methodology used, the proposed improvements to their infrastructure, and the overall public and private benefits associated with this study may strengthen stakeholder relationships.

Rail network improvements, reconfigurations, and possible realignments have been reviewed utilizing appropriate engineering methods to determine the operational viability of the existing and possible routes. Proposed ancillary and support facilities have also been identified.

The next step in this analysis would be to continue to review and analyze current and projected freight flow volumes to determine possible freight flows to and/or from the conceptual Trans-Texas Corridor routes and truck to rail freight shifts within the San Antonio region. Alternate uses for the existing freight rail corridor, the result of possible excess capacity windows generated by the proposed rail improvements, would also support the MPO's 2025 multimodal transportation plan.

The last step would be to proceed with an environmental impact study, with an emphasis on current and proposed land use for a recommended through-freight alignment.

The alternate uses for the existing freight rail corridor and current and proposed land use carries with it the increased potential for economic developments that could accompany new intermodal facilities, logistics parks, or mega-industrial or manufacturing facilities intended to allow the San Antonio region to flourish economically during this period of growth.

July 29, 2008

Ms. Jennifer Moczygemba
Section Director – Multimodal Section
Texas Department of Transportation
118 East Riverside Drive
Austin, TX 78704

Dear Jennifer,

Thank you for the opportunity to review the Central Texas Rail Network Rail Relocation Feasibility Analysis presented by TXDOT and the San Antonio Region Freight Study presented by HNTB Corporation. We appreciate all of the effort both your team and the consultants expended in order to complete both of these studies.

Consistent with the comments made in this letter, Union Pacific is prepared to move forward with further analysis of the rail infrastructure between San Antonio and Austin. This analysis will help determine what infrastructure is ultimately necessary to potentially accommodate a passenger rail service between San Antonio and Austin without negatively impacting our existing and future freight service in the region.

As we have stated before, Union Pacific could support the concept in the scenario identified in the studies as Planning Case B2. The concept begins to address our concerns which include the following:

- Affords the opportunity for passenger rail by rerouting UP's existing Austin subdivision through-freights to a new alignment which is necessary to accommodate passenger rail;
- Protects Union Pacific's ability to serve its existing customer base in the region without any degradation of service standards;
- Minimizes the impact to Union Pacific's east / west transcontinental route; and
- Eliminates a significant number of at-grade highway grade crossings

While we recognize that a new rail by-pass around the city of San Antonio, studied in Planning Case C, could potentially eliminate additional freight rail operations within the city of San Antonio, we believe this alternative is not a viable option for the following reasons:

- A by-pass would increase Union Pacific's east / west route mileage by approximately 15 miles, effectively reducing our competitive position with trucks plus increasing our costs and fuel usage by approximately one million gallons annually. Putting additional trucks on the road would cause congestion in an area already plagued with this problem.
- Service to local shippers and other shippers in the State of Texas may deteriorate; and
- The proposed yard structure is not operationally functional.

In addition, we are opposed to any relocation of Union Pacific's operations in the San Antonio-Austin area as a part of the Trans Texas Corridor ("TTC"). Inclusion of this corridor as part of the TTC project would limit both operational and commercial flexibility to serve existing and future customers.

Finally, in order to protect our local and through-freight rail service, this project cannot be completed in an incremental manner. The new infrastructure must be completed and turned over to Union Pacific at the time of completion.

John H. Rebensdorf
VP Network Planning & Operations

UNION PACIFIC RAILROAD
1400 Douglas St., Stop 1110, Omaha, NE 68179-1110
ph. (402) 544-4279 fx. (402) 501-0227
jrebensd@up.com

We look forward to identifying the next steps that should be taken in order to advance Planning Case B2. If we move forward on this study, it will be with the understanding that either party is free to suspend or cease participation.

Very truly yours,

cc: Joe Adams, Vice President Public Affairs, UPRR