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16. Abstract <p>The period from 1987 to 1993 saw a dramatic increase in the volume of trade between the United States and Mexico. This growing binational trade has, predictably, increased border traffic at U.S.-Mexico ports of entry. Since trade is set to continue growing over the next 10 years, spurred in part by the recently ratified North American Free Trade Agreement, transportation planners in both the U.S. and Mexico have grown increasingly concerned about its impact on border street and regional highway infrastructure. The specific concern is truck traffic: Although intermodal traffic is growing strongly, the majority of goods are still moved by trucks. Moreover, such truck traffic is channeled through a relatively small number of key border gateways.</p> <p>Focusing on the Laredo, Texas, gateway, this study examined the issues and potential remedies associated with U.S.-Mexico border area truck flows. As the third in a series of project reports, this executive summary synthesizes key issues and presents general findings and recommendations with respect to truck traffic and its impact within border cities. It seeks also to communicate a central theme of the study — namely, that cross-border planning must utilize intermodal data from both Mexico and the U.S., must identify binational administrative constraints to border crossing efficiencies, and must therefore have the cooperation and participation of planners on both sides of the border. Presently, cross-border trade activity exists as a dense web of interrelated operations; accordingly, the most effective infrastructure planning will necessarily be systemwide in scope and be able to respond to any future opportunities for improving border transit mechanisms.</p>					
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EXECUTIVE SUMMARY —
TRUCK TRAFFIC IN
LAREDO, TEXAS: A CASE STUDY OF ISSUES AND REMEDIES

by

Rob Harrison

Research Report 1312-3F

Truck Traffic in Laredo, Texas: A Case Study of Issues and Remedies
Research Project 7-1312

conducted for the

Texas Department of Transportation

by the

Center for Transportation Research
Bureau of Engineering Research
The University of Texas at Austin

November 1993

IMPLEMENTATION STATEMENT

Because this report represents an assessment of possible transportation implications for the city of Laredo, Texas, implementation of the findings is limited to whatever policy changes might derive from its recommendations.

Prepared in cooperation with the Texas Department of Transportation.

DISCLAIMERS

The contents of this report reflect the views of the author, who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Texas Department of Transportation. This report does not constitute a standard, specification, or regulation.

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SUMMARY

The period from 1987 to 1993 saw a dramatic increase in the volume of trade between the United States and Mexico. This growing binational trade has, predictably, increased border traffic at U.S.-Mexico ports of entry. Since trade is set to continue growing over the next 10 years, spurred in part by the recently ratified North American Free Trade Agreement, transportation planners in both the U.S. and Mexico have grown increasingly concerned about its impact on border street and regional highway infrastructure. The specific concern is truck traffic: Although intermodal traffic is growing strongly, the majority of goods are still moved by trucks. Moreover, such truck traffic is channeled through a relatively small number of key border gateways.

Focusing on one such gateway at Laredo, Texas, this study examined the issues and potential remedies associated with U.S.-Mexico border area truck flows. As the third in a series of project reports, this executive summary synthesizes key issues and presents general findings and recommendations with respect to truck traffic and its impact within border cities. It seeks also to communicate a central theme of the study — namely, that cross-border planning must utilize intermodal traffic and commodity data from both Mexico and the U.S., must identify binational administrative constraints to border crossing efficiencies, and must therefore have the cooperation and participation of planners on both sides of the border. Presently, cross-border trade activity exists as a dense web of interrelated operations; accordingly, the most effective infrastructure planning will necessarily be systemwide in scope and be able to respond to any future opportunities for improving border transit mechanisms.

Finally, it should be noted that the reports in this series describe the border situation up to September 1993. Because events alter rapidly along the border, it is therefore likely that, by the time this report is published, new issues may have emerged, while others identified here have been resolved. Such is the difficulty in working in an area of rapid change.

EXECUTIVE SUMMARY —
TRUCK TRAFFIC IN LAREDO, TEXAS: A CASE STUDY
OF ISSUES AND REMEDIES

BACKGROUND AND STUDY OBJECTIVES

Trade between the United States and Mexico has more than tripled since 1987, growing to over \$75 billion in 1992 and providing a \$5 billion trade surplus in favor of the United States. This trade growth establishes Mexico as the third largest U.S. trading partner (behind Canada and Japan) and has had a dramatic impact on the economies of both Texas in general and the border communities in particular. Now, the North American Free Trade Agreement (NAFTA), the trade pact recently ratified by the U.S., Canada, and Mexico, is poised to further accelerate trade between the two countries, with substantial benefits predicted to accrue to the Texas-Mexico border region.

Already significantly affected by current trade, the border communities are understandably concerned about further impacts that NAFTA will impose on their infrastructure. Over 70 percent of non-petroleum U.S.-Mexico trade carried by surface transportation passes through Texas gateways. Therefore, more so than in other regions, transportation—particularly the highway network—plays a vital role in current trade operations. This study makes a contribution to statewide transportation planning by investigating transborder trucking operations at a key border crossing—the City of Laredo (see Figure 1). The results of this investigation, published as two Center for Transportation Research reports, also serve to illuminate important issues affecting all U.S.-Mexico border communities bracing for the trade expansion likely to occur under NAFTA.

In focusing on Laredo, Texas, the study team identified trucking, brokerage, freight consolidation, and transportation-related financial services as key revenue sources for border cities. However, these economic benefits have been increasingly offset by the infrastructure damage caused by trucks using downtown streets to cross the Rio Grande (where, aside from traffic congestion and road deterioration, there are collateral issues of pollution and safety). Concerned with these and other problems, many border communities have appealed to TxDOT for assistance. Accordingly, and in view of the historical underinvestment in, and current poor condition of, some border region highways, the Texas Department of Transportation (TxDOT) is undertaking a \$2 billion, 5-year border infrastructure investment program. And what they seek in terms of additional infrastructure includes upgrading trunk roads, improving linkages in city systems (e.g., loops), and providing general highway rehabilitation.

STUDY DESIGN

This 1-year study, undertaken throughout 1992, targeted two cities that comprise a major trade gateway: Nuevo Laredo in the Mexican state of Tamaulipas, and its U.S. sister city, Laredo, located in Webb County, Texas. An additional focus—one that underscored many problems associated with border mobility and transportation planning—was the International Solidarity

Bridge, a recently opened (and currently underutilized) structure that connects Colombia, Nuevo Leon, to the extreme western limits of Laredo. Thus, the study had to address not only issues affecting Laredo and Nuevo Laredo, but also those relating to the new bridge, which is linked to planning needs in Monterrey (Nuevo Leon).

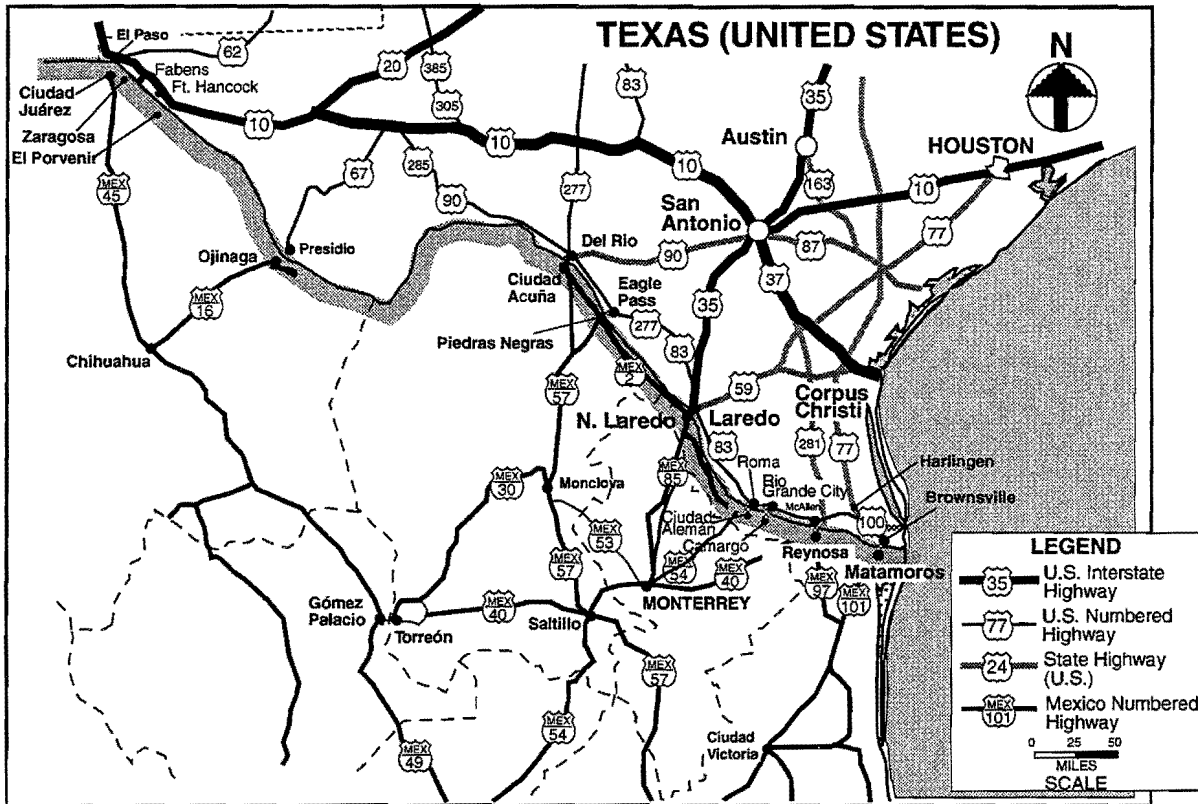


Figure 1. Texas-Mexico border highway infrastructure (Note: 1 mile=1.61 km)

The study team has prepared two reports. The first examines the effects of the recent and projected growth of transborder truck traffic on the city of Laredo. It concludes that additional investments in city infrastructure are needed to manage truck and auto traffic, and that dedicated truck routes could be financed by raising bridge tolls to incorporate a user fee for their provision and maintenance. The second report considers impacts within the city of Laredo, particularly as they relate to truck routes. Additionally, in an appendix, it considers the International Solidarity Bridge from the Monterrey perspective, using the economic feasibility report prepared in Nuevo Leon as a basis for evaluating the bridge's role in the transportation planning process. Because each report has been prepared as a stand-alone document, there is necessarily some repetition of certain background themes (e.g., NAFTA, U.S.-Mexico trade, and bridge data).

The purpose of this executive summary is to synthesize key issues and to present our findings with respect to truck traffic and its impact on border cities. It seeks also to communicate a central theme of the study—namely, that cross-border planning must utilize intermodal data from both Mexico and the U.S., must identify the binational administrative constraints to border crossing efficiencies, and must therefore have the cooperation and participation of planners on both sides of the border. Presently, cross-border trade activity exists as a dense web of interrelated operations; accordingly, the most effective infrastructure planning will necessarily be systemwide in scope and be able to respond to any future opportunities to improve border transit mechanisms.

FINDINGS AND RECOMMENDATIONS

The findings and recommendations of this study are grouped according to three primary topics: (1) Mexican issues, (2) the Colombia Bridge, and, finally, (3) the City of Laredo. Below key points related to each topic are summarized, with material from the study reports cited when necessary.

Mexico

1. *Economic Change.* Historically one of the most protectionist countries in Latin America, Mexico has undergone major economic and trade changes since President Carlos Salinas de Gortari took office in 1988. Through initiatives introduced by the Salinas Administration, Mexico's inflation rate decreased from nearly 160 percent in 1988 to its current rate of around 8 percent, its lowest in 20 years. And since 1987, U.S.-Mexico trade has tripled, with this year's (1993) trade activity expected to exceed \$76 billion. In terms of Mexico-Texas trade, Texas' exports to Mexico represent approximately 46 percent of total U.S. exports to Mexico and are growing at around 7 percent a year—even in the absence of a free trade agreement. University of Texas economists at the LBJ School of Public Affairs have calculated that NAFTA will generate over 180,000 new jobs in Texas export industries, expanding in the process Texas' role as the major hub of U.S.-Mexico trade activity.

2. *Transport Sector.* Of all northbound Mexican freight tonnage moving into the United States, water transportation accounts for 66 percent (mostly oil tankers), trucks account for 22 percent, rail accounts for 6 percent, and pipeline accounts for 6 percent. However, looking at land transportation specifically by value, we find that trucks move 65 percent (a figure bolstered by Mexico's deregulation of the trucking sector), rail moves 18 percent, and pipeline accounts for 17 percent.

As part of its ongoing National Road Program, Mexico has undertaken an extensive privatization program to provide 2,484 miles (4,000 km) of new highways within a 5-year period (1989-1994). While the first phase of this program is now complete (1,242 miles, or 2,000 km, in place), Mexican truckers have so far shown a reluctance to use the expensive toll highways, preferring instead to remain on the federal "free" highways. As a consequence, Mexican authorities are currently considering trucker incentives and toll discounts to deal with this unexpected (though not entirely unpredictable) flaw in their highway privatization plans.

The Mexican rail authority—Ferrocarriles Nacional de Mexico (FNM)—is also being modernized. Main trackage is basically sound, though FNM has problems with terminals, motive power, equipment and service control, and communications. U.S. Class I railroads that operate within Mexico (Southern Pacific, Union Pacific, Burlington Northern, and Santa Fe) have begun to assist FNM in remedying these shortcomings.

Finally, Mexico's thirteen main commercial ports have been de-unionized (1991), and a privatization program is being developed.

Overall, then, the Mexican transportation sector is undergoing radical reorganization, with the likelihood that a different set of modal services will be provided in the future. At such time, other competitive modes may divert traffic from trucks and thus alter the current pattern of trade movement along the border.

3. *Future Trade Prospects.* By changing the nature of international trucking operations, the U.S.-Mexico element of the North American Free Trade Agreement may dramatically impact all border cities. As proposed, there would be a 10-year phase-in of NAFTA's land transportation provisions, with many changes set to occur sooner. Importantly, deliveries will be permitted by both countries into contiguous border states 3 years after the signing of the agreement—meaning that Mexican trucks, no longer constrained to operate within the ICC 12-mile (19.3 km) border zone, will be permitted to ship to any destination in Texas after December 17, 1995. In addition, Mexico will permit 49 percent U.S. or Canadian ownership of Mexican trucking companies offering international services. Six years after ratification of the agreement (December 1999), full cross-border access will be permitted for all truckers (though no cabotage will be permitted). And 7 years after ratification of the agreement, Mexico will permit U.S. interests to obtain 51 percent ownership of Mexican trucking firms, moving to 100 percent ownership 10 years after the agreement is ratified. These changes will almost certainly lead to new trucking alliances, logistical systems, and the development of inland trade zones and distribution centers.

4. *Trucking Sector.* In 1987, before Salinas took office, Mexican trucking was tightly controlled through fixed routes, regulated prices, limited entry, and quasi-monopolistic operating practices. As president, Salinas deregulated the trucking sector through decrees, political party policies, and new laws. His success has been such that, today, the industry has neither fixed routes nor fixed prices; moreover, there is free entry into the system and fierce competition among both established and new entrants. This competition, in turn, has lowered tariffs in real terms, has raised service levels, and has thus contributed to the growth in transport services associated with the domestic economy and with U.S.-Mexico trade.

As mentioned above, a highway infrastructure program is underway, the centerpiece of which is a 2,484-mile (4,000-km) toll road system. Originally seen as a system comparable to the U.S. interstate system, this massive highway program, as discussed previously, has run into difficulties because its higher fees—over 50¢ per mile (80¢ per km) for an 18-wheel truck on a typical facility—have so far discouraged Mexican truckers from using the new facilities. This

situation has exacerbated the already severe problems of congestion, pavement damage, pollution, and safety presently associated with the Mexican free system.

The trucking sector also remains weakened by current legislation that restricts U.S. operators to the border zone. Short-haul Mexican truckers, operating transborder “drayage” services, link long-haul operations on both sides of the border. This is likely to change dramatically under NAFTA, and Mexican truckers fear that their more efficient U.S. counterparts will eventually dominate trip patterns within the U.S. trade picture. The U.S. companies’ ability to deliver high levels of service with modern equipment (and to control the trip through advanced technology) does suggest that NAFTA trucking will be dominated by U.S. companies. Investment and entry by U.S. firms will, however, strengthen the Mexican trucking industry over time through partnerships and competition. The availability of U.S. equipment in Mexico will further hasten this trend.

Other trucking issues: Mexico is far behind other nations in worldwide container use, with its current intermodal services limited to trailers on flat cars (TOFC). Containerization should be given a boost, however, by Mexico’s ambitious plan for privatizing and upgrading its port facilities. If Mexican shippers become more accustomed to using containers through the enhancement of the port system, then the options for shippers will grow and may alter the current dominance of truck trailers in U.S.-Mexico trade patterns.

5. *Drayage Services.* Currently, U.S. and Mexican truck operations are essentially restricted to the International Commerce Zone along the border—a situation that has given rise to irregularities in the provision of crossing services. Along some sector borders (e.g., Brownsville), only Mexican-based operators deliver the trailers, while at other gateways (e.g., Laredo) joint arrangements prevail. Because trips are short, truckers use the oldest equipment available, which, in addition to being difficult and expensive to maintain, creates safety problems. Generally, tractors haul in one direction only, with the empty portion of the trip (“deadheading”) creating additional miles of travel, higher energy and operating costs, extra pollution, and a greater risk of accidents. Again, these services may significantly change under NAFTA.

6. *Truck Size and Weight Issues.* Mexico’s domestic size and weight limits for trucks are substantially greater than those currently permitted in the United States. And because NAFTA does not affect sovereignty within the three nations, differences in domestic truck sizes and weights will be permitted. Yet clearly, extremely heavy trucks—legal or illegal—pose a threat to the Texas and U.S. system. First, there is the obvious issue of highway infrastructure damage that will result if heavy trucks are allowed to travel on highways designed for much lighter loads. Second, there is the possibility of a competitive response within the Mexican trucking sector that will put U.S. companies at a disadvantage. Finally, there is the intermodal perspective, whereby significantly heavier trucks will distort the competitive situation between modes (e.g., rail and the trucking sector). Mexican truckers flagrantly ignore vehicle weight limits that are already legally fixed at values significantly higher than those found in the U.S. For example, in the U.S. the five-

axle vehicle is fixed at 80,000 pounds (36,320 kg); by contrast, the same vehicle in Mexico is fixed at 91,300 pounds (41,450 kg), with the average overload around 110,000 pounds (49,940 kg). Such excessive weight translates into accelerated pavement consumption. These issues are of great concern to transportation planners.

7. *Industrial Zones.* Current patterns of trade are concentrated within two traditional zones and, more recently, at new production centers. The traditional zones include, on the one hand, the extensive border area that accommodates the 2,000 maquiladora plants, and, on the other, the traditional centers of production in the industrial heartland of Mexico—an area defined by lines running from Monterrey to Mexico City and to Guadalajara. Finally, there are new production sites centered around transportation modes, including ports (e.g., Yucatan) and rail yards (e.g., Torreón).

With respect to maquiladoras, the border zone is unlikely to experience further significant growth. Problems of labor, land acquisition, availability of water and utilities, environmental concerns, and rising labor costs suggest that new maquila plants will move southward. Additionally, as maquilas are allowed to market part of their production within Mexico, the proximity of domestic markets will most likely draw maquiladoras away from the border. Although this southward movement of maquilas is predicated in part on an improvement of transportation services in Mexico, it seems highly probable that border dominance of maquilas in current trade patterns will weaken.

8. *Border Crossing Mechanisms.* The complexity associated with border freight crossings may well be simplified under NAFTA. Presently, border cities are served by an array of consolidators, brokers, insurance agents, drayage companies, and other third-party service agents involved in moving transborder traffic. These efforts are further complicated by the fact that the rules (e.g., customs procedures) governing freight movements differ according to trade direction. Currently, the majority of southbound truck freight is moved by semi-trailers that are first switched at the border and then collected by a drayage company for delivery to a maquiladora or Mexican transport company. Many northbound trailers are empty (reflecting the trade imbalance) or are reconsolidated within the ICC border zone. Finally, though rail intermodal operations are growing significantly at the U.S. border, freight must still cross the border highway and bridge systems before being loaded onto rail cars. The complexity of such operations is shown in Figures 2 and 3.

Border crossing mechanisms are dominated by Mexican brokers that participate in every key step of a southbound move. This arrangement has led to quasi-monopolistic operating practices that are costly and inefficient. Simplifying border mechanisms and improving infrastructure management would lower costs and promote greater efficiency.

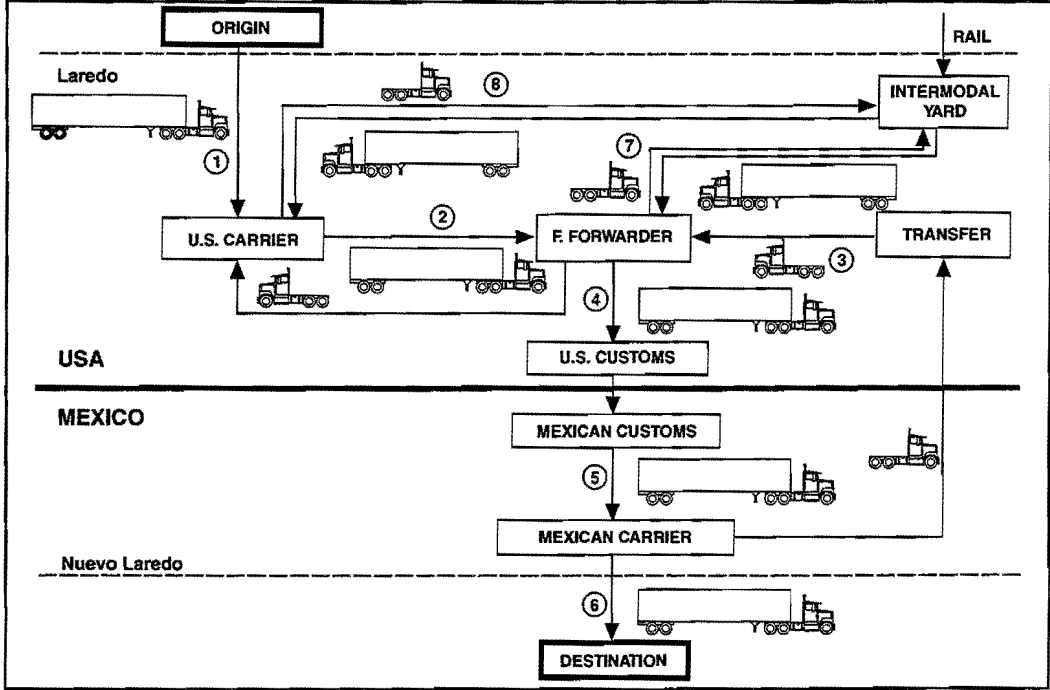


Figure 2. Crossing pattern for southbound truck traffic

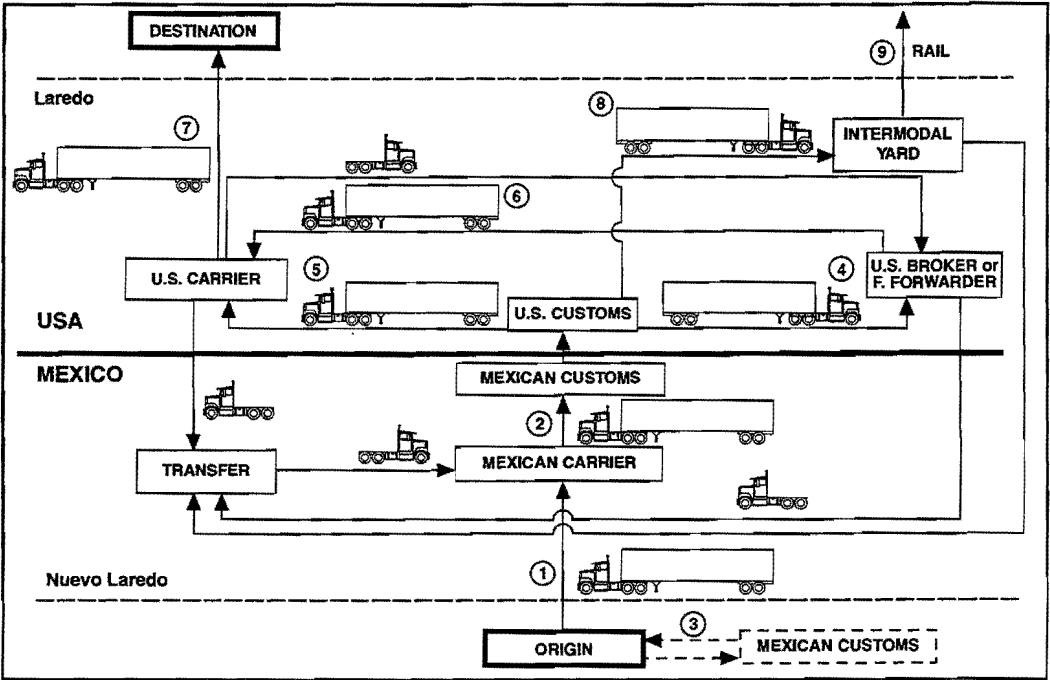


Figure 3. Crossing pattern for northbound truck traffic

9. *Customs Harmonization.* Harmonization of customs rules and related transportation measures by mode, scheduled for codification within the NAFTA pact, could lead to significant changes, particularly for goods pre-cleared for inspection in customs areas located deep within their respective countries. Changing current cross-border practices could stimulate trade between such cities as Dallas/Ft. Worth, Houston, San Antonio, Monterrey, and Mexico City, particularly if the routes connect with new bridge/highway systems. A highway link connecting Interstate Highway 35, the Solidarity Bridge, and the Monterrey autopista (toll road) is an example of such an arrangement. In addition, customs could develop special truck processing sites where economies of scale would justify special equipment and procedures to expedite transit.

10. *Traffic Forecasts.* Current border planning is hampered by an inability to forecast traffic both within mode and between modes (with or without NAFTA). Such forecasts would ideally capture cargo weight, value, and trip characteristics. A method for predicting truck traffic, recommended by one of the study reports, should be evaluated in future studies. An effort should be made to work with U.S. Customs in building a shared data bank.

11. *Border Crossing Infrastructure.* This report was completed before the release of the U.S. Department of Transportation's ISTE 6015 Study on border infrastructure needs. The DOT-commissioned study reported that the facilities immediately at the border crossings were adequate and would remain so for the foreseeable future, even with the anticipated increase in trade. A central argument was a General Services Administration (GSA) capacity analysis that indicated that the system would be capable of handling an approximate fourfold increase in truck traffic (over 8 million trucks processed a year potential, compared with 2.3 million in 1992). Yet the Laredo study results suggest that bridge *location* is more important than *capacity*. And as new loop, bypass, and beltway schemes are implemented, traffic will be diverted from current bridge locations. For example, if trucks move along the Northwest Loop at Laredo, the current central bridge sites cannot be utilized efficiently. Traffic analysis therefore suggests there will be a need for new bridge construction in the Laredo gateway to accommodate these new highway schemes.

Solidarity Bridge at Colombia

1. *Need.* By 1989, Laredo planners had identified a need for additional bridge capacity, based on existing patterns of traffic crossing the two bridges in the downtown area. While Laredo officials initially argued for the construction of a new bridge within the (then) city limits, they eventually acceded to U.S. and Mexican plans to construct the facility at a site 20 miles (32.2 km) west of the city. Interestingly, this decision-making process was marked by the persistence and political will of Nuevo Leon officials, who carried out an extensive feasibility study of this site, organized much of the financing, and provided political inducements to convince the (then) Texas government to agree to the construction of this bridge. Details of this feasibility study indicate that the Mexican officials were essentially driven by the need for a more direct Monterrey metroplex link with the border and U.S. markets—one that bypassed Tamaulipas and Nuevo Laredo.

Resigned to the inevitable construction of this structure, Laredo officials finally sanctioned the building of the bridge, and city borders were expanded to capture the new site.

2. *Demand for the Facility.* Bridge construction was undertaken and completed in 1991, despite the fact that the interfacing highway infrastructure was only marginally adequate on the U.S. side and totally inadequate on the Mexican side, particularly where it linked with the federal highways from Nuevo Laredo to Monterrey. Adding to these limitations was the lack of brokerage and insurance agents on-site to service the facility. And overall, demand for the new facility proved disappointing. It is currently difficult and costly to drive from the Solidarity Bridge to Monterrey, and Laredo consolidators in particular found the distance to the bridge too long—and, therefore, too costly—for practical use in shipping to destinations within Tamaulipas. In 1992, only 3 percent of all trucks moving south within the entire Laredo Bridge System used the Solidarity Bridge. Northbound movement numbers are higher but still relatively low. Looking to reverse this situation, U.S. planners undertook to improve highways on the U.S. side by widening and resurfacing Mines Road. (In late 1992, the first contract for upgrading Mines Road to a four-lane divided highway was awarded.) Thus, the U.S. has taken the initiative in improving the linkage from the bridge to Laredo and to its planned inner loop. Figure 4 shows the planned Laredo Beltway (as of 1992) with the constituent infrastructure elements. In addition, there is a proposed private toll road, Camino Colombia, that would link the Solidarity site more directly to IH-35. On the Mexican side, links remain unchanged as of April 1993, though there are plans to build a new highway (either toll or free) from Colombia to the Nuevo Laredo-Monterrey autopista. Until this link is completed, demand for the facility will remain highly constrained.

3. *Economic Feasibility.* The Mexican feasibility study of the bridge site revealed that bridge construction was to be only one part of a complex proposal involving the bridge, highways, agricultural investment, support services, and regional industrial development. Currently, all elements other than the bridge have been delayed, neglected, or ignored. The bridge project alone, from an economic viewpoint, is a poor one, rendered so principally by timing. The provision of a bridge without related highway infrastructure has generated little traffic, a poor cash flow (putting strains on the Laredo Bridge System), and difficulties for such General Services Administration (GSA) clients as U.S. Customs, the Immigration and Naturalization Service, and the Food and Drug Administration (all of whose posts currently see little or no traffic, while their Laredo counterparts face heavy workloads). In addition, because the project was designed for highways only, it overlooked the opportunity to evaluate the benefits of a multimodal crossing point. Currently, the Union Pacific (UP) Railroad is proposing a new rail-only crossing between central Laredo and the Colombia Bridge.

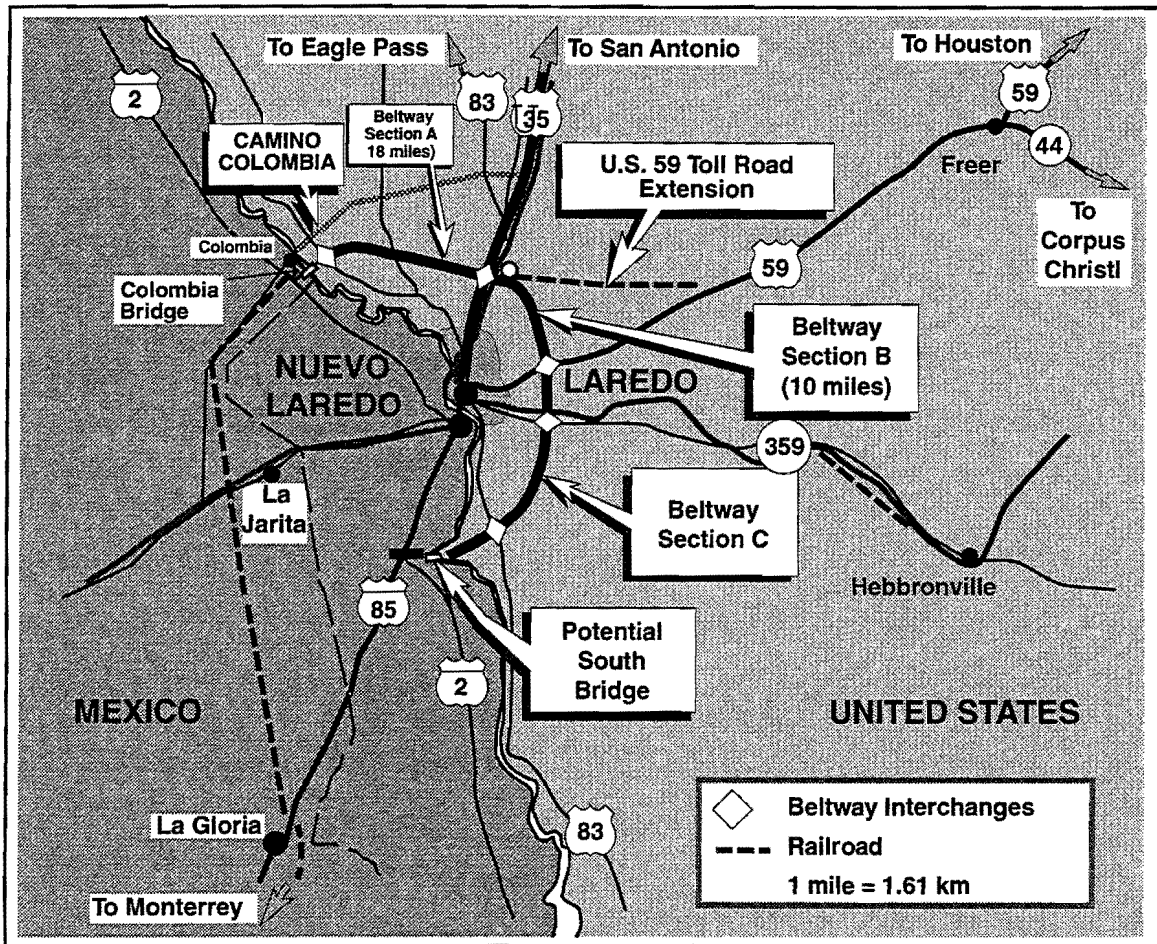


Figure 4. Laredo Beltway

4. *Advanced Technology.* Although the bridge is currently linked to IH-35 through FM 1472 (Mines Road), a more direct link to IH-35, such as Camino Colombia, would reduce travel time and shorten trip distances. If the bridge can also be linked effectively to the Mexican autopista network, then higher volumes of truck traffic should be generated, particularly if NAFTA streamlines and simplifies customs procedures. The new demand, in turn, could prompt GSA clients (e.g., customs) to deploy at a few key border crossing sites expensive surveillance and inspection equipment that cannot currently be justified at the ever-growing number of smaller border bridges. In addition, new developments in Intelligent Vehicle Highway System (IVHS) technology promises great benefits for bridge sites so equipped. Again, such technology can be deployed only at border sites where there are high volumes of truck activity (greater than 3,000 vehicles per day). CTR staff have termed such sites “supercrossings” and are advocating their evaluation as part of a border multimodal planning strategy.

City of Laredo

1. *Port of Entry Details.* Laredo is now the second largest inland port in the United States (behind Detroit), while Nuevo Laredo is the most active customs port not only in Mexico but in *all* of Latin America. Handling 36 percent of all Mexico's external trade, Nuevo Laredo brought in more than \$2 billion in Mexican customs fees between January and October 1992—an amount that represents 63 percent of all customs revenues received from the entire U.S. border area. Quite understandably, such trade revenue has become critically important to Laredo's economic vitality. However, as mentioned previously, the processing sites for both truck and rail traffic are downtown, necessitating the routing of much traffic through a totally inadequate system of city streets. The predictable result of this arrangement has been an increase in downtown traffic congestion, pollution, accidents, transport inefficiency, and street damage. But in a step toward reducing these urban problems, city authorities are now planning for commercial expansion to be made west along Mines Road and around the proposed loop system. Overall, they are attempting to balance the benefits of commercial traffic with the liabilities associated with such activity (e.g., pollution, accidents, and highway maintenance budget overruns).

2. *Border Drayage, Safety, and Pollution.* Cross-border traffic operations are complex, costly, and inefficient. An example: Tractors returning to the U.S. from Mexico—having delivered or collected loads—must return empty, since return loads are not permitted under current border trans-shipment agreements. The significant amount of single tractors running through the system is clearly inefficient and costly. Moreover, the majority of these tractors are older models, particularly those used in drayage operations, wherein trailers are taken from a yard on one side of the border to a yard on the other side of the border (such load utilization does not justify the use of modern, expensive equipment). The older Mexican trucks, whose average age is already over three times that of U.S. trucks (14 vs. 4.5 years), cannot meet the latest emissions and safety requirements. Thus, in Laredo there are large numbers of older, pollution-generating, accident-prone vehicles shortening the service lives of city streets. This will continue as long as the present cross-border mechanisms remain in place. For now, there is no adequate method of cost recovery; nor is there a program of street maintenance capable of providing the quality of infrastructure required by this heavy traffic.

3. *Pavement Modeling and Cost Recovery.* A preliminary analysis based on a pavement deterioration model indicated that strengthening truck routes would benefit all users. Believing that a cost recovery system should be set up, this study recommends the implementation of either a fee-permitting system administered by both cities for local travel over the city networks, or a simple increase in toll fees to compensate for the provision of this improved infrastructure. Clearly, the simpler toll-increase procedure has merit for two reasons: (1) it already exists, and (2) as long as the increase is not significant, it is likely that truckers would accept this as a trade off for obtaining a higher quality infrastructure. Initial modeling suggests that an increase on the order of

15 percent would be sufficient to pay for the strengthening of the key truck routes in Laredo. However, more detailed work is needed to develop an acceptable fee structure.

4. *City Street Planning.* The city is developing an enhanced street system of inner and outer loops with TxDOT technical assistance and local, state, and federal funds. While the loop system will create new patterns of traffic, unless there is a new bridge within the Laredo system close to the existing city bridges, significant traffic will remain in the downtown area. The bridge at Colombia, once it is linked effectively with both the U.S. interstate system and the Mexican autopista network, will eventually divert much U.S. through traffic to the Mexican industrial zones. And though the initial rate of diversion may be slowed by the reluctance of traditional brokers and shippers to use the new facility, the economic attractiveness of the bridge-highway system should eventually prevail, altering significantly (in the medium term) city and bridge traffic patterns. Again, this is a key issue being considered in TxDOT planning.

5. *City Highway Planning Needs.* The city urgently needs to develop new facilities to take advantage of new funding sources and to plan new infrastructure. It needs to develop databases that show not only the condition of city streets, but also patterns of traffic movement across the city network. This study recommends that a city traffic database be set up with vehicle classification and counting systems; samples of weight data should also be included to determine appropriate design standards. Given that the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 requires that a pavement management system (PMS) be developed by the metropolitan planning organization (MPO), we recommend that truck routes be part of the PMS for Laredo.

6. *Intermodal Needs.* It is also important that Laredo collect data and develop an intermodal perspective, since its importance as a gateway relies not merely on trucks but also on rail traffic moving into Mexico. The potential development of rail intermodal services in the next decade could play a critical part in the emerging patterns of trade traffic; accordingly, the city needs to monitor these developments in order to plan effectively. This study advocates again that the city attempt to link with other intermodal planning, and that this be part of the TxDOT planning process.

A final note regarding intermodal needs: Air freight to Mexico, another rapidly growing mode, now represents over 6 percent, by value, of U.S.-Mexico trade. Accordingly, air freight should be recognized within the intermodal context and, along with other modes, should be monitored in order to identify its impacts on other key transport modes that sustain Laredo's commercial and economic viability.

BORDER REGION ISSUES

Findings that can be applied across the border region are grouped into the following areas:

1. Border transfers are complex and impose significant costs on shippers. Investments in single-solution programs—more bridges or better highways—do not necessarily result in improved trade flows. The whole system must be recognized, analyzed, and evaluated.

2. Planning activities and processes should be strengthened at a regional level (TxDOT), at city levels (MPOs or cities), and at the international level. The scope should be widened to include key players in the border transfer mechanism, namely, the GSA, customs, and other federal entities.

3. The international dimension should be explicitly recognized by strengthening planning links with Mexican states and federal authorities. The work accomplished to date to this end should be supported and enhanced. It could be formalized to produce and to utilize common data bases on both sides of the border. Short- and medium-term infrastructure plans in Mexico and along the U.S. border should be formally shared and reviewed. The experience gained from these exchanges could then be used to develop the more difficult long-term plans.

4. Transportation planning is currently hampered by severe data constraints and data shortages in key areas. Cities should collect comprehensive traffic and load data for implementing pavement management systems. They should also conduct regular origin and destination studies to define trade patterns and needs. In order to better determine its infrastructure needs, TxDOT should develop a regional system (possibly GIS) in which these data are identified and supplemented by modal flows.

5. Intermodal traffic should be tracked by both city and TxDOT operations. In addition to the collection of modal data, TxDOT planning should encourage modal operators to contribute to the development of an effective regional intermodal system.

6. While bridge crossing capacities may be adequate for future traffic levels, many current bridges are poorly located. It seems likely that new out-of-town bridges will be required to complement loop and beltway schemes now being considered—and in some cases implemented—to divert heavy traffic away from pedestrians, urban businesses, and retail activities. This will change demand for the traditional downtown gateway bridge sites.

