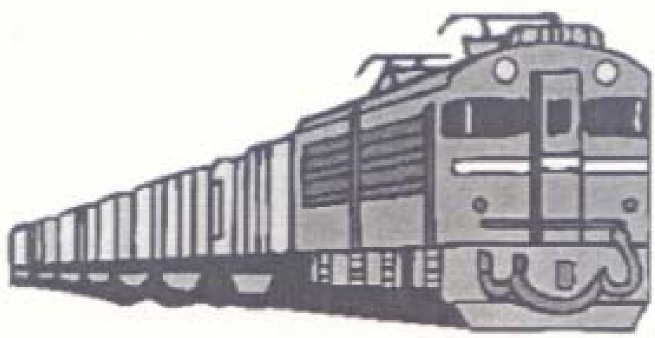
Perspectives

ON TEXAS PUBLIC POLICY

Freight Rail's Potential to Alleviate Traffic Congestion



by

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EXECUTIVE SUMMARY

ABSTRACT

Urban areas around the nation face serious traffic congestion. While trucks represent an important resource, they have a disproportionately high impact on traffic congestion. That impact would be even greater if it was not for the strong freight rail industry.

The United States is unique in having retained a strong freight rail market. Freight rail in Europe and Japan has lost most of its market share, which has led to much higher levels of truck traffic, and more intense traffic congestion. Part of the reason for the decline of freight rail in these areas has been that emphasis on passenger rail has limited freight capacity and competitiveness. U.S. freight railroads have been able to grow and maintain most of their market share at least partially because passenger rail services have been greatly curtailed, which has provided needed capacity for growth. The Northeast Corridor of the United States is more akin to Japan or Europe, with a much smaller market share for freight rail, again largely due to the emphasis placed upon passenger rail.

The international experience, historical trend, and Northeast Corridor experience suggest that a strong freight rail system is incompatible with a strong passenger rail network. This is important, since many states and metropolitan areas seek to reduce traffic congestion through expansion of passenger rail (intercity and commuter). By driving freight away from railroads, the net effect of these projects could be to worsen traffic congestion. With respect then to traffic congestion, the question is whether a strong freight rail system or a strong passenger rail system is likely to provide greater benefits.

To contain urban traffic congestion, it is crucial that the freight rail industry maintains or expands its market share. If freight rail experiences market share losses akin to those sustained in Europe or Japan, the equivalent of a 50 percent increase in urban traffic volumes can be expected by 2020. This would translate into serious economic losses.

Freight projects that assist in maintaining freight rail market shares or separate or expedite truck traffic appear to have more potential for reducing traffic congestion than passenger rail projects in many areas. Public policy should be directed to implementing the most effective freight or passenger projects for reducing traffic congestion.

TRAFFIC CONGESTION AND FREIGHT

Traffic Congestion in Texas: Steadily increasing urban traffic congestion has become one of the most important issues in public opinion polls and public policy. It is especially a problem in fast-growing areas such as the state of Texas. Texas traffic is exacerbated by its high population growth rate, its proximity to the Mexican border, and the rapidly increasing truck traffic being generated by the North American Free Trade Agreement (NAFTA).

High costs and community impacts have made wholesale expansion of metropolitan roadways difficult, if not impossible. For decades, urban road expansion has fallen far behind the increases in traffic. Significant increases in overall traffic volumes are expected in all Texas metropolitan areas, and it is likely that truck traffic will increase at an even greater rate because of NAFTA.

Highway and Rail Freight: The nation's highway freight industry moves 42.7 percent of combined rail and truck intercity freight and has been improving its share of the combined rail and truck freight market for decades. The industry was deregulated in 1979 and improved its productivity 36 percent through 1998 (ton miles per million dollars of revenue).

At the same time, trucks contribute disproportionately to traffic volumes. It is estimated that the average combination truck (single trailer or double trailer) consumes approximately 3.8 times the road space of an automobile. Large truck traffic volumes have been rising considerably faster than other traffic. From 1990 to 1999, urban truck traffic increased 48.7 percent, 80 percent above the 26.9 percent growth rate of other traffic. Over the next 20 years, truck volumes are expected to more than double in the United States.

Despite the market share gains of trucks, freight rail has maintained a strong market share, at 57.3 percent of the combined rail and truck market in 1998. Rail freight was deregulated in 1980. Since deregulation, rail freight has improved its productivity 143 percent (ton miles per million dollars of revenue).

The volume of rail freight is illustrated by the fact that if all rail freight traffic was diverted to trucks, truck traffic would increase approximately 116 percent. Over the next 20 years, rail freight volumes are expected to increase by one-half. This is a slower rate than the projected truck increase, and implies a further erosion of 15 percent in rail market share. This will lead to greater roadway congestion.

Little attention has been given to implementation of freight projects to alleviate traffic congestion. This report will provide a preliminary analysis of the potential for reducing traffic congestion through both rail freight and highway freight projects.

THE UNIQUE ROLE OF FREIGHT RAIL IN THE UNITED STATES

The United States and Canada are unique among high-income world nations in having retained considerable rail freight market shares.

The International Decline of Freight Rail: This greater reliance on rail freight in the United States reduces the amount of truck traffic on highways. The United States has the highest volume of freight traffic in the world, and its per capita volume is second only to Canada. Despite the continuing urbanization of lower-income nations such as China, the U.S. freight rail industry expanded its share of the world's freight traffic during the 1990s. U.S. rail freight volumes per capita are 20 times that of Europe and 40 times that of Japan. Canadian per capita rail ton mileage is 30 percent higher than in the United States. In comparison to the United States and Canada, Europe and Japan are nearly fully dependent upon roadway freight.

Other high-income areas have seen their freight rail market shares drop precipitously. Since 1970, Japan's rail share of the combined truck-rail market has fallen 75 percent, to 7.4 percent (less than one-seventh the U.S. share). More than 35 percent of highway traffic is trucks, nearly five times the U.S. rate. Approximately 45 percent of traffic in Tokyo (the world's largest urban area) is trucks, where truck traffic volumes per square mile are six times that of U.S. urban areas.

The European Union has experienced a 60 percent decline in rail freight market share since 1970, and now stands at 16 percent (less than one-third the U.S. share). Trucks represent 16.5 percent of all traffic in Europe, more than double the U.S. figure of 7.5 percent. Urban truck traffic per square mile is more than 70 percent higher than in the United States.

As was noted above, the U.S. rail share of the combined truck-rail market is 57.3 percent, down 11 percent from 1970. Unlike Europe and Asia, the U.S. freight rail industry has experienced overall increases in volume, capturing 50 percent of new ton mileage since 1970. Freight rail carries a wide variety of commodities, especially bulk items, such as grain and coal and cargoes that are less time sensitive.

At the same time, Europe and Japan are known for their comprehensive and well-patronized passenger rail systems. Canada and the United States, with the greatest per capita rail freight volumes among high-income nations, also have by far the lowest passenger rail market shares. It appears that a strong freight rail market share is incompatible with a strong passenger rail market share.

The Survival of Freight Rail in the United States: The greatest losses occurred between 1940 and 1960, with the loss rate dropping by two-thirds from 1950 to 1998. Since 1960, total freight rail volumes have increased 140 percent, and freight rail has captured more than 50 percent of the new combined rail and truck market. After 1960, the interstate highway system became available for trucks and improved their competitiveness relative to rail. But for the freight rail systems, this competitive disadvantage was offset by the capacity created from cancellation of passenger train service. From 1940 to 1971, the route miles of passenger rail service were reduced more than 80 percent. Without this reduction, it is unlikely that freight rail would have been able to increase its volume, and traffic congestion would be considerably worse. If freight rail volumes had remained at the 1960 level, roadway traffic would be the equivalent of 20 percent worse today.

The Highway-Dependent U.S. Northeast Corridor: As in Europe and Japan, the U.S. Northeast Corridor (Washington through Baltimore, Philadelphia, and New York to Boston) exhibits both a strong passenger rail market share and a weak rail freight share. This corridor, comprising less than 2,000 miles of the nation's more than 100,000 railroad route miles, handles 75 percent of commuter rail traffic and more than 40 percent of intercity rail (Amtrak) service. The Northeast is by far the nation's least freight rail-dependent area (and most truck dependent), despite having some of the nation's largest seaports (seaports, with their large volume of container traffic, are generally large generators of freight rail traffic). Because a lack of investment and priority for passenger service, there are no freight rail lines into New York, the nation's largest city, from the west (New Jersey). A new freight-only tunnel under New York Harbor is being proposed.

FREIGHT RAIL AND TRAFFIC CONGESTION: PROSPECTS

Freight Railroad Competitiveness: As noted above, freight railroads have lost market shares and are projected to sustain further market share losses. Nonetheless, the U.S. losses have been considerably less than those of Japan and Europe.
Freight railroads have advantages over truck freight. They are able to move large volumes of freight comparatively inexpensively, and with a lesser expenditure of energy. The intermodal market, consisting of truck trailers and ocean shipping containers moved by rail and truck, is growing rapidly and has significant potential for expansion.

On the other hand, rail freight has significant competitive disadvantages relative to trucks. The most important is its comparative inflexibility, which manifests itself in slow operating speeds. Rail infrastructure is inherently much more limited than that available to intercity trucks. As a result, operating speeds of rail are comparatively slow. Moreover, the rail freight industry is among the nation's most capital intensive, which makes maintenance and expansion of the infrastructure challenging.

Freight railroads face a significant external threat. New commuter rail systems and proposed expansion of intercity rail service could make the freight railroads even less competitive. In the long run, this could result in diversion of large volumes of freight to trucks and to urban highways that are already congested.

Traffic Impacts: Significant increases in truck traffic can be expected on highways. Current projections call for a more than 100 percent increase in urban truck traffic through 2020. This is the equivalent of a 21 percent increase in all urban traffic. If rail freight's market share was to fall to European levels, truck traffic could be expected to increase 235 percent, the equivalent of a 49 percent increase in urban traffic.

Rail and Highway Freight in Texas: Texas metropolitan areas generally utilize rail freight more than other metropolitan areas. Houston has by far the highest share of rail freight tonnage and per capita tonnage of the top ten U.S. metropolitan areas. Dallas-Fort Worth ranks third in rail tonnage per capita and fourth in rail tonnage market share. San Antonio also has a much higher-than-average dependence on rail freight.

It is likely that both rail and truck freight volumes will expand at a higher-than-average rate in Texas because of the comparatively rapid population growth rate. NAFTA volumes are likely to increase the truck and rail volumes even more, since Texas has the most proximate Mexican border points of entry for 75 percent of the markets in Mexico, the United States, and Canada.

Economic Impact: At the same time, the additional traffic will cause further delays and impose congestion costs on Texas metropolitan areas. The projected reduction in the rail freight market share and the resulting additional congestion cost would be $6 billion in major Texas metropolitan areas in 2020 alone. If rail freight's market share drops to European levels, the cost would rise to $19 billion. This would be equal to from $1,250 to $3,750 per household.

REDUCING TRAFFIC CONGESTION

Freight Projects and Traffic Congestion: The Potential: There is evidence that freight-based projects offer substantial opportunities to contain traffic congestion.

The Alameda Corridor freight project in Los Angeles involves placing port-serving railroad lines in a trench for more than 20 miles. This will reduce daily vehicle hours of traffic congestion by 14,500, at a cost of $5.23 per delay hour. By comparison, the Houston light rail line, currently under construction, will cost more than $120 per vehicle hour of traffic delay reduction. Moreover, the Alameda Corridor project is more cost effective in its air quality impacts. For example, the Alameda Corridor project is more than 140 times as cost effective in Nitrogen Oxide (NOx) reduction as the Houston light rail project.

Further, the Alameda Corridor project appears to be 11.5 times as cost effective in reducing traffic delay as the average new transit investment (primarily rail) proposed in the United States.

There is a proposal to develop an upgraded truck-rail intermodal system between Dallas and Houston. The cost per automobile equivalent trip removed from urban roadways would be superior to virtually any of the nation's new urban rail systems.

Similarly, projects that expedite and separate the movement of highway freight traffic can have a superior benefit. An exclusive truck freeway bypass of Austin could be 40 to 70 times as cost effective per automobile equivalent trip removed from Interstate 35 in Austin than the light rail proposal rejected by voters in 2000.

The potential for freight projects is underscored by an analysis of truck, transit, and traffic data in 45 world cities. Generally, trucks appear to increase traffic congestion much more than transit reduces it. In the United States, trucks are responsible for 19 times the traffic volume that is removed by transit ridership (a "truck-transit benefit ratio" of 19:1). In Houston, the only Texas urban area in the available international database, trucks are estimated to account for more than 40 times as much road travel as is reduced by transit travel.

Based on the Houston truck-transit benefit ratio, the 25 to 70 percent transit ridership increases projected for Texas urban areas over the next 20 years would produce the same reduction in traffic volumes as a 0.6 percent to 1.6 percent reduction in truck volumes over the same period.

Balanced Transportation Policy: A principal purpose of funding for urban transit projects is the reduction or containment of traffic congestion. Achieving this objective requires a balanced approach that relies on the most effective traffic-containing measures, rather than being skewed toward a particular strategy. Because it is so difficult to increase urban roadway capacity, and because rail freight traffic losses are generally transferred to traffic-increasing trucks, public policy should avoid actions that make freight rail less competitive. The international, national, and Northeast Corridor experience imply that strong rail freight market shares may be incompatible with an emphasis on commuter or intercity rail.

The private freight railroads are a national infrastructure resource. If freight rail should not continue to grow, thus losing market shares at a higher rate than in the past, urban traffic congestion would become worse. Further, there are other potential advantages of a public policy that would forbid government actions that skew the freight market away from rail to truck:

★ Rail has a lower fatality rate than trucks.

★ Rail moves freight with less energy.

★ Rail generally pollutes less than trucks.

★ Rail freight rates are lower than those of trucks, lowering ultimate product prices.

As noted above, there may be cases where freight rail or truck projects might achieve greater traffic congestion reductions than transit projects for the same amount of public funding. Transit funding that is intended for traffic mitigation should be available to the most cost-effective projects, passenger or freight.

It is recommended that:

★ Urban transportation planning should routinely solicit and consider all potential passenger and freight alternatives for increasing usable automotive capacity and reducing traffic congestion.

★ Transit congestion relief funding should be equally available to passenger and freight projects based upon their comparative effectiveness in reducing or containing traffic congestion.

★ Development of any major investment (passenger or freight) should proceed only where it is found that the project is more cost effective in reducing traffic congestion than any other project considered.

★ Commuter rail or intercity rail projects should generally not be considered, except in corridors that already have significant passenger rail volumes and where a rebuttable (legally challengeable on a factual basis) finding is made that neither the present nor future competitiveness of the rail freight system, locally, regionally, or nationally, would be compromised by the project. Such a policy is required to ensure the continued competitiveness of the freight rail industry and thereby manage traffic congestion.

★ A Federal Transit Administration (FTA) program should be developed that identifies the most critical urban traffic reduction needs and prioritizes projects to achieve the greatest return.

★ To minimize the potential for overall societal economic loss, a rebuttable finding should be required that any project have a projected cost per hour of traffic delay reduced that is less than the personal economic cost of such delay.

I. TRAFFIC CONGESTION AND FREIGHT

TRAFFIC CONGESTION IN TEXAS

Background: Traffic congestion[1] is increasing around the nation and is routinely one of the most significant concerns raised in public opinion surveys. Generally, recurring[2] roadway traffic congestion is concentrated in the larger urban areas. Between the urban areas, traffic generally flows well. Moreover, much of the interstate highway system was built with sufficiently wide medians to permit comparatively inexpensive capacity expansion. In most locations, there is room to accommodate at least one additional lane in each direction, and a large percentage of bridge overpasses are capable of handling such an expansion.

While the need for highway expansion is the greatest in urban areas, it is also the most difficult. Costs are considerably higher, and the potential for disruption of residences, neighborhoods and businesses is greater. Because of this disruption, there is much greater political opposition to urban roadway expansion. Also, in many corridors, the available capacity expansion on urban freeways has already been utilized.

Urban planners often imply that roadway traffic congestion can be mitigated by expanding public transit service, especially urban rail (light rail, metro,[3] and commuter rail). However, the planning reports that have justified virtually all such urban rail proposals around the nation have generally shown little impact on traffic congestion (Appendix). Moreover, traffic congestion has continued to intensify both in urban areas with urban rail systems and in those without.

This report examines the impact of truck and rail freight on urban traffic congestion in Texas. It further seeks to determine whether there is potential for cost-effective mitigation of traffic congestion and air pollution through freight system improvements.

Population Growth: Texas is now the nation's second-most populous state, having passed New York during the last decade and experiencing rapid growth. The 2000 U.S. Census indicates that Texas has a population of 20,852,000, up 23 percent from the 1990 figure of just under 17 million. During the 1990s, Texas increased over 75 percent faster than the national rate. Texas added 3.9 million residents, slightly less than much larger California's 4.1 million. Among the

[1] Traffic-related air pollution is also a concern. However, despite rising traffic volumes, air pollution has been falling in recent decades in U.S. urban areas, largely due to on-board vehicular air pollution control systems (Internet: www.demographia.com/db-metapall97.htm and www.demographia.com/db-usmetap-8897.htm and www.demographia.com/db-airpollu1970.htm). Moreover, highway system emissions will *continue* to drop for many years to come as the older, dirtier cars are replaced by newer ones, even if there is never another change in emission requirements for new vehicles.

[2] Traffic congestion can occur due to accidents or other incidents anywhere on the roadway system. The most intense regularly occurring traffic congestion, however, is largely limited to urban areas due to their higher density and higher demand for road space.

[3] Fully grade-separated subway or elevated rail systems, such as in New York, Washington, D.C., Chicago, Paris ("Metro") or London ("Underground"). Such systems are also referred to as "heavy rail" (as opposed to light rail or commuter rail).

other 48 states, only Florida added more than one-half the amount of new Texas population (Table 1).

Table 1
10 States Adding the Most Population: 1990-2000

Rank	State	1990	2000	Change	%
1	California	29,760,021	33,871,648	4,111,627	13.8%
2	**Texas**	**16,986,510**	**20,851,820**	**3,865,310**	**22.8%**
3	Florida	12,937,926	15,982,378	3,044,452	23.5%
4	Georgia	6,478,216	8,186,453	1,708,237	26.4%
5	Arizona	3,665,228	5,130,632	1,465,404	40.0%
6	North Carolina	6,628,637	8,049,313	1,420,676	21.4%
7	Washington	4,866,692	5,894,121	1,027,429	21.1%
8	Colorado	3,294,394	4,301,261	1,006,867	30.6%
9	Illinois	11,430,602	12,419,293	988,691	8.6%
10	New York	17,990,455	18,976,457	986,002	5.5%

Source: U.S. Census Bureau.

Much of Texas' population growth has been urban. In 1990, approximately 59 percent of the population was in the four largest metropolitan areas (Dallas-Fort Worth, Houston, San Antonio and Austin). From 1990 to 2000, 72 percent of the state's growth was in those four metropolitan areas (2.8 million). The large Texas metropolitan areas were among the fastest growing in the nation (Table 2).

★ Dallas-Fort Worth alone added 30 percent of the new population, with an increase of nearly 1.2 million. Only Los Angeles and New York added more residents than Dallas-Fort Worth. Among the 50 U.S. metropolitan areas with more than one million residents in 2000, Dallas-Fort Worth ranked 9th in its percentage of population increase.

★ Houston added 940,000 new residents, more than all but five metropolitan areas and ranked 12th in percentage increase among the top 50.

★ Austin was the second-fastest-growing metropolitan area among the top 50, growing 47.7 percent (only Las Vegas grew faster). Austin added more than 400,000 residents, more than the population of cities such as St. Louis, Pittsburgh or Cincinnati.

★ San Antonio became the nation's 29th largest metropolitan area, adding 270,000 residents. San Antonio's growth rate was 18th among the top 50 metropolitan areas.

In just 10 years, the four largest Texas metropolitan areas added a population equivalent to that of the city of Chicago, or 1.25 times that of Paris.

Table 2
Metropolitan Areas over 1,000,000 Population and
Texas Metropolitan Areas over 250,000

Rank	Metropolitan Area	2000	1990	Change
1	New York--Northern New Jersey--Long Island, NY--NJ--CT–PA CMSA	21,199,865	19,549,649	8.4%
2	Los Angeles--Riverside--Orange County, CA CMSA	16,373,645	14,531,529	12.7%
3	Chicago--Gary--Kenosha, IL--IN--WI CMSA	9,157,540	8,239,820	11.1%
4	Washington--Baltimore, DC--MD--VA--WV CMSA	7,608,070	6,727,050	13.1%
5	San Francisco--Oakland--San Jose, CA CMSA	7,039,362	6,253,311	12.6%
6	Philadelphia--Wilmington--Atlantic City, PA--NJ--DE--MD CMSA	6,188,463	5,892,937	5.0%
7	Boston--Worcester--Lawrence, MA--NH--ME--CT CMSA	5,819,100	5,455,403	6.7%
8	Detroit--Ann Arbor--Flint, MI CMSA	5,456,428	5,187,171	5.2%
9	**Dallas--Fort Worth, TX CMSA**	**5,221,801**	**4,037,282**	**29.3%**
10	**Houston--Galveston--Brazoria, TX CMSA**	**4,669,571**	**3,731,131**	**25.2%**
11	Atlanta, GA MSA	4,112,198	2,959,950	38.9%
12	Miami--Fort Lauderdale, FL CMSA	3,876,380	3,192,582	21.4%
13	Seattle--Tacoma--Bremerton, WA CMSA	3,554,760	2,970,328	19.7%
14	Phoenix--Mesa, AZ MSA	3,251,876	2,238,480	45.3%
15	Minneapolis--St. Paul, MN--WI MSA	2,968,806	2,538,834	16.9%
16	Cleveland--Akron, OH CMSA	2,945,831	2,859,644	3.0%
17	San Diego, CA MSA	2,813,833	2,498,016	12.6%
18	St. Louis, MO--IL MSA	2,603,607	2,492,525	4.5%
19	Denver--Boulder--Greeley, CO CMSA	2,581,506	1,980,140	30.4%
20	Tampa--St. Petersburg--Clearwater, FL MSA	2,395,997	2,067,959	15.9%
21	Pittsburgh, PA MSA	2,358,695	2,394,811	-1.5%
22	Portland--Salem, OR--WA CMSA	2,265,223	1,793,476	26.3%
23	Cincinnati--Hamilton, OH--KY--IN CMSA	1,979,202	1,817,571	8.9%
24	Sacramento--Yolo, CA CMSA	1,796,857	1,481,102	21.3%
25	Kansas City, MO--KS MSA	1,776,062	1,582,875	12.2%
26	Milwaukee--Racine, WI CMSA	1,689,572	1,607,183	5.1%
27	Orlando, FL MSA	1,644,561	1,224,852	34.3%
28	Indianapolis, IN MSA	1,607,486	1,380,491	16.4%
29	**San Antonio, TX MSA**	**1,592,383**	**1,324,749**	**20.2%**
30	Norfolk--Virginia Beach--Newport News, VA--NC MSA	1,569,541	1,443,244	8.8%
31	Las Vegas, NV--AZ MSA	1,563,282	852,737	83.3%
32	Columbus, OH MSA	1,540,157	1,345,450	14.5%
33	Charlotte--Gastonia--Rock Hill, NC--SC MSA	1,499,293	1,162,093	29.0%
34	New Orleans, LA MSA	1,337,726	1,285,270	4.1%
35	Salt Lake City--Ogden, UT MSA	1,333,914	1,072,227	24.4%
36	Greensboro--Winston-Salem--High Point, NC MSA	1,251,509	1,050,304	19.2%
37	**Austin--San Marcos, TX MSA**	**1,249,763**	**846,227**	**47.7%**
38	Nashville, TN MSA	1,231,311	985,026	25.0%
39	Providence--Fall River--Warwick, RI--MA MSA	1,188,613	1,134,350	4.8%
40	Raleigh--Durham--Chapel Hill, NC MSA	1,187,941	855,545	38.9%
41	Hartford, CT MSA	1,183,110	1,157,585	2.2%
42	Buffalo--Niagara Falls, NY MSA	1,170,111	1,189,288	-1.6%

43	Memphis, TN--AR--MS MSA	1,135,614	1,007,306	12.7%
44	West Palm Beach--Boca Raton, FL MSA	1,131,184	863,518	31.0%
45	Jacksonville, FL MSA	1,100,491	906,727	21.4%
46	Rochester, NY MSA	1,098,201	1,062,470	3.4%
47	Grand Rapids--Muskegon--Holland, MI MSA	1,088,514	937,891	16.1%
48	Oklahoma City, OK MSA	1,083,346	958,839	13.0%
49	Louisville, KY--IN MSA	1,025,598	948,829	8.1%
63	**El Paso, TX MSA**	**679,622**	**591,610**	**14.9%**
74	**McAllen--Edinburg–Mission, TX MSA**	**569,463**	**383,545**	**48.5%**
106	**Beaumont--Port Arthur, TX MSA**	**385,090**	**361,226**	**6.6%**
108	**Corpus Christi, TX MSA**	**380,783**	**349,894**	**8.8%**
121	**Brownsville--Harlingen--San Benito, TX MSA**	**335,227**	**260,120**	**28.9%**
128	**Killeen--Temple, TX MSA**	**312,952**	**255,301**	**22.6%**

Source: U.S. Census Bureau.
CMSA: Consolidated metropolitan statistical area.
MSA: Metropolitan statistical area.

Further, Texas is expected to continue to grow rapidly. It is projected that the state population will rise 55 percent through 2025 (Table 3).[4] This is more than double the national population projection of 23 percent. More than 85 percent of the new Texas residents are expected to be in the largest metropolitan areas. Dallas-Fort Worth is expected to approach 9 million, nearly the present population of metropolitan Chicago, while Houston will reach 7.5 million, approximately the present level of the San Francisco and Washington-Baltimore areas. Austin is expected to nearly double in size, while San Antonio will increase by nearly one-half. McAllen and El Paso are expected to exceed or approach the present population of Austin, growing 137 percent and 72 percent respectively.

Table 3
Projected Population: Texas and Metropolitan Areas over 500,000 in 2025

Metropolitan Area	2000	2025	Change	%
Austin	1,250,000	2,403,000	1,153,000	92.2%
Brownsville	335,000	589,000	254,000	75.8%
Dallas-Fort Worth	5,222,000	8,849,000	3,627,000	69.5%
El Paso	678,000	1,166,000	488,000	72.0%
Houston	4,670,000	7,497,000	2,827,000	60.5%
McAllen	569,000	1,346,000	777,000	136.6%
San Antonio	1,592,000	2,333,000	741,000	46.5%
Metropolitan Areas over 500,000	14,316,000	24,183,000	9,867,000	68.9%
Balance of State	6,536,000	8,049,000	1,513,000	23.1%
State	20,852,000	32,232,000	11,380,000	54.6%

Projected using Census Bureau and Texas Data Center information.

[4] Applies the average of two Texas Data Center projection increase scenarios (Scenario 1.0 and Scenario 1990-1998) to the 2000 U.S. Census figure for each metropolitan area.

Traffic Congestion Growth: There is an intense public concern about growing traffic congestion in the nation's urban areas. The high cost and political barriers related to adding highway capacity have precluded the roadway expansions that could have accommodated growing traffic volumes.[5] The high population growth in Texas urban areas has caused traffic volumes to rise even more quickly than in other urban areas. Since 1982, traffic volumes on major roads in the five largest Texas urban areas have nearly doubled, while capacity has increased only 56 percent. As a result, the hours of time spent in delayed traffic have increased more than 300 percent (Figure 1). The lost productivity due to traffic delay amounted to 0.38 percent of gross state product in 1982, and increased by 2.5 times to 0.94 percent in 1999.[6]

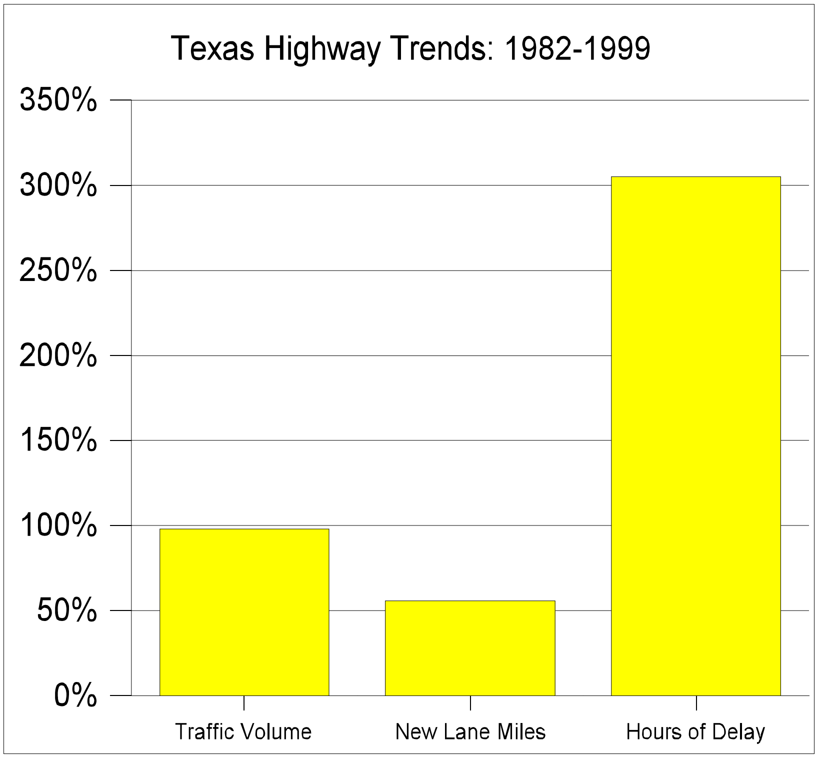

Figure 1
Calculated from Texas Transportation Institute data.

[5] There is a popular conception that building additional roadways is futile, because they cause ("induce") nearly as much additional travel as new roadway capacity is provided. Studies that show significant "induced traffic" effects tend to focus only on the new capacity and do not take into consideration the impacts on existing roadways that experience reduced traffic levels. A Federal Highway Administration (FHWA) paper estimates that there is an "induced traffic" factor of between five percent and 13 percent, based upon vehicle miles. This effect, however, largely disappears if measured in travel time, rather than vehicle miles traveled. As better travel options are provided, people tend to travel approximately the same amount of time, and travel farther because of the higher travel speeds made possible by the new roadway capacity. For example, based upon the FHWA research, induced traffic based upon travel time falls from minus nine percent to plus four percent (calculated from data in Patrick DeCorla-Souze and Harry Cohen, *Accounting for Induced Travel in Evaluation of Urban Highway Expansion*, Internet: www.fhwa.dot.gov/steam/doc.htm).

[6] Calculated from Texas Transportation Institute (1982 is earliest data available; 1999 is latest data available).and U.S. Department of Commerce Bureau of Economic Analysis data.

Nonetheless, Texas policymakers have been generally more successful than those in most other large U.S. urban areas in providing new highway capacity to accommodate rising traffic volumes, because they have provided greater increases in capacity.[7] Regional planning organizations have forecast the following approximate increases in travel demand:[8]

- ★ 75 percent in Dallas-Fort Worth (1995-2020)
- ★ 50 percent in Houston (2000-2020)
- ★ 70 percent in San Antonio (1995-2025)
- ★ 65 percent in Austin (1997-2020)

Further, metropolitan population figures from the 2000 Census indicate that growth during the 1990s was generally greater than had been estimated. As a result, the traffic volume increase projections made in the late 1990s for the 2020 to 2025 time frame could have underestimated the extent of future growth. Growth in Dallas-Forth Worth was 22 percent more than projected, 21 percent more in Austin, and 11 percent more in Houston.[9]

Because the most intense traffic congestion is in urban areas, it will be exceedingly expensive to provide additional highway capacity. Further, the most significant barrier to urban highway expansion is not lack of funding. There are significant political, neighborhood, and community barriers to expanding highway capacity in urban areas, and it will be difficult to accommodate the additional traffic growth that is projected over the next quarter century.

In short, traffic congestion is likely to grow substantially in Texas metropolitan areas unless sufficient new capacity is provided. Because Texas is on the principal routes for the growing NAFTA trade, a disproportionate share of the new traffic could be trucks.

HIGHWAY AND RAIL FREIGHT

Trucks and rail account for 64 percent of the nation's domestic freight volume, up from 57 percent in 1960. The balance is carried by pipelines, waterways, and air (Figure 2). Over the same period, rail freight has fallen slightly, from 38 percent to 37 percent of volume, while truck volumes have risen from 19 percent to 28 percent. In terms of total ton mileage, freight railroads have gained more than the other modes (Figure 3).

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[7] Thomas A. Rubin and Wendell Cox, *The Road Ahead: Innovations for Better Transportation in Texas*, Texas Public Policy Foundation, February 2001.

[8] Latest data available in each metropolitan area.

[9] Assumes U.S. Census Bureau 1990-1999 rate through 2000 as a base. The San Antonio projection was within 0.3 percent.

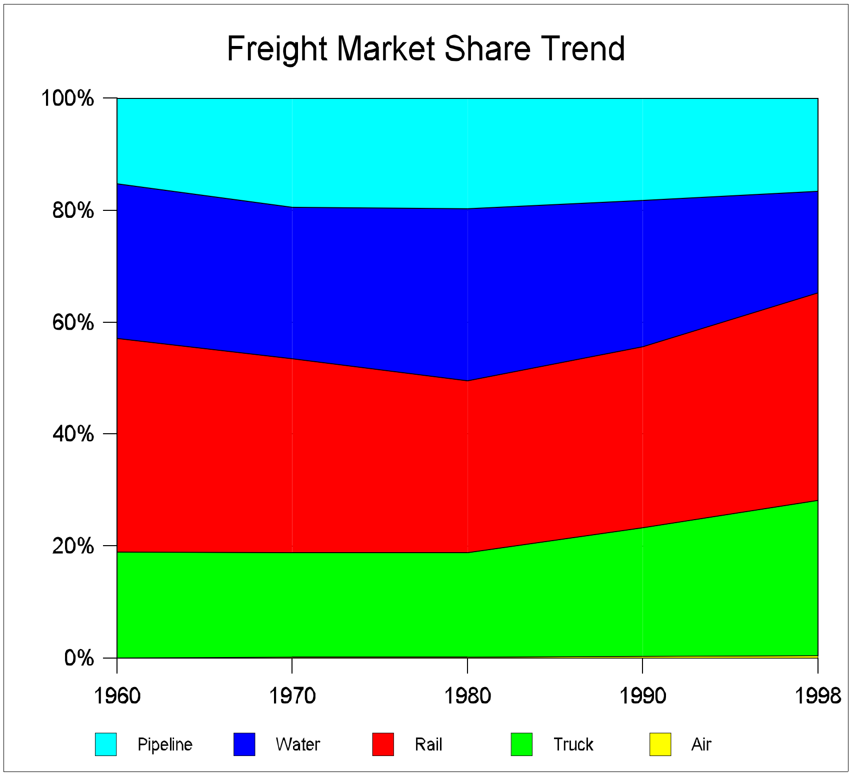

Figure 2
Calculated from U.S. Department of Transportation data.

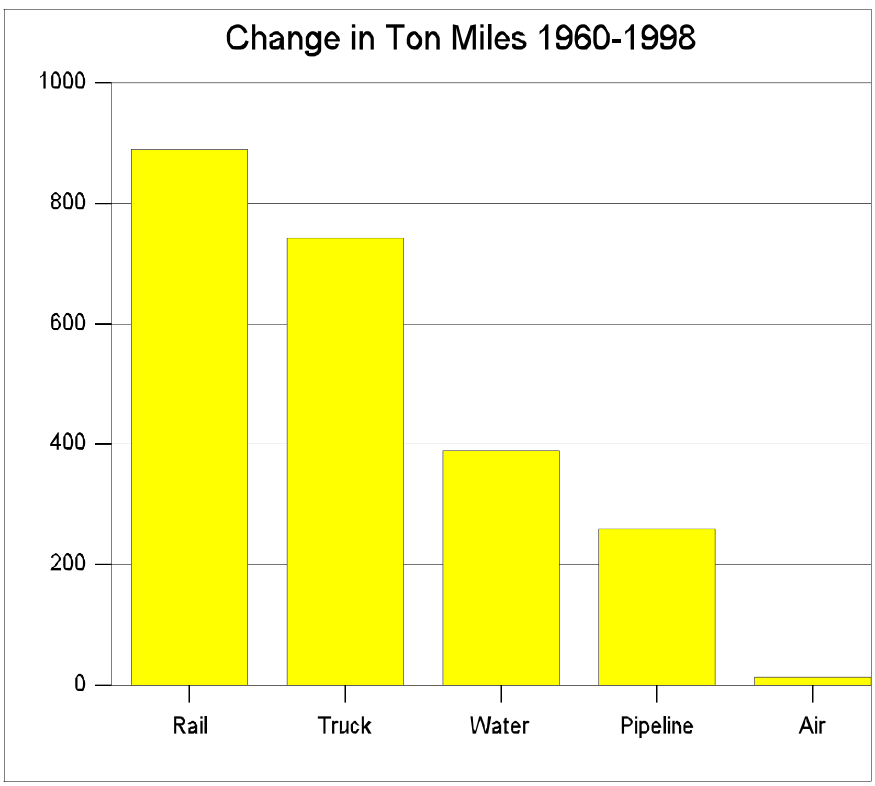

Figure 3
In billions of ton miles.
Calculated from U.S. Department of Transportation data.

Nonetheless, for decades, the nation's freight railroads have been losing market shares to highway freight (trucks). This has worsened traffic congestion. Moreover, any continued loss of rail freight market shares to trucks would have a more significant impact because of the difficulty of building new highway capacity through the most congested travel corridors. Virtually all of the volume that is carried by freight rail could be transferred to trucks.

Highway Freight (Trucks)

Rail freight's market share losses have translated into higher market shares for highway freight (trucking).[10] In 1998, 42.7 percent of combined intercity highway-rail freight was moved by truck, up 14 percent from 1980.[11] During this period, the trucking industry, which was deregulated in 1979, made significant productivity strides.[12]

★ Revenue per ton mile dropped 26 percent from 1980 to 1998.

★ The truck share of the gross domestic product has fallen nearly 15 percent since 1980.[13]

★ Trucks now move 36 percent more ton miles per million dollars of revenue than in 1980.[14]

As trucking has become more productive and increased in volume, it has also contributed to greater traffic congestion. Currently, large trucks represent 7.5 percent of the traffic volume in the United States.

While trucks carry a large volume of shipments between cities, their impact on traffic congestion is greatest within urban areas. For example, an Interstate 35 study found that over the route from Laredo to Duluth, Minnesota, 42 percent of rural highway mileage has sufficient capacity to handle traffic growth through 2025, while only five percent of urban mileage has sufficient capacity.[15] As was noted above, recurring traffic congestion is largely an urban phenomenon, while expansion of urban highway systems is difficult.

Moreover, trucks consume considerably more roadway capacity in urban areas than passenger cars and sport utility vehicles (SUVs) because of their larger size and slower acceleration

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[10] All of the following is based upon constant (inflation adjusted) dollars.

[11] Calculated from data in *National Transportation Statistics* (annual), U.S. Department of Transportation, Bureau of Transportation Statistics. Data in ton miles (a ton mile is a ton moved one mile).

[12] Calculated from data in *National Transportation*.

[13] Calculated from *National Income and Product Accounts*, U.S. Department of Commerce, Bureau of Economic Analysis.

[14] Calculated from *National Transportation Statistics.*

[15] Federal Highway Administration and Texas, Oklahoma, Kansas, Missouri, Iowa and Minnesota state departments of Transportation, *I-35 Trade Corridor Study Newsletter*, Fall 1999.

characteristics. Based upon Federal Highway Administration data,[16] it is estimated that (Figure 4):

★ Single trailer trucks are the equivalent of 3.77 passenger cars (passenger car equivalents) on congested urban freeways.

★ Double trailer trucks are the equivalent of 4.47 passenger cars on congested urban freeways.

Large trucks have the traffic impact of 3.8 passenger cars on congested urban freeways.

★ On average, large trucks[17] have the traffic impact of 3.8 passenger cars on congested urban freeways, based on a weighted average of single and double trailer trucks.

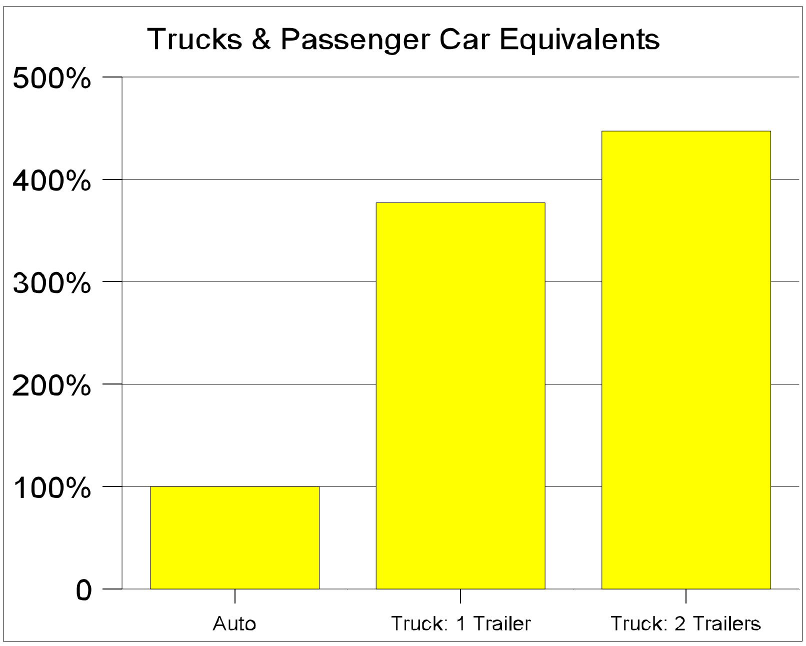

Figure 4
Calculated from FHWA data.

Large truck traffic volumes have been rising considerably faster than other traffic. From 1990 to 1999, urban truck traffic increased 48.7 percent, 80 percent above the 26.9 percent growth rate of other traffic (Figure 5).[18]

[16] Analysis of Federal Highway Administration truck passenger car equivalents in urban traffic congestion (unpublished data).

[17] Combination trucks (trucks with trailers, single, double or triple).

[18] Calculated from FHWA *Highway Statistics* data.

Over the next 20 years, truck tonnage is expected to more than double (an increase of 109 percent) in the United States, a rate more than five times that of population growth.[19] This will, by itself increase traffic approximately eight percent. But because of the greater road space consume by trucks, the traffic impact will be the equivalent of a more than 30 percent increase in traffic.

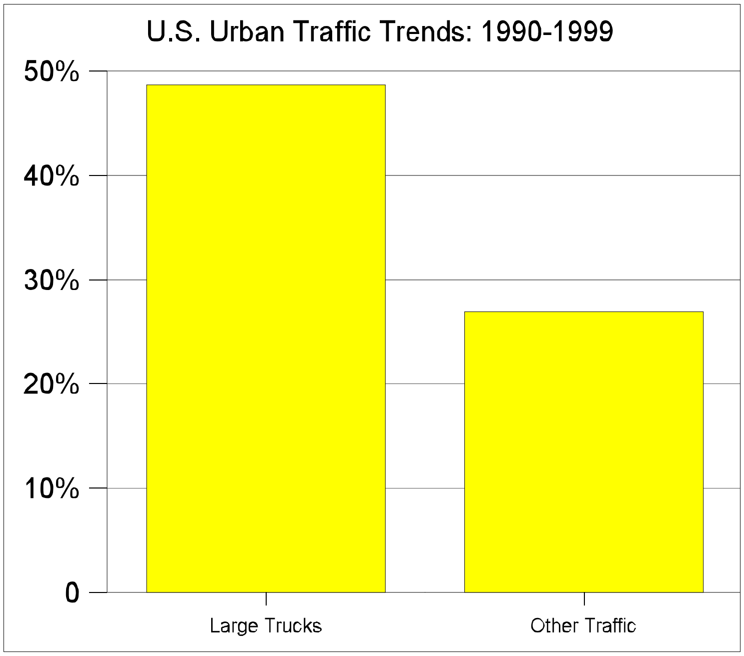

Figure 5
Calculated from FHWA data.

Over the next 20 years, truck tonnage is expected to double in the United States, a rate more than five times that of population growth.

Rail Freight

Despite the considerable volume carried by the nation's trucking firms, the freight rail system carries more. Rail freight accounts for nearly one-third more in volume (ton miles) than trucks. Rail freight carried approximately 57 percent of combined highway-rail land freight volume in 1998 (Figure 6).[20] The freight railroad industry was deregulated in 1980 and has become considerably more productive since that time.

- ★ Revenue per ton mile dropped 59 percent from 1980 to 1998.
- ★ Rail freight's share of the gross domestic product has fallen more than 60 percent since 1980.
- ★ Rail freight now moves 143 percent more ton miles per million dollars of revenue than in 1980.

[19] Bruce Lambert, *The Freight Analysis Framework*, Federal Highway Administration (FHWA), May 2001 (Internet: http://www.ops.fhwa.dot.gov/freight/pp/FAF%20Basic%20presentation- May%202001.PPT)

[20] Calculated from *National Transportation Statistics.*

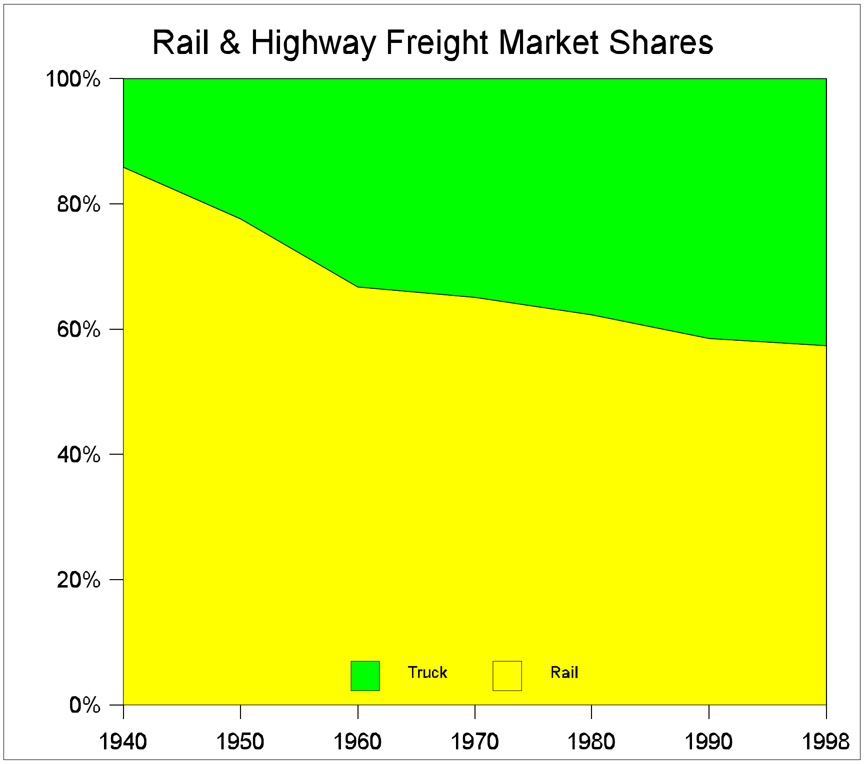

Figure 6
Calculated from U.S. Department of Transportation data.

If the volume of traffic freight that is carried by America's railroads was carried by trucks instead, it is estimated that truck traffic would be approximately 116 percent higher.[21] While this would represent a modest ten percent increase in traffic, the impact would be much greater because trucks consume considerably more road space than cars (above). This would be the equivalent of a 36 percent increase in traffic volume.

Rail freight market share losses translate directly into more truck traffic.

Like highway freight, U.S. rail freight traffic volume is growing and is expected to increase by one-half through 2020, more than double the rate of population growth (Figure 7).[22] However, this is a slower rate than is projected for trucks and, if projections are accurate, would reduce rail freight's market share from 57.3 percent to 48.8 percent, a loss of 15 percent. This annual loss of 0.74 percent is nearly three times the annual loss rate from 1990 to 1998 (0.25 percent). Generally, rail freight market share losses translate directly into more truck traffic. The projected freight rail market share reduction will result in higher traffic volumes with the impact felt most in urban areas that already face heavy traffic congestion and the highest air pollution levels.

[21] Estimated by applying large truck ton miles per vehicle mile to rail freight ton miles. A circuituity factor of 0.87 is applied (from the American Association of Railroads), because rail routes are more circuitous than truck routes.

[22] Lambert, FHWA.

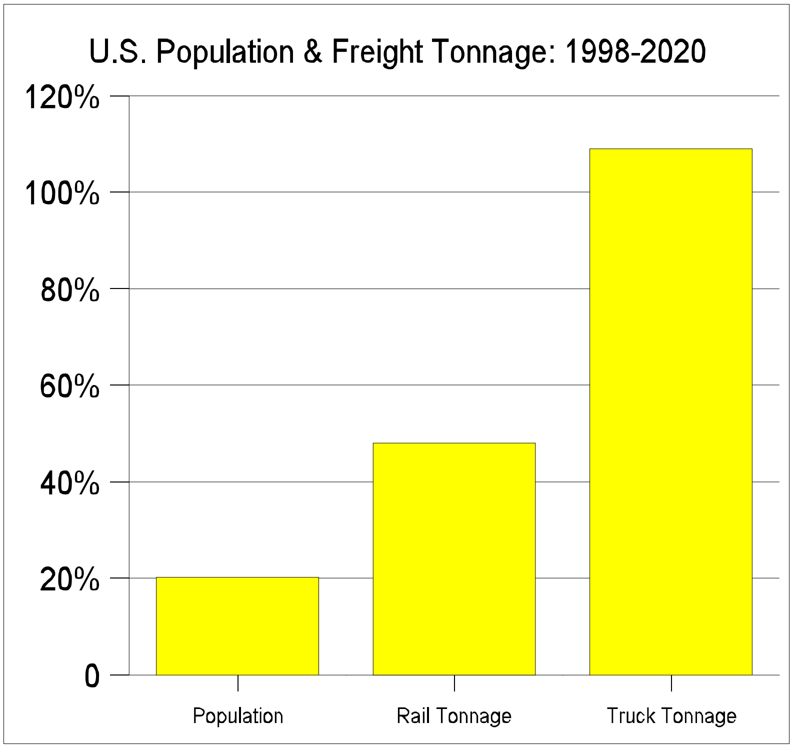

Figure 7
Calculated from U.S. Department of Transportation and Census Bureau data.

II. THE UNIQUE ROLE OF FREIGHT RAIL IN THE UNITED STATES

The United States and Canada are unique among high-income world nations in having retained considerable rail freight market shares. This greater reliance on rail freight in the United States reduces the amount of truck traffic on highways compared to other high-income areas, such as Europe and Japan.[23] Other high-income areas of the world have seen their freight rail market shares fall precipitously as well as actual volumes (ton miles). From the analysis that follows of high-income nations, the United States, and the U.S. Northeast Corridor, it appears that a crucial element in positioning the freight rail industry to maintain market share and grow is capacity – which means minimization of conflict from passenger trains. As is noted below, the conflict arises from the practice of awarding them priority over freight and their higher operating speeds, which necessitates additional train passing (overtaking) movements.[24]

[23] This section includes limited information on Canada, because full information is not available.

[24] The priority given passenger trains is the most important impediment. If passenger trains could be operated subject to the same speeds and delays as freight trains, there would be considerably less conflict. However, this would mean very slow train operation (under 25 miles per hour average), which would attract few, if any passengers.

The International Decline of Freight Rail

The World Bank railways database[25] indicates that U.S. ton mileage is the highest in the world, one third more than second-ranking China[26] and nearly double that of third-ranking Russia.[27] The United States, China, and Russia comprise more than 70 percent of world freight railway volumes. Despite its comparatively small population base, Canada's freight railways, which operate in a market very similar to that of the United States, rank fourth in overall volume (ton mileage).[28]

Moreover, the international position of U.S. freight railways has become stronger in recent years. From 1990 to 1996,[29] the U.S. share of world freight railway volume rose 60 percent, from approximately 20 percent to 32 percent.[30] It is significant that overall U.S. freight rail volumes have risen at a rate nearly a quarter higher than that of rapidly developing China since 1990. Over the same period of time freight rail volumes in Russia have dropped more than 50 percent.

Canada leads the world in rail ton miles per capita, approximately 1.3 times that of the second-ranking United States (Figure 8). U.S. freight rail volumes per capita exceed those of the European Union and Mexico by more than 20 times and Japan by 40 times. As a result, Japan and Europe are nearly fully dependent upon highway freight, as opposed to the United States and Canada, where a large share of freight moves by rail.

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[25] World Bank Railway Database (Internet: www.worldbank.org)

[26] China has an underdeveloped road system. However, China is in the process of developing a toll based freeway system of nearly 25,000 miles (including non-tolled urban freeways) that will reach virtually all regions of the nation (which covers more land than the 48 contiguous U.S. states. Major portions of this system are now open and China already has double the freeway miles than any nation other than the United States (Internet: http://www.publicpurpose.com/hwy-china2d.htm). There were approximately 55,000 miles of freeways in the United States in 1999.

[27] Russia has a primitive road system, with virtually no freeways. Railroad coverage of Russia is generally better than that of road coverage. For example, the Trans-Siberian Railway operates from the historical western core of Russia to Vladivostok on the Pacific Ocean. There is no road in Russia paralleling much of this this route, or any east-west road across Russia.

[28] Canada has a comparatively small freeway system (less mileage than Mexico) that is largely limited to major cities and the corridor from Windsor (Detroit) to beyond Quebec (through Toronto and Montreal). The longer truck running times that result make railroads more competitive in Canada than in the United States (Internet: http://www.publicpurpose.com/hwy-china2d.htm).

[29] Latest international data available.

[30] The U.S. share was also approximately 20 percent in 1980.

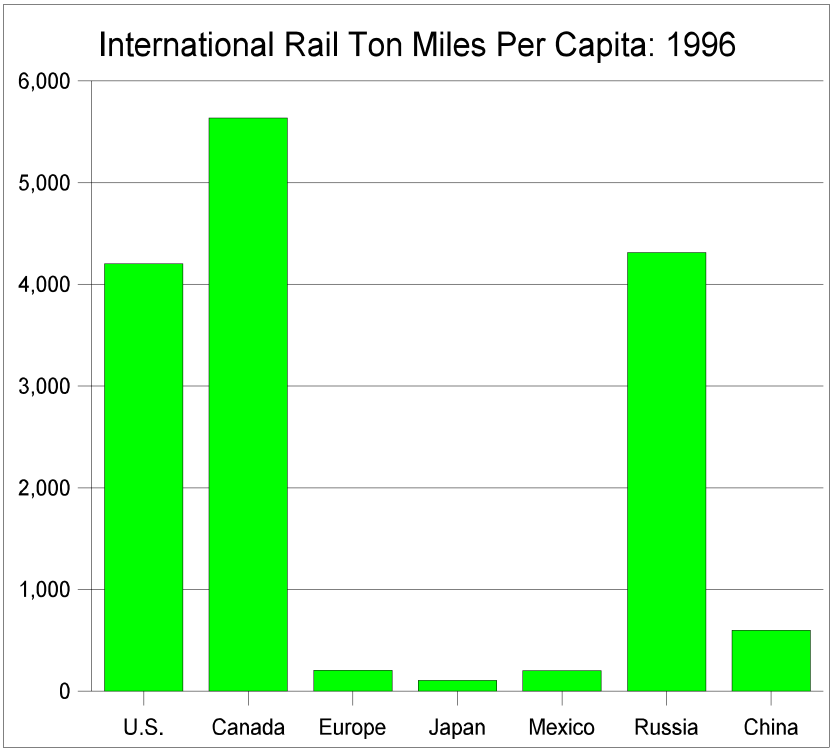

Figure 8
Source: Calculated from World Bank information.

Japan: In Japan, freight rail carries only 7.4 percent of combined rail and road ton miles, 87 percent lower than the U.S. freight rail market share. Trucks are 35.2 percent of total traffic volumes (vehicle miles), representing five times the share of traffic as in the U.S.[31]

Freight rail has suffered serious market share losses in Japan. In 1970, freight rail's market share was more than 30 percent[32] and has since declined approximately 75 percent. The loss since 1980 is approximately 50 percent, when freight rail's market share was over 15 percent. Total rail and truck tonnages have increased more than 125 percent since 1970. Overall rail tonnage has decreased 55 percent. As a result, trucks have captured 120 percent of the incremental (increased) combined rail and truck traffic.[33]

Truck traffic congestion is particularly intense in the urban areas of Japan. Analysis of an international database indicates that Tokyo, where approximately 45 percent of traffic is trucks, has by far the highest truck share in the high-income world. Truck traffic (vehicle miles) per

[31] Calculated from Japan Road Transport Bureau, Ministry of Transport data for 1997.

[32] As a share of the truck and rail freight market.

[33] Douglas Ostrom, "Trucking in Japan," *JEI Report*, May 9, 1997 and Japan Road Transport Bureau, Ministry of Transport data.

square mile in 1990 was nearly equal to that of all traffic (car and truck) in Houston and Austin. Tokyo's truck volumes per square mile were approximately six times that of U.S. urban areas.[34]

European Union: Freight rail's market share in the European Union is higher than Japan, at 16 percent of ton miles. But this is still 72 percent below the U.S. freight rail market share. Trucks are 17 percent of traffic volumes.[35] In Europe, trucks represent more than twice the share of traffic as in the U.S.

In Japan, trucks have five times the share of traffic as in the U.S. ... In Europe, trucks represent more than twice the share of traffic as in the U.S.

In recent years, rail freight was far more significant in Europe. In 1970, freight rail's market share[36] was nearly 40 percent and as late as 1980 remained above 30 percent. Freight rail's market share has declined nearly 62 percent since 1970 and 48 percent since 1980. Combined land freight tonnage has increased more than 200 percent since 1970, yet rail freight tonnage has declined by more than 15 percent. As a result, trucks have attracted approximately 125 percent of the incremental (increased) freight traffic, and actual rail freight volumes have declined 17 percent.[37] The heavy market share losses have continued into the 1990s, down 30 percent. Trucks now represent 16.5 percent of highway traffic in the European Union. Analysis of the international database indicates that truck traffic was more intense in European urban areas. Truck volumes were 71 percent higher per square mile in Europe than in U.S. urban areas in 1990.[38]

The European Union has become concerned about the over-reliance on highway freight and has implemented a "Rail Freeway" program to increase rail freight volumes. Virtually no progress is evident, as freight rail's market share continues to decline.

[34] Calculated from Jeffrey R. Kenworthy and Felix B. Laube, *An International Sourcebook of Automobile Dependence in Cities: 1960-1990,* (Boulder, Colorado: University Press of Colorado), 1999. This volume contains detailed information on demographics and transport for 46 world urban areas. Houston is the only Texas urban area included. In 1990, the Tokyo urbanized area had 53,000 truck vehicle miles per square mile. In 1999 both Houston and Austin had approximately 58,000 truck vehicle miles per square mile.

[35] Estimated for the early 1990s from International Road Federation data.

[36] Of the combined rail-road freight market.

[37] Estimated from European Conference of Ministers of Transport data.

[38] Calculated from Kenworthy & Laube (latest information available).

Canada: Canada's freight rail market share is 75.6 percent,[39] well above even that of the United States.[40] However, trucks represent 14 percent of highway volumes,[41] nearly equaling the European rate. The international database indicates that truck traffic is also more intense in urban areas, where truck vehicle miles were 40 percent higher per square mile than in U.S. urban areas.[42] Rail market share has begun to fall faster than in the United States. From 1990 to 1996, rail's share of the combined rail-truck market declined 3.7 percent, 12 times the 0.3 percent U.S. loss over the same period of time.[43]

Mexico: NAFTA trade partner Mexico is highly dependent upon trucking. In 1996, the rail share of the combined truck-rail freight market was only 11 percent, a 35 percent loss from 1990.[44]

By comparison to the United States, Europe and Japan are far more dependent upon highway freight.

United States: As noted above, the rail freight market share is much higher in the United States than Europe and Japan, at 57.3 percent (Figure 9). While rail's U.S. market share has been declining, it has been at a far lower rate than in Europe and Japan (Figure 10). In contrast to Europe and Japan, where freight rail volumes have fallen, U.S. freight rail has captured 50 percent of the increase in traffic since 1970. In fact there has been an overall 80 percent increase in U.S. rail freight ton mileage (Figure 11). At least partially because of the large rail freight market share, trucks represent a much smaller percentage of traffic in the United States, at 7.5 percent (Figure 12). By comparison to the United States, Europe and Japan are far more dependent upon highway freight.

[39] Calculated from data in *North American Transportation in Figures*, United States Department of Transportation, Bureau of Transportation Statistics, 2000.

[40] Data for historic market share analysis is not available.

[41] Canada's higher truck volume is a result of lower average personal vehicle travel volumes relative to the United States.

[42] Calculated from Kenworthy & Laube.

[43] Data for comparison to 1980 not available.

[44] Data for comparison to 1980 not available.

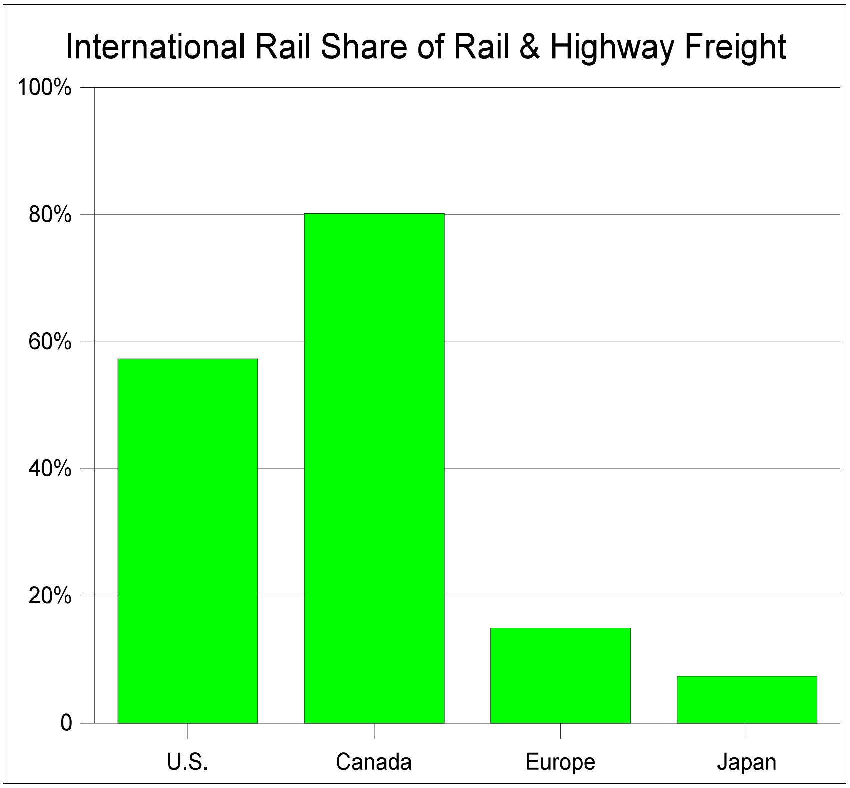

Figure 9
Calculated from national transportation department(s) data. U.S. 1998, Canada 1996, EU 1999, Japan 1997

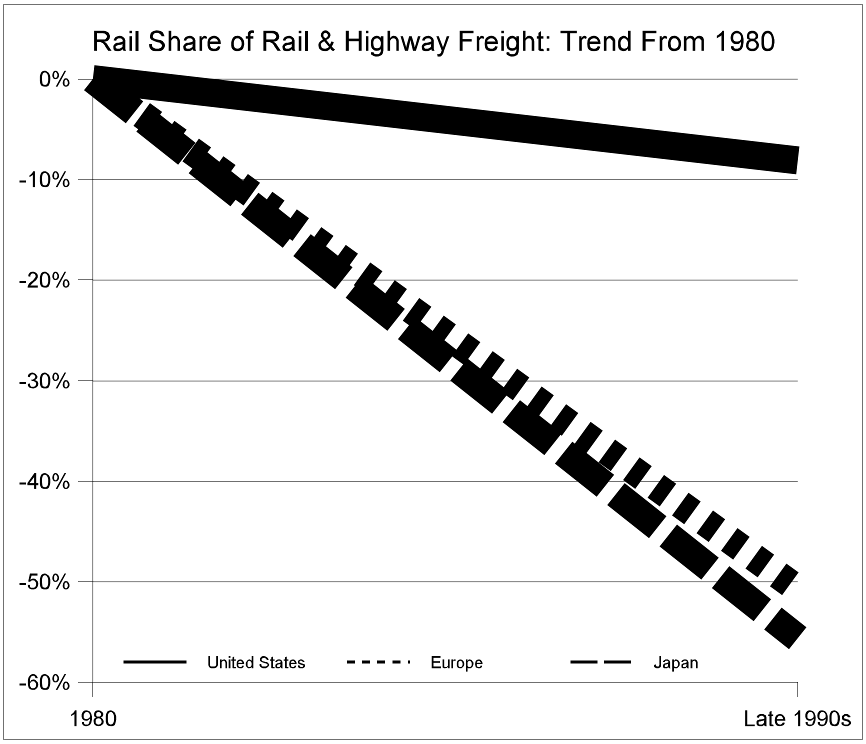

Figure 10
Calculated from national transportation department(s) data. U.S.1998, EU 1999, Japan 1997
U.S. to 1998, EU to 1999, Japan to 1997

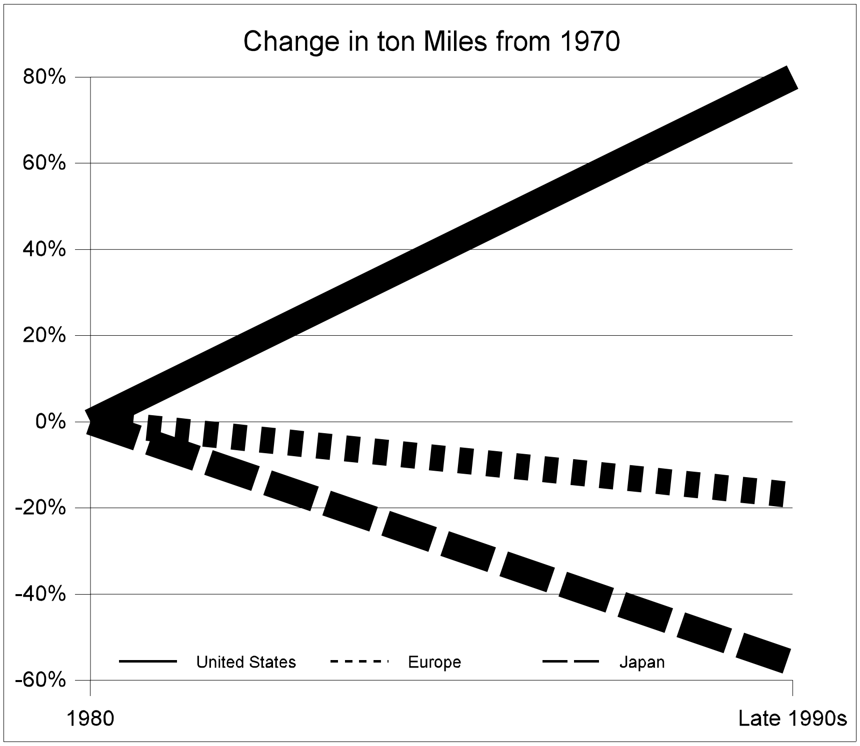

Figure 11
Calculated from national transportation department(s) data. U.S. 1998, EU 1999, Japan 1997
U.S. to 1998, EU to 1999, Japan to 1997

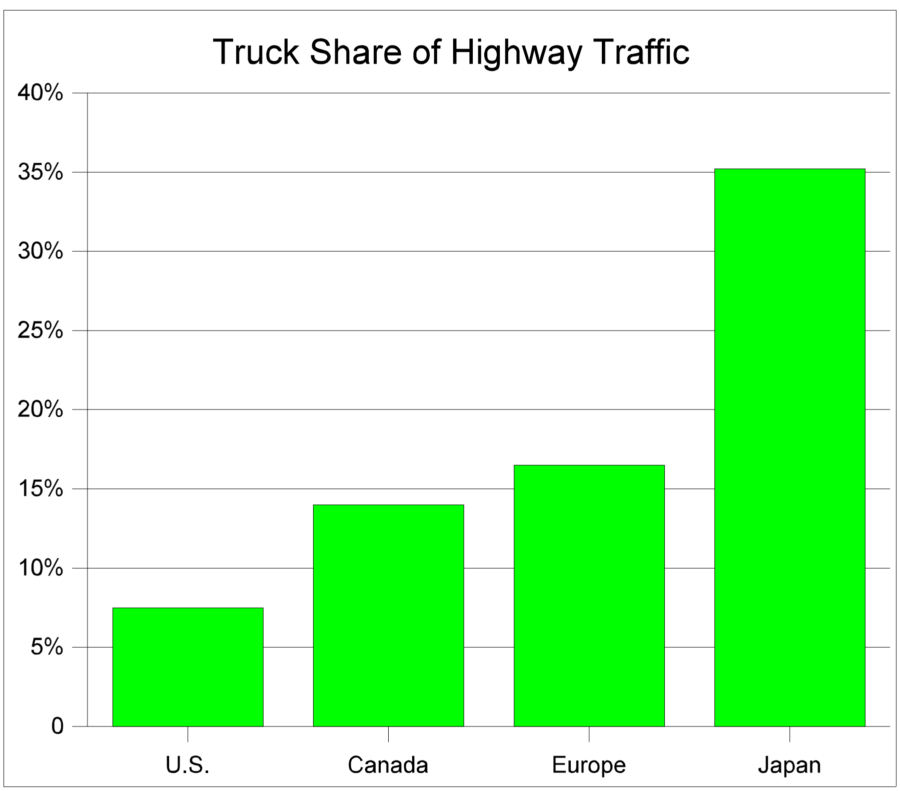

Figure 12
Calculated from national transportation department(s) data.

Passenger Rail: While having small freight rail market shares, Europe and Japan are known for their much more comprehensive intercity and metropolitan passenger rail systems. Intercity high speed trains operate from 130 miles per hour to 200 miles per hour. Per capita passenger rail ridership (commuter rail and intercity rail only)[45] in Europe and Japan is from 12 to 60 times as high as in the United States and Canada (Figure 13). At the same time, rail passenger market shares are falling rapidly. In Japan, a loss 20 percent was sustained between 1990 and 1997. Passenger rail's market share lost 23 percent from 1990 to 1998 in the European Union, with virtually all of the loss being captured by automobiles.[46]

Both Canada and the United States, which have the highest rail freight market shares, have minuscule passenger rail market shares (Figure 14).[47] As noted above, the highest truck component of overall traffic in the high-income world is in Tokyo, which is also the most transit dependent high-income urban area. Approximately 49 percent of personal travel is on transit, [48] and approximately 85 percent of transit travel is on commuter railways that are largely dedicated to passenger service. By comparison, the less than two percent of urban travel is on transit in the United States.

[45] Metros and light rail operate over exclusive rights of way that are separate from tracks that are used by freight rail. As a result, metros and light rail generally do not generally interfere with freight rail service.

[46] In passenger kilometers, road and rail modes. Calculated from European Union and Japan Ministry of Transport data.

[47] Includes intercity and commuter rail services (these are services that operate over tracks that also handle freight service).

[48] The highest public transit market shares in the high-income world are in Japan. The highest European urban area share is in Paris at 27 percent (calculated from Kenworthy and Laube), compared to New York at approximately nine percent and the U.S. national urban average of 1.6 percent (www.publicpurpose.com/ut-usmet9399mkt.htm).

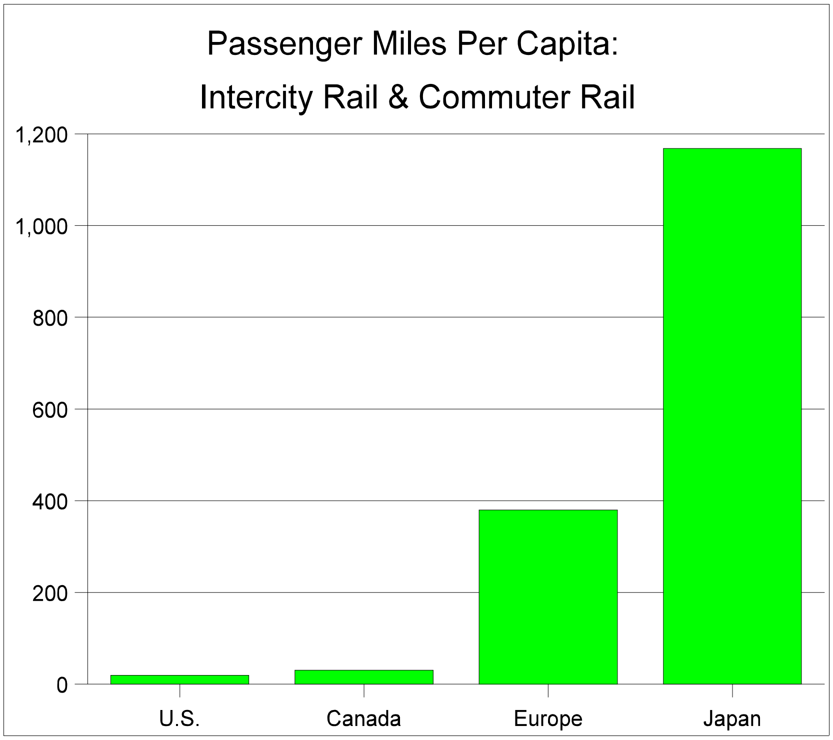

Figure 13
Calculated from national transportation department(s) data.
Commuter rail and intercity rail only (light rail and metro excluded because they do not generally interfere with freight rail).

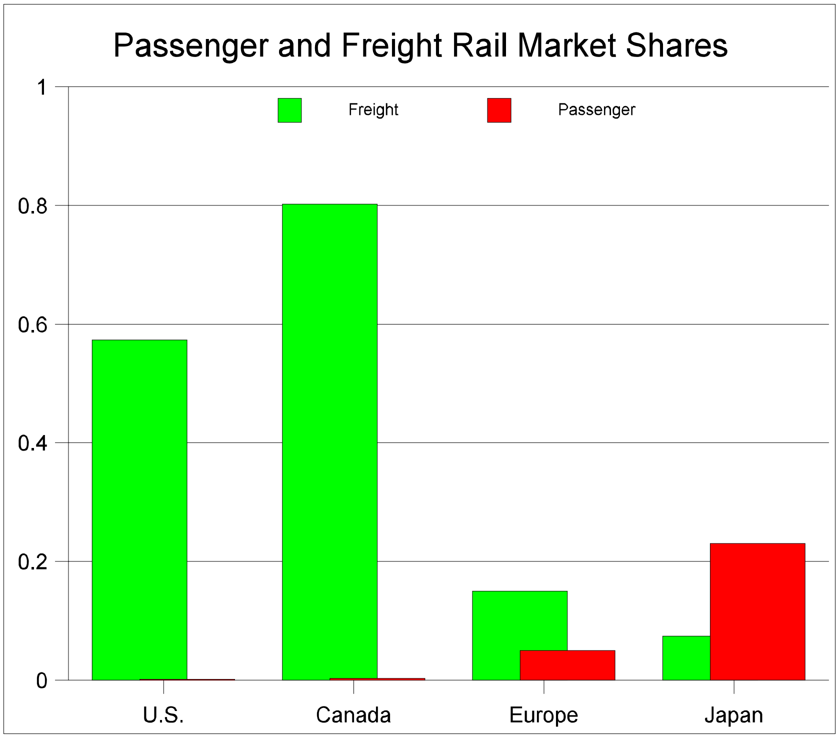

Figure 14
Calculated from national transportation department(s) data.
U.S. and Canada passenger market shares are so small that they are barely visible.

THE SURVIVAL OF FREIGHT RAIL IN THE UNITED STATES

The retention of freight rail's market share has been significant in comparison with trends in Europe and Japan. While freight rail's market share has been declining for more than 50 years, the greatest declines occurred decades ago. The greatest loss was sustained between 1940 and 1960, when market share declined 22.1 percent (a 1.2 percent annual loss).[49] During the 1950s, actual rail ton mile volumes declined, and trucks captured 117 percent of the new combined truck and rail business. Rail freight became much more successful in subsequent decades, and volumes have increased 140 percent. Freight rail has captured more than 50 percent of the new combined rail and freight volumes since 1960. Rail freight's market share loss has narrowed substantially, to 14.4 percent between 1960 and 1998 (Figure 6). This represents an annual rate that is one-third that of the 1940 to 1960 period (0.4 percent).

This comparatively strong performance is particularly notable, since the national interstate highway system was largely completed after 1960. It might have been expected that these more efficient and rapid highways would have accelerated the transfer of tonnage from railroads to trucks.

Freight rail's increase in actual volume, which is in contrast to that of Europe and Japan (below) coincided with a substantial reduction of passenger train service. From 1940 to 1971, passenger rail route miles were reduced more than 80 percent (Figure 15). An approximately 40 percent reduction occurred in 1971, when Amtrak was established. Passenger train services were reduced and public subsidies began. Moreover, as noted below, a large percentage of the remaining passenger rail service is concentrated in the narrow Northeast Corridor between Washington and Boston, with much of that on routes that have little or no freight business. It would appear that the competitive advantage gained from the greater capacity due to passenger train eliminations largely canceled the competitive disadvantages created by trucks operating faster on the interstate highway system. If rail freight had not increased its volume after 1960, roadway traffic would be the equivalent of 20 percent worse today. The survival of freight rail and the attendant positive traffic congestion impacts appears to be, at least in part, a benefit obtained from canceling most of the nation's passenger rail service.

The survival of freight rail and the attendant positive traffic congestion impacts, appears to be, at least in part, a benefit obtained from canceling most of the nation's passenger rail

[49] Calculated from U.S. Department of Transportation and U.S. Census Bureau data.

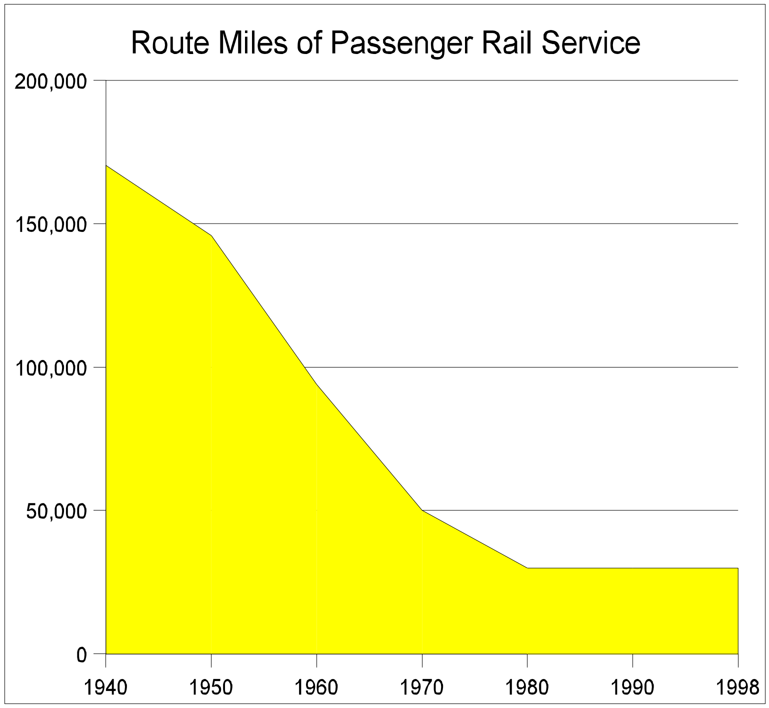

Figure 15
Calculated from U.S. Department of Transportation data.

THE HIGHWAY-DEPENDENT U.S. NORTHEAST CORRIDOR

As the U.S. freight rail and international analyses above indicate, priority for passenger rail service can limit the market share of freight rail and thereby increase truck traffic. This is also evident in the Northeast Corridor of the United States. The narrow corridor from Washington, D.C. through Baltimore, Philadelphia, and New York to Boston represents less than 2,000 miles of the nation's more than 100,000 miles of railroad. Yet this corridor alone accounts for approximately 80 percent of U.S. commuter rail operations and 40 percent of intercity rail ridership.[50] Much of this volume operates on routes with little or no freight service. Generally, freight service is not allowed on the main corridor route except between 10:00 p.m. and 6:00 a.m.

Like Europe and Japan, the evidence from the U.S. Northeast Corridor seems to indicate that high passenger rail dependence is associated with low freight rail market shares and correspondingly higher truck traffic volumes.

Commuter rail systems in the New York metropolitan area (parts of which are in the states of New York, New Jersey and Connecticut) carry 850,000 daily passengers. This high volume of commuters is largely carried to and from New York's Manhattan central business district, which is the world's second largest, with 1.7 million employees. This is more than four times the size

50 Calculated from National Transit Database and Amtrak annual report, 1999 data.

of the nation's second-largest central business district, Chicago's Loop. New York also has by far the nation's highest dependence on transit, with 27 percent of workers using public transit for the work trip, more than double the rate of any other U.S. metropolitan area.[51] Moreover, the Northeast has a transit work trip market share of nearly 13 percent, approximately four times that of the rest of the nation.[52]

As in Europe and Japan, this priority for passenger rail is accompanied by comparatively weak rail freight market shares (Table 4). Rail freight's share of the truck-rail tonnage is approximately one-third the national average in the Northeast, and well below that of any other region. Per capita rail tonnage in the Northeast is less than one-fourth that of the nation (Figure 16), and one-fifth that of the second-least rail freight dependent region. This is despite the fact that the Northeast has some of the nation's largest seaports (for example, New York, Boston, Philadelphia, and Baltimore). The priority given passenger trains is most evident here, where freight operations are largely limited to late night, making effective competition with trucks very difficult. Like Europe and Japan, the evidence from the U.S. Northeast Corridor seems to indicate that high passenger rail dependence is associated with low freight rail market shares and correspondingly higher truck traffic volumes.[53]

Table 4
Rail Freight Share of Combined Truck-Rail Market by Region

Region	1993	1997	Change in Market Share	Rail Tonnage per Capita: 1997
Northeast	8.9%	5.7%	-35.9%	1.3
Midwest	16.8%	15.7%	-7.0%	7.0
South	20.5%	17.7%	-13.4%	6.6
West	27.3%	24.0%	-12.0%	7.1
United States	19.5%	16.8%	-14.0%	5.8

Calculated from U.S. Census Bureau Commodities Flow Survey data.

Assessment: Freight and Passenger Rail

A number of states and local governments are considering expanded intercity passenger rail and commuter rail in hopes of containing roadway and airport congestion. The American Public Transportation Association is seeking enactment of federal legislation that would give priority to commuter rail services. The legislation would allow the Surface Transportation Board to compel freight railroads to accept commuter rail trains and establish pricing. By reducing freight rail

51 37 percent of the workers who used transit for the work trip in 1990 lived in the New York metropolitan area (latest data available). Early state surveys give indications that the percentage of national transit commuters living in the New York area has increased to 2000.

52 Calculated from U.S. Census Supplemental Survey, 2000.

53 Data in tons, rather than ton miles. Regional ton mile data is not available.

capacity and competitiveness, such strategies and requirements could set in motion the types of market share losses that have already been sustained in Europe and Japan.

The major high-income areas of the world either have strong freight rail market shares or strong passenger rail market shares. None has both. The international evidence, U.S. rail industry history, and evidence from the U.S. Northeast Corridor implies that a strong rail freight system is incompatible with a significant emphasis on commuter rail or intercity rail. As will be outlined below, this is because effective and efficient passenger train operations conflict substantially with efficient and effective freight operations. With regard to urban transport congestion, the public policy issue is, then, which confers greater net benefits on society: a strong passenger rail system or a strong freight rail system?

The...evidence implies that a strong rail freight system is incompatible with a significant emphasis on commuter or intercity rail.

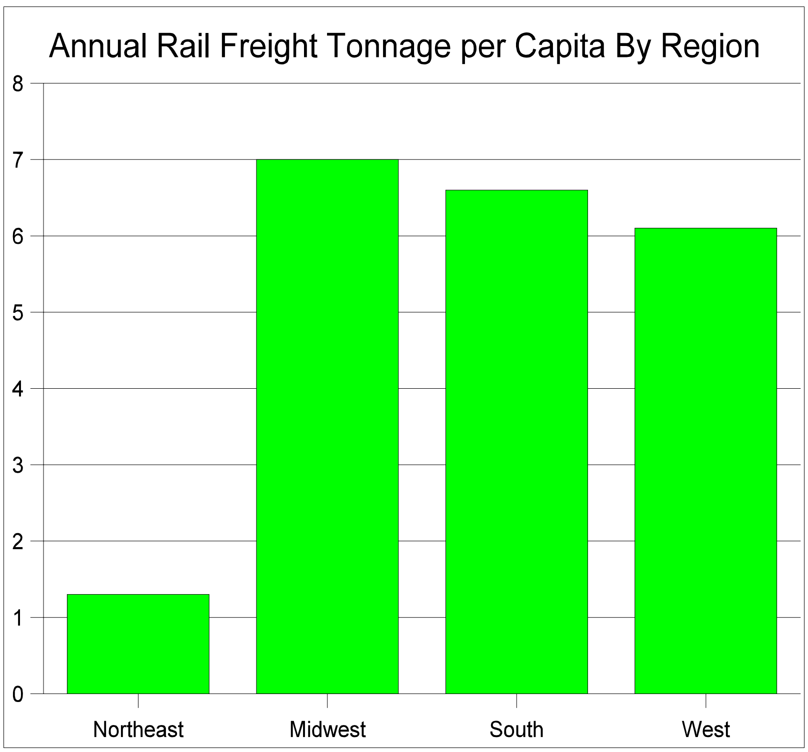

Figure 16
Calculated from U.S. Census Bureau Commodity Flow Survey, 1997.

Rail freight's market share has fallen particularly in the New York metropolitan area, the nation's largest. Virtually all rail tunnel capacity across the Hudson River is used by passenger trains.[54] Barge transfer of freight rail cars, itself comparatively slow and inefficient, has fallen

[54] Many contemporary freight cars are too large for the trans-Hudson tunnels. However, the predominance of passenger traffic has excluded even "normal" sized freight cars from entering New York from New Jersey through the tunnels.

nearly 99 percent since 1970. As a result, there is little freight rail traffic into the city or through the New York metropolitan area. Citing the fact that New York has seen its rail freight market share drop share for years, Congressman Jerrold Nadler refers to the metropolitan area as the most dependent on trucks of any in the nation.[55] Thus, New York, the nation's most rail passenger- dependent metropolitan area, relies upon rail freight to a much lower degree than the U.S. average.

New York's comparatively high dependence on trucks makes the traffic situation worse. As a result, local officials are considering a new rail freight tunnel under New York Harbor to increase rail freight usage and reduce truck traffic. According to the city of New York's Economic Development Corporation, the proposed tunnel would remove more than 1,000,000 truck trips annually from two bridges and reduce both travel times and air pollution.[56]

III. RAIL FREIGHT AND TRAFFIC: PROSPECTS

FREIGHT RAILROAD COMPETITIVENESS

Any erosion in rail freight market shares is likely to manifest itself in higher levels of truck traffic. This, in turn, would inordinately increase traffic congestion and air pollution, at the same time that expanding urban infrastructure has become exceedingly expensive, difficult, and sometimes virtually impossible politically.

The market share losses experienced in the international context, and to a lesser extent in the United States, indicate rail freight is a fragile industry. Emphasis on passenger rail services combined with the competitiveness of the highway freight industry could lead to serious reductions in rail freight market shares.

Any erosion in rail freight market shares is likely to manifest itself in higher levels of truck traffic.

In the abstract, it would be inappropriate for public policy to favor one mode of freight transport over another. However, market share losses for rail freight have ominous public policy implications.

Opportunities: At the same time, it is not necessary for freight rail market shares to decline in the future. Indeed there is significant potential for market share improvements and a corresponding lesser increase in traffic congestion.

Freight rail in the United States is most competitive in the movement of bulk commodities, such as coal, grain and petrochemical products. Generally, these products are not time sensitive, so that the slower operating speeds of freight rail do not represent a significant competitive

[55] "Mayor Calls for Rail Freight Tunnel, NYC Port Development," *Mobilizing the Region*, Tri-State Transportation Campaign, January 17, 1997. The analysis in this report indicates that New York is less dependent upon trucks than Boston.

[56] http://newyorkbiz.com (City of New York Economic Development Corporation website), accessed 10 August 2001.

disadvantage. On the other hand, it is not inconceivable for these products to be carried by highway freight, as they are in many countries.

Intermodal shipments appear to represent the most immediate opportunity for rail freight market share growth. Intermodal shipments are freight containers or truck trailers on rail cars. Intermodal shipments are obtained either from ocean vessels in ports or from trucks at intermodal transfer facilities. From 1993 to 1997, intermodal truck-rail volumes (tons) grew at more than double the combined national rail-truck rate. In Texas, truck-rail intermodal grew nearly 170 percent, five times the national truck-rail intermodal rate. The Port of Houston experienced a 130 percent increase in container traffic from 1990 to 2000.[57] Two railroads have recently built new intermodal rail yards and transfer facilities in the Laredo area to respond to the growing NAFTA trade.[58] The railroad and trucking industries are working cooperatively to increase the amount of intermodal traffic.[59] Presently, truck-rail intermodal shipments represent approximately two percent of the combined truck-rail volume in the United States (Figure 17).[60] Further, despite the large increase in intermodal business from 1993 to 1997, it was offset by a similar loss in conventional rail freight shipments.[61]

[57] Internet: www.portofhouston.com

[58] Texas-Mexican Railroad and Union Pacific Railroad.

[59] There are good reasons for these two competing industries to work together. In recent years the trucking industry has experienced driver shortages, which could lead to substantially higher labor costs in the future (these would be reflected in the prices of consumer goods).

[60] Calculated from U.S. Census Bureau Commodity Flow Survey, 1997.

[61] Intermodal truck-rail shipments gained 0.5 points in market share, while rail only shipments declined 0.5 points. Source: U.S. Census Bureau Commodity Flow Survey, 1997.

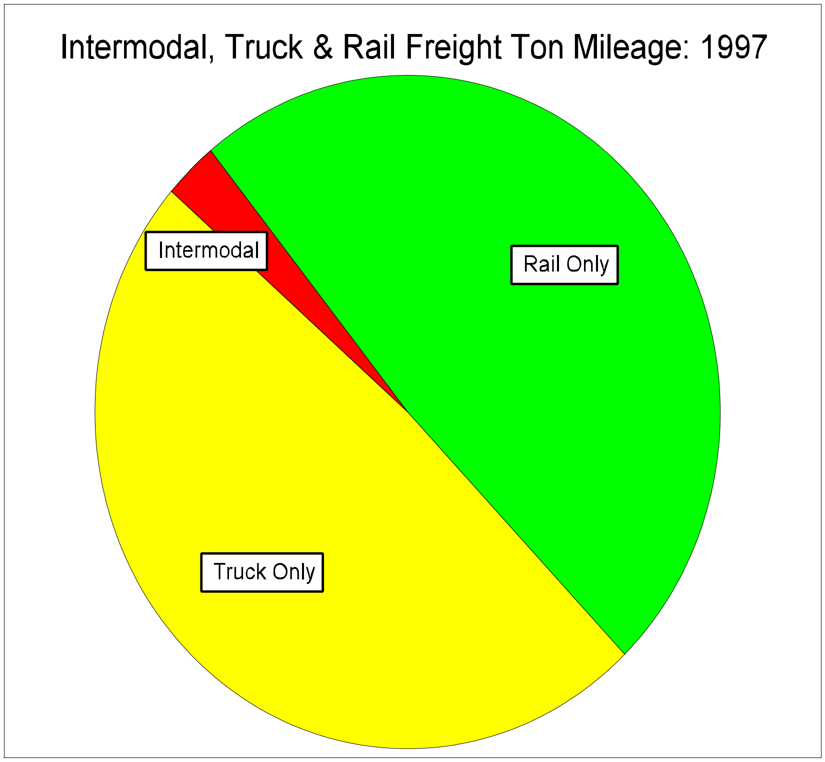

Figure 17
Calculated from Commodity Flow Survey data for 1997.

Rail freight also has a significant cost advantage over trucks for shippers. In 1998, the average revenue per rail ton mile was $0.0234. By comparison, truck revenues per ton mile were 10 times higher, at $0.262.

Threats: Freight railroads, however, face serious challenges:

Comparative Inflexibility: Freight railroads are inherently less flexible than trucks, which creates competitive challenges. This results in slower operating speeds, which create a particular advantage in the commercial environment that relies so much on "just in time" deliveries.

Freight railroads are inherently less flexible than trucks, which creates competitive challenges.

Trucks are capable of moving virtually all of the nation's freight from any point in the nation to any other point on the nation's 3.9 million miles of roadways. Further, virtually all interstate trucks are able to use the complete system, without having to transfer their loads or trailers to other carriers. Railroads, on the other hand, can complete direct movements only on a network of 100,000 miles and must transfer loads or cars between railroads. As a result, much rail freight must be transferred to or from trucks. Such transfers take a significant amount of time. Further, most rail freight journeys include time spent in classification yards for routing to different destinations.

Further, the operating environment of railroads is inherently less flexible than that of trucks. The highways on which trucks operate provide frequent or even continuous opportunities for trucks to pass slower vehicles, making it possible to maintain comparatively high average operating speeds. The opportunities for passing movements on railroads are much less frequent. The average operating speed for the nation's freight trains was less than 23 miles per hour in the third quarter of 2000 (Box: Freight Railroads: One-Way Highways).[62]

Because trucks operate as much smaller single units, they can pick up a single load at a location and deliver it to a single destination thousands of miles away. Rail freight, however, typically moves goods from many origins to many destinations. A single rail car will typically be required to be "classified" (routed) at a rail yard during the journey, which is time consuming. In the third quarter of 2000, the average delay (dwell) time for shipments at the nation's rail yards was nearly 29 hours. For a 1,000 mile journey, this delay would reduce the average travel speed for a shipment to under 15 miles per hour.

All of this is exacerbated by the fact that railroads are operating at or near capacity, especially in larger cities and along the main lines in the busiest corridors.

Capital Intensiveness: Railroads are one of the nation's most capital intensive industries.[63] As a result, it is especially challenging for railroads to maintain and expand infrastructure.

Expansion of Passenger Rail

Because of its already significant operational problems, imposition of new intercity and commuter trains represents a serious threat. It has the potential to force a significant erosion of freight rail's competitive situation relative to that of trucks (Box: Freight Railroads: One-Way Highways). This potential is exacerbated because the operational constraints of the freight railroads are greatest in the urban centers where the commuter rail services would operate and intercity services would terminate. Because trucks consume so much more road space than cars and new passenger rail systems remove comparatively little traffic (below), it is possible that expansion of passenger rail services would add to urban traffic congestion and air pollution, rather than reducing it.

It is possible that expansion of passenger rail services would *add* to urban traffic congestion and air pollution.

Intercity Rail and High-Speed Rail: High-speed rail systems have been operating in Japan and Europe for decades. Top speeds are from 130 miles per hour to 200 miles per hour and trains operate on exclusive, fully grade separated rights of way between cities.[64] High-speed rail systems have been proposed for a number of corridors in the United States, including in Texas.

[62] Calculated from American Association of Railroads data for the third quarter 2000.

[63] *It's About Money*, Texas Transportation Institute, February 21, 2001.

[64] Only high speed passenger trains operate on these rights of way. Tracks are shared with other traffic only in urban areas, such as Tokyo, Osaka, and Paris.

A recent significant proposal was a 200 mile per hour line that would operate from Tampa through Orlando to Miami.[65] However the route would have had little impact on traffic congestion or air pollution.[66] Data from marketing reports developed by the promoters indicated that in urban areas, 0.5 percent of drivers would be attracted and in rural areas (where there is much less traffic congestion), diversion would be limited to approximately 11 percent of freeway traffic.[67] Expanding roadways was shown to be considerably more cost effective.[68]

There are a number of additional proposals to increase intercity rail service in other parts of the nation, including some that are called "high-speed rail." None, however would achieve top operating speeds of more than 110 miles per hour, and it is therefore unlikely that any would be capable of reducing traffic congestion as much as the small impact that was projected for the genuinely high-speed rail Florida project.[69] Further, intercity rail is not an effective strategy for reducing urban traffic congestion because intercity travel represents such a small proportion of travel in urban areas.

Commuter Rail: New commuter rail systems, operating over freight rail tracks, have been opened in Los Angeles, Miami-Fort Lauderdale-West Palm Beach, San Diego, Washington, Seattle and San Jose. However, the impact of these systems on traffic congestion has been very small. Based upon the optimistic assumption that all new commuter rail ridership was attracted out of cars, these new systems have, on average, diverted less than 0.15 percent of freeway and principal arterial traffic in their respective urban areas. The most comprehensive new system is a six route network in the Los Angeles area, under this optimistic assumption, account for less than 0.20 percent of freeway traffic.[70] In these urban areas, the automobiles diverted by commuter rail would be replaced by new traffic in less than one month.[71]

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[65] Amtrak's Acela service reaches 150 miles per hour in brief stretches between New York and Boston. The average speed between Boston and New York is approximately 66 miles per hour, and 90 miles per hour between New York and Washington. Little U.S. passenger rail service exceeds an 80 miles per hour except in the Northeast.

[66] To materially reduce air pollution, transit must materially reduce traffic volumes.

[67] A more reasonable projection would be approximately one-half of these numbers. See James Madison Institute Florida High-Speed Rail report below.

[68] Wendell Cox, *Evaluation of the FDOT-FOX Miami-Orlando-Tamps High-Speed Rail Proposal*, James Madison Institute, April 1997.

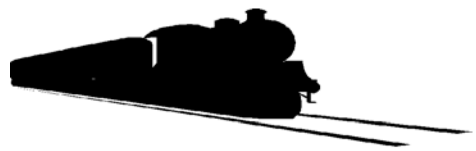
[69] Average speeds of these systems would be generally slower than that of Amtrak's Acela, which itself is slower than the European and Japanese high-speed rail systems. The critical factor that makes genuinely high-speed rail possible in Europe and Japan is the provision of new fully grade separated and exclusive rights of way. High-speed rail trains operate on tracks shared by slower services only in approaching urban stations. Even in the high volume U.S. Northeast Corridor, genuine high-speed rail will not be possible without construction of an exclusive new line over most of the route.

[70] 0.9 percent of adjacent freeway traffic (Wendell Cox, *Commuter Rail for the Austin-San Antonio* Corridor. Texas Public Policy Foundation, 2000).

[71] Based upon annual traffic growth rates since the year before opening of commuter rail systems.

Passenger Rail Expansion in Texas: Expansion of intercity or commuter rail could place Texas at particular risk. Houston, Dallas-Fort Worth, and San Antonio are more highly rail freight dependent than average, which means that there is a greater potential for diverting rail freight to trucks. Moreover, some of the nation's most significant freight rail delays are experienced in railroad yards in the Houston area, which is also the nation's most rail dependent major freight market .[72]

Freight Railroads: One-Way Highways



The complexity of operating trains competitively over freight railroads can be illustrated by comparing them to highways. Most of the nation's main line freight railways are single track, meaning that a single train can operate in a single direction at any one time.

The simple matter of trains passing one another forces average operating speeds to be comparatively low. On average, the nation's freight railroads operate at less than 23 miles per hour. Trains spend much time stopped on sidings as other trains pass by. Higher speed trains operating in the same direction must be allowed to pass, as well as trains that operate in the opposite direction. This is made more complicated by the varying speeds of different types of trains. For example, a standard freight train might operate at a top speed of 60 miles per hour, a heavy unit train (for example, carrying coal) might operate at 40 miles per hour, and an intermodal train might operate at 70 miles per hour. Passenger trains, which operate over freight railways, may operate up to 79 miles per hour under normal circumstances.

A highway operating under the same constraints would have a single lane in one direction and parking lanes (sidings) every few miles. Cars would be forced to operate at the slowest speed of the car in front until the slower cars were driven into the next parking lane. Cars operating in the other direction would have to wait in parking lanes until a section of roadway was opened ahead, the result of having parked the traffic from the opposite direction in the next parking lane.

The entire roadway would operate with signals that, at any point in time, stop traffic operating in one direction and allow traffic in the other direction to move. Much of the nation's freight railroad system operates along the same lines as a major roadway construction project in mountainous terrain – where, for example, west-bound traffic may be stopped for one hour or more to allow east-bound traffic to travel through a section with only one lane open. These operational complications make it difficult for rail freight to compete with trucks for time-sensitive loads.

72 American Association of Railroads data for third quarter 2000.

Even double track railways have considerably less capacity than a two lane roadway. The two lane roadway has shoulders (emergency lanes), which permit the slowest traffic to pull off to the side to allow other traffic to pass. At any point that it is safe, cars are able to pass slower cars by using the lane used by traffic operating in the opposite direction. The train, on the other hand, can pull over to the side to allow another train to pass only where there is a siding. The train may use the opposing directional track only where there are switches that allow such operation. Even so, it takes much more space for a long train to pass another, and the potential is high for forcing a train operating in the other direction to stop.

There are other difficulties as well. Rail customers (factories and other businesses) are served along the railroad right of way. Switching movements interfere with through trains (an operational situation akin to attempting to back trucks into loading docks from freeways). Grades (hills) force heavier trains to operate more slowly, further reducing track capacity.

Because passenger trains operate at higher speeds and may be given priority over freight trains (such as Amtrak trains and commuter trains under a proposal by the American Public Transportation Association), there is considerable potential for reducing the operational effectiveness of freight rail, and driving additional business to trucks.

TRAFFIC IMPLICATIONS

If the rail freight industry fails to maintain its market share, truck traffic will increase substantially, placing a disproportionate burden on the nation's urban roadways. Based upon the national freight volume increase projections and Texas highway volume projections, the following impacts could be expected through 2020 (Figure 18).[73]

★ If the rail freight industry maintains its market share, Texas truck traffic can be expected to increase 68 percent. This would represent a 14.3 percent overall increase in traffic, based upon passenger car equivalents.

★ If the rail freight industry loses the projected 15 percent in market share (above), Texas truck traffic is projected increase 102 percent. This is the equivalent of a 21.3 percent increase in overall traffic levels.

★ If the rail freight industry were to lose market share to the present European Union level, Texas truck traffic is projected to increase 235 percent, the equivalent of a 49.0 percent traffic increase.

[73] From 1999.

★ If the rail freight industry were to lose market share to the present Japanese level, Texas truck traffic is projected to increase 265 percent, the equivalent of a 55.3 percent traffic increase.

Because it is unlikely that urban roadway construction would be able to keep pace with such truck traffic increases, the time lost in traffic delay is likely to increase substantially, imposing economic losses on both individuals and the community as a whole.

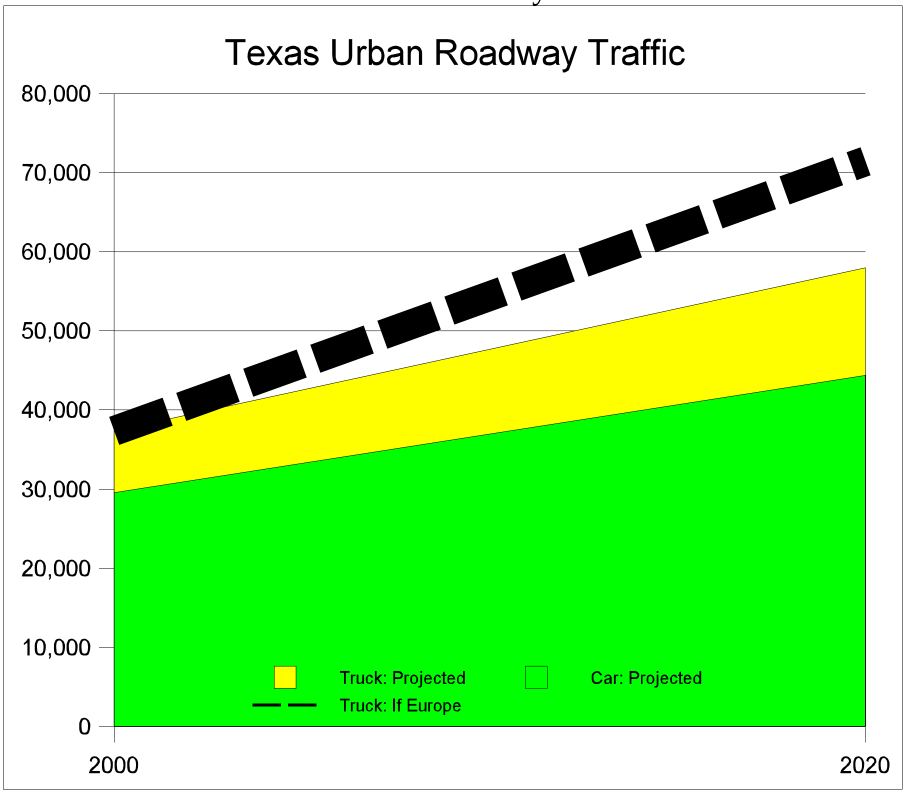


Figure 18
Based upon passenger car equivalent traffic levels for trucks.
If Europe: If rail freight market share drops to European level.
Method described in text.

RAIL AND HIGHWAY FREIGHT IN TEXAS

Texas metropolitan areas generally rely upon freight rail more and are less dependent on trucks. The U.S. Census Bureau's Commodity Flow Survey indicates that, among the ten largest U.S. metropolitan areas (Table 5): [74]

★ Houston is by far the most rail freight dependent (Figure 19). On an annual basis, 8.07 tons of rail freight[75] are handled per capita, 2.5 times that of second-ranking Detroit. This is more than five times the average for the largest metropolitan areas. Houston also leads

[74] U.S. Census Bureau, Economic Census, 1997.

[75] Inbound and outbound (shipped and received) combined, excluding intermodal.

in the rail share of the combined rail-truck market at 23.6 percent,[76] 1.5 times that of second-ranking Detroit. The international database also indicates that Houston is less dependent upon highway freight. The truck share of traffic in Houston is 17.2 percent less than the average of the other 12 U.S. urban areas.[77]

★ Dallas-Fort Worth ranks fourth in rail tonnage per capita and third in the rail share of the combined rail-truck market.

★ San Antonio accounts for higher rail tonnage per capita than all of the top 10 U.S. metropolitan areas except for Houston. The other large Texas metropolitan area, Austin is an exception, ranking lower than any of the top 10 metropolitan areas in its reliance on rail freight.

Table 5
Rail and Truck Freight Data: 10 Largest Metropolitan Areas

Rank	Metropolitan Area	Truck Freight Tons per Million VMT	Rail Freight Tons per Million VMT	Ratio	Rail Tonnage Share	Rank	Rail Tons/per Capita	Rank
1	**Houston**	**5,249**	**1,625**	**3.36**	**23.6%**	**1**	**8.07**	**1**
2	Detroit	7,925	799	1.65	9.2%	2	3.18	2
3	Chicago	8,933	716	1.48	7.4%	4	2.55	3
4	**Dallas-Fort Worth**	**3,995**	**393**	**0.81**	**9.0%**	**3**	**2.00**	**4**
5	Philadelphia	6,659	321	0.66	4.6%	7	0.83	8
6	San Francisco	4,789	243	0.50	4.8%	6	0.95	6
7	Washington-Baltimore	3,172	234	0.48	6.9%	5	0.95	5
8	Los Angeles	4,658	216	0.45	4.4%	8	0.87	7
9	New York	4,547	194	0.40	4.1%	9	0.52	9
10	Boston	3,983	97	0.20	2.4%	10	0.34	10
	Average	5,391	484	1.00	7.6%		2.03	
Exh.	**Austin**	**4,739**	**45**	**0.09**	**0.9%**		**0.24**	
Exh.	**San Antonio**	**4,178**	**955**	**1.97**	**18.6%**		**4.34**	

Source: 1997 U.S. Census Bureau Commodity Flow Survey

76 Of the combined rail-truck ton mile volume, excluding intermodal.

77 Calculated from Kenworthy and Laube.

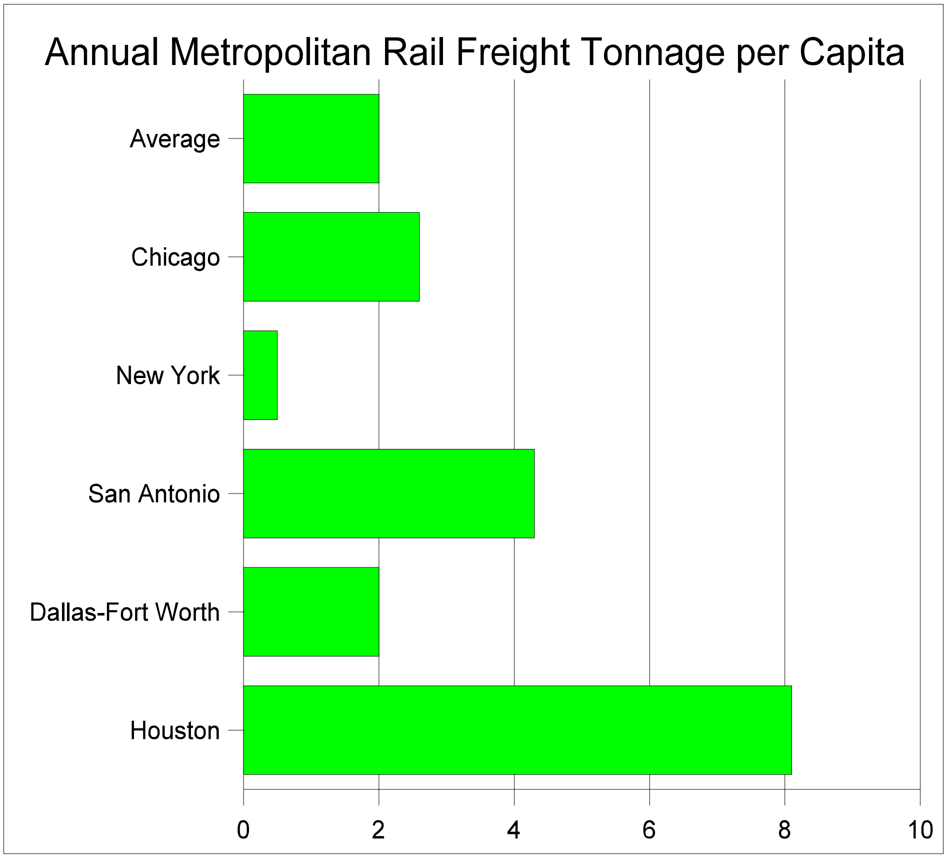


Figure 19
Calculated from U.S. Census Bureau Commodity Flow Survey, 1997.

It is estimated that diversion of all rail freight to highways in Texas metropolitan areas would increase traffic congestion (Roadway Congestion Index[78]) more than 20 percent.[79] This would make Houston the third-most congested urban area in the United States, compared to its actual ranking of 26th. The impacts in Austin, Dallas, and San Antonio would rank each of these urban areas in the top ten nationally as well (Table 6). The actual impacts would probably be greater, because the largest Texas urban areas have higher-than-average freight rail market shares (below).

[78] The Roadway Congestion Index (RCI) measures traffic volumes in relation to roadway capacity. A 1.01 RCI indicates that the roadway system is operating at one percent over capacity.

[79] Assumes an average passenger car equivalent of 3.8 for trucks.

Table 6
Estimate of Roadway Congestion Index if all Rail Freight were in Trucks

	Actual 1999	Rank	If No Rail	Rank
Austin	1.06	30	1.29	6
Dallas	1.05	33	1.28	7
Fort Worth	0.96	48	1.17	20
Houston	1.10	26	1.34	3
San Antonio	1.02	39	1.24	9

Roadway Congestion Index from the Texas Transportation Institute.
Method: Applies national increase in truck traffic that would occur if all volume were on trucks at the passenger car equivalency rate of 3.8.

Freight Projections

As noted above, national truck and rail freight volumes are projected to increase at well ahead of population increase rates. It is likely that the increase in freight traffic will be even greater in Texas because of its strategic position relative to the Mexican border. More than 75 percent of the market in each of the three nations, the United States, Canada, and Mexico, is closer to the Texas-Mexico border crossings than any other (Figure 20).[80]

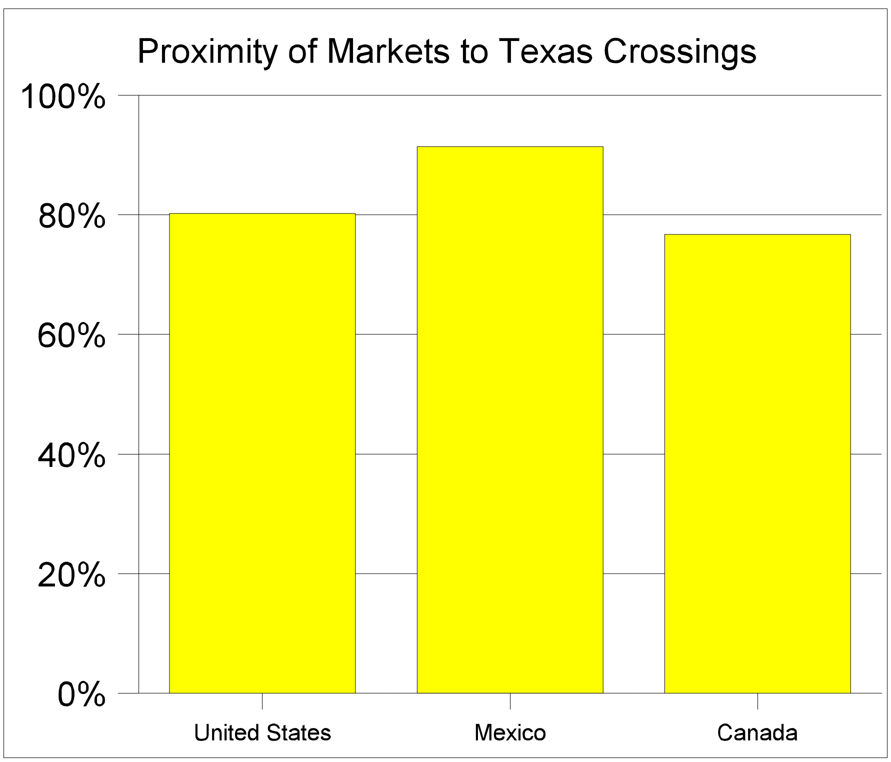


Figure 20
Rubin and Cox.

[80] Based upon 1999 population.

This is already evident in freight volume data. Laredo, the largest port of entry on the entire Mexican border, has already experienced an increase from 1994 of 91 percent in trucks while rail traffic has increased 108 percent.[81]

These increases can be expected to continue. For example, the Laredo Urban Transportation Study (LUTS) projects a 443 percent increase in truck traffic by 2025 and a 285 percent rail freight increase. Through truck traffic is expected to increase 125 percent in Austin through 2020.[82] The extraordinary increases in truck traffic could result in serious degradation of traffic conditions in all major Texas metropolitan areas.

THE ECONOMIC COST OF EXCESS TRAFFIC CONGESTION

The Texas Transportation Institute's 2001 Mobility Study (latest) estimates that the cost per passenger hour of delay is $12.40.[83] There are additional delays in wasted fuel costs and the cost to trucking companies from slower operations. As congestion and delays increase, higher consumer prices occur and there is a loss of leisure time.

The extraordinary increases in truck traffic could result in serious degradation of traffic conditions in all major Texas metropolitan areas.

The economic cost of freight rail market share losses can be estimated in Texas using recent TTI data on traffic volume and delay trends. In the nation's urban areas of more than 1,000,000 population, traffic delays rose from 1990 to 1999 an average of 3.74 times the rate of traffic volume increase.

At the projected 15 percent rail market share loss through 2020 (above), truck traffic would intensify overall traffic demand (Table 7).[84] All of these amounts are in addition to the present cost of congestion[85] and the additional cost that will be imposed by the increase in automobile and truck traffic without any loss in rail freight market share.

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81 Rubin and Cox.

82 Texas Department of Transportation, *IH-35 Trade Corridor Study: Executive Summary.*

83 David Shrank and Tim Limax, Texas Transportation Institute *2001 Mobility Study 2001,* Texas Transportation Institute (TTI), Texas A&M University. This report is prepared by TTI under contract each year to the U.S. Federal Highway Administration. It is the nation's definitive report on urban traffic congestion and contains data for 68 U.S. urban areas.

84 Estimated from TTI (relationship of traffic volume growth to traffic delay growth, adjusted for population increase) and U.S. Department of Commerce Bureau of Economic Analysis data (personal income, 1999), the Perryman Group (www.perrymangroup.com) *Long Term Economic Outlook* for Texas metropolitan areas (real personal income growth), and the Texas Data Center (population growth).

85 In 1999, the per capita cost of congestion was $705 in Dallas-Fort Worth, $850 in Houston, $410 in San Antonio, and $785 in Austin (TTI and calculated from TTI data).

- ★ In Dallas-Fort Worth the annual costs of congestion from increased truck traffic would rise $2.6 billion, to $452 per capita, representing 0.8 percent of local personal income.
- ★ In Houston, the annual costs of congestion from increased truck traffic would rise $2.5 billion, to $546 per capita, representing 1.1 percent of local personal income.
- ★ In San Antonio, the annual costs of congestion from increased truck traffic would rise $0.5 billion, to $269 per capita, representing 0.8 percent of local personal income.
- ★ In Austin, the annual costs of congestion from increased truck traffic would rise $0.5 billion, to $483 per capita, representing 1.0 percent of local personal income.

If rail freight's market share was to fall to the level of the European Union (a 74 percent loss) through 2020, the resulting additional truck traffic would have the following effect on the costs of congestion (Table 7):

The combined economic loss from truck induced traffic delay in the largest Texas urban areas would be from $13 billion to $26 billion in 2020.

- ★ In Dallas-Fort Worth the annual costs of congestion from increased truck traffic would rise $8.1 billion, to $1,422 per capita, representing 2.6 percent of local personal income.
- ★ In Houston, the annual costs of congestion from increased truck traffic would rise $7.8 billion, to $1,717 per capita, representing 3.5 percent of local personal income.
- ★ In San Antonio, the annual costs of congestion from increased truck traffic would rise $1.4 billion, to $845 per capita, local representing 2.4 percent of local personal income.
- ★ In Austin, the annual costs of congestion from increased truck traffic would rise $1.6 billion, to $1,519 per capita, representing 3.3 percent of local personal income.

Table 7
Estimated Economic Cost of Extraordinary Truck Volume Increases

	Cost of Additional Traffic Congestion if Freight Rail Loses Projected Share (Billions)	Cost per Capita	Compared to Gross Personal Income	Cost of Additional Traffic Congestion if Freight Rail Share Falls to European Union Level (Billions)	Cost per Capita	Compared to Gross Personal Income
Austin	$0.5	$483	1.0%	$1.6	1,519	3.3%
Dallas-Fort Worth	$2.6	$452	0.8%	$8.1	1,422	2.6%
Houston	$2.5	$546	1.1%	$7.8	1,717	3.5%
San Antonio	$0.5	$269	0.8%	$1.4	845	2.4%
Total	$6.0	$463	0.9%	$19.0	1,459	2.9%

Table 7 Estimated Economic Cost of Extraordinary Truck Volume Increases
Methodology in Footnote 84. 1999$

The combined economic loss from truck induced traffic delay in the largest Texas urban areas would be from $6 billion to $19 billion in 2020. This is between $463 and $1,459 per capita (approximately $1,250 to $3,750 per household), equaling 0.9 to 2.9 percent of personal income.

On the other hand, development of productive new freight infrastructure projects would lead to increased productivity and employment. For example, new intermodal facilities would increase local employment levels at the same time as they contribute to lower levels of traffic congestion and air pollution. Further, as freight projects improve traffic flows, the largest Texas metropolitan areas will become more competitive relative to areas in other parts of the nation and the world.

IV. REDUCING TRAFFIC CONGESTION

FREIGHT PROJECTS AND TRAFFIC CONGESTION: THE POTENTIAL

While continuing truck volume increases from business growth and rail market share losses pose overwhelming challenges to road systems, there may be significant opportunities to reduce traffic congestion and air pollution by expanding freight facilities. Projects that separate or expedite truck traffic, or assist in ensuring that freight rail captures at least its present market share in the future will be important strategies for reducing urban traffic congestion. A case study, three Texas examples, and an international analysis illustrate the point.

Case Study: The Los Angeles Alameda Corridor Project: The Los Angeles Alameda Corridor freight rail project represents a comparatively cost-effective project with respect to its traffic reduction impacts. The Alameda Corridor is compared to the Houston light rail line, which is under construction.

★ The 7.5-mile Houston light rail line will operate from downtown to the Astrodome.[86]

★ The total capital cost is projected at approximately $300 million.

★ All capital costs and the overwhelming majority of operating costs are being funded by tax sources. Local taxes are being used for construction, while operations will be supported by local and federal tax sources.

[86] Metropolitan Transit Authority (MTA) of Harris County, *Downtown to Astrodome Corridor: Major Investment Study Report/Environmental Assessment,* August 1999.

★ The light rail line is projected by the transit agency (Metro) to reduce evening peak hour traffic volumes in the downtown-Astrodome corridor approximately 0.4 percent in 2020, compared to the volumes that would otherwise be expected in that year.

★ It is projected that vehicular traffic delay will be reduced 543 hours daily in the corridor. The tax cost per each hour of delay in traffic reduction is $123 (the cost for each hour of traffic delay reduced of a competing bus proposal was a more modest $21.89).

★ Air quality impacts would be comparatively small. The annual cost in 2020 for each ton of air pollution reduction would range from $200,000 to $2,000,000.

The Alameda Corridor is a 20-mile long consolidated freight rail corridor that is being built in a trench from the Los Angeles and Long Beach harbors to rail freight yards to the east of downtown. The trend will provide grade-separated crossings for streets in the corridor.[87]

★ The total capital cost is $2.4 billion.

★ All but $370 million of project costs are being financed by commercial (non-tax) sources.

★ It is projected that automobile and truck traffic delay will be reduced 14,500 hours daily as a result of the elimination of grade railway crossings.

★ The public subsidy cost per hour of vehicular delay reduced is $5.43.[88]

★ Some air quality impacts in the corridor would be substantial. Nitrogen Oxides would be reduced 20 percent in 2020, Sulphur Oxides 26.0 percent, particulate matter (PM-10) 14.8 percent, and Reactive Organic Gases 12.9 percent. The cost per ton of pollution reduced would vary from $5,000 to $170,000.

With respect to investment of public subsidies, the Alameda Corridor is more efficient than the Houston light rail project:

★ The cost per hour of traffic delay reduction is much higher for the Houston light rail line, at more than $120. The Los Angeles Alameda Corridor freight rail project achieves 23 times as many hours of reduced traffic delay per $1 million as the Houston light rail project (Table 8 and Figure 21).

★ The costs of pollution abatement are also much higher in Houston. The Los Angeles Alameda Corridor freight rail project is from 1.1 to 143.5 times as effective per $1

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[87] Alameda Corridor Transportation Authority (ACTA), *Alameda Corridor Environmental Impact Report*, January 1993.

[88] Public subsidy includes all non-user taxes and fees imposed by government. It does not include user fees, such as fuel taxes that are dedicated to highways (which are prices charged for the use of the road, just as the fees for service by municipally owned electric utilities are user fees, not subsidies). The difference between a tax and a user fee is that a user fee may be avoided by not using the good or service (such as highways or airports), while a tax must be paid regardless of whether or not a government service is used (for example, schools).

million in removing air pollution tonnage (Table 9). The Los Angeles project is most effective compared to Houston in removing Nitrogen Oxides (Figure 22). Nitrogen Oxides have been the primary concern of recent efforts to reduce air pollution in the Houston area.

Table 8
Comparison of Traffic Benefits: Houston Light Rail & Los Angeles Alameda Corridor (Freight)

Factor	Houston Light Rail	Los Angeles Alameda Corridor
Daily Reduction in Vehicle Delay (Hours)	543	14,511
Tax Cost per Hour Reduction in Travel Delay	$123.34	$5.25
Delay Hours Reduced per $1 Million	8,107	190,458
Benefit Comparison	1.00	23.49
Calculated from MTA and ACTA data.		

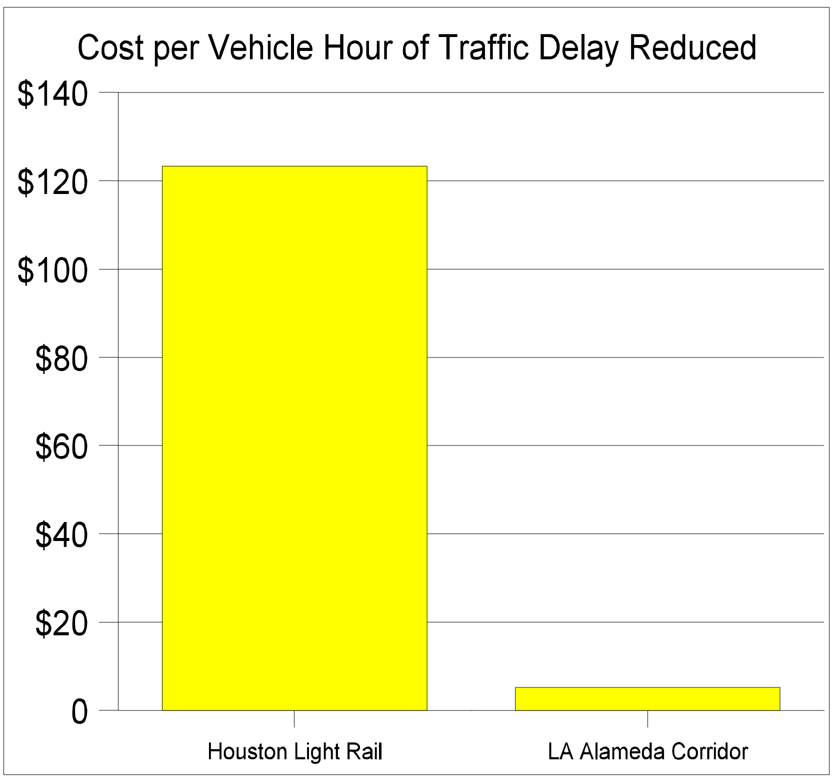

Figure 21
Estimated from MTA and ACTA data.

Table 9 Air Pollution Impacts: Houston Light Rail & Los Angeles Alameda Corridor (Freight)			
Tons Removed per $1 Million	Houston Light Rail	Los Angeles Alameda Corridor	Los Angeles Benefit Compared to Houston
Carbon Monoxide	3.2	7.3	2.3
Nitrogen Oxides	1.4	197.5	143.5
Hydrocarbons/Reactive Organic Gases	0.5	13.7	26.9
Particulate Matter (PM10)	5.2	5.9	1.1
Calculated from MTA and ACTA data.			

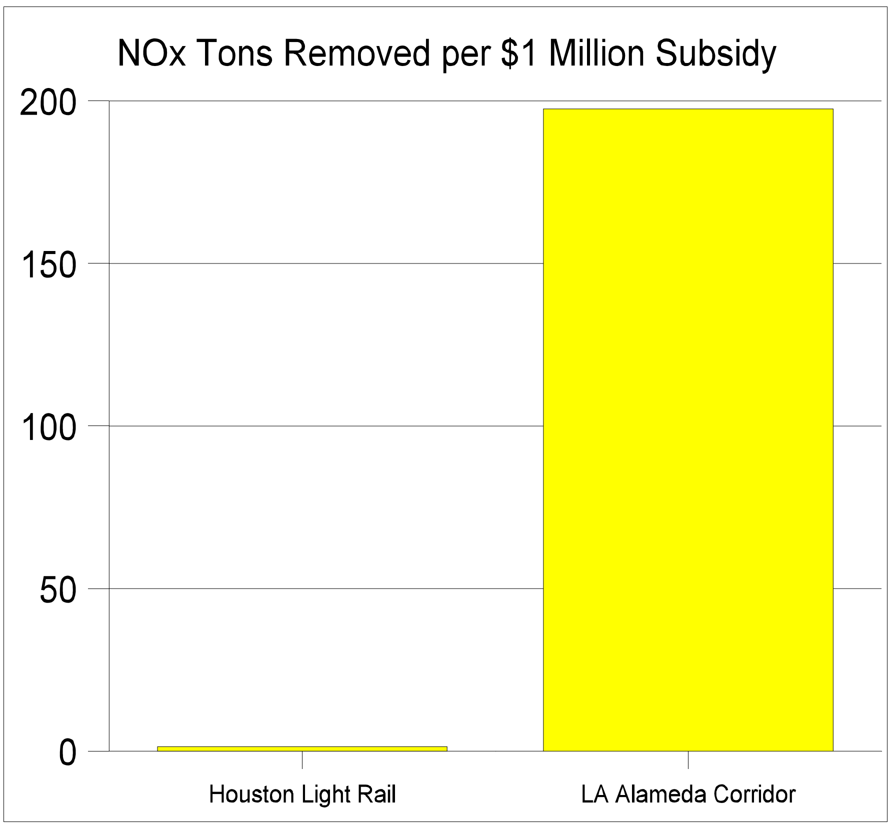

Figure 22
Estimated from MTA and ACTA data.
Houston light rail is barely visible (1.4 compared to Alameda Corridor 197.5).

Comparison of the Alameda Project to FTA Projects: A comparison to major transit investments (rail and rapid bus) under consideration also implies that freight projects could be comparatively more effective in reducing traffic congestion and air pollution. For example, the cost-per-person hour (as opposed to vehicle hour) of delay reduced by the Alameda Project is

$3.28.[89] A subsequent Los Angeles grade separation project (Orange County Gateway) is projected to have a cost-per-hour of delay reduced of $8.16.

By comparison, the average cost-per-person hour of delay reduced is 11.5 times as much ($37.65) for new transit lines for which federal funding has been sought in recent years.[90] The Alameda Corridor project is projected to reduce person hours of delay by 305,000 for each $1 million in subsidy, more than 10 times as much as the nearly 27,000 for the average transit rail or busway project (Table 10) that has been considered by the Federal Transit Administration (FTA) (Figure 23).[91]

The Alameda Corridor project is projected to produce nearly 305,000 person hours of delay for each $1 million in subsidy, compared to nearly 27,000 for the average transit rail or busway project.

★ Bus rapid transit projects would require 8.4 times as much subsidy as the Alameda Corridor per hour of delay.

- Commuter rail projects (such as the Trinity Rail Express in Dallas-Fort Worth) require 9.7 times as much subsidy on average as the Alameda Corridor per hour of delay.

- Light rail projects (such as the Dallas light rail line) require 14.1 times as much subsidy on average as the Alameda Corridor per hour of delay.

- Heavy rail (metro or subway) projects require 9.0 times as much subsidy on average as the Alameda Corridor per hour of delay.

- The average cost of the rail projects, at 37.65,[92] is nearly three times the cost-per-person hour of congestion[93] used in economic analysis by the Texas Transportation Institute (TTI) in its annual mobility study for the Federal Highway Administration.[94]

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89 Calculated from ACTA data.

90 Based upon an analysis of FTA *New Starts* reports for 1998-2002.

91 Out of the 34 projects in the sample, only two were more cost effective than the Alameda Corridor. However, delay reduction figures for these projects is not considered believable. Data supplied for the Las Vegas heavy rail project and the Miami busway project indicate that the delay reduction per new transit rider would be more than three hours per trip. This is an excessively high figure for systems that are approximately five miles long.

92 Calculated from a sample including 34 transit lines in the FTA "new starts" evaluation process from 1999 to 2002. Capital cost were annualized over 40 years at a seven percent discount rate (in 1999$, midpoint of construction). Fare revenues (user fees) excluded from calculation and assumed at 30 percent of operating costs).

93 A subsequent Los Angeles grade separation project, the Orange County Gateway, is projected to have a cost per reduced delay hour of $8.16, less than one-fourth the transit rail average (calculated from data in Los Angeles Economic Development Corporation, *Orange County Gateway Cost Benefit Analysis*, September 1999).

94 TTI.

Table 10 Comparison of Cost-per-Delay Hour: Alameda Corridor Project and Urban Rail			
	Cost-per-Person Hour of Delay Reduced	Delay Hours Reduction per $1 Million in Subsidy Expenditure	Productivity of Alameda Project
Alameda Corridor	$3.28	304,733	1.0
New Transit Lines (34)	$37.65	26,560	11.5
Bus Rapid Transit	$27.59	36,251	8.4
Commuter Rail	$31.90	31,349	9.7
Light Rail	$46.11	21,689	14.1
Metro	$29.61	33,771	9.0

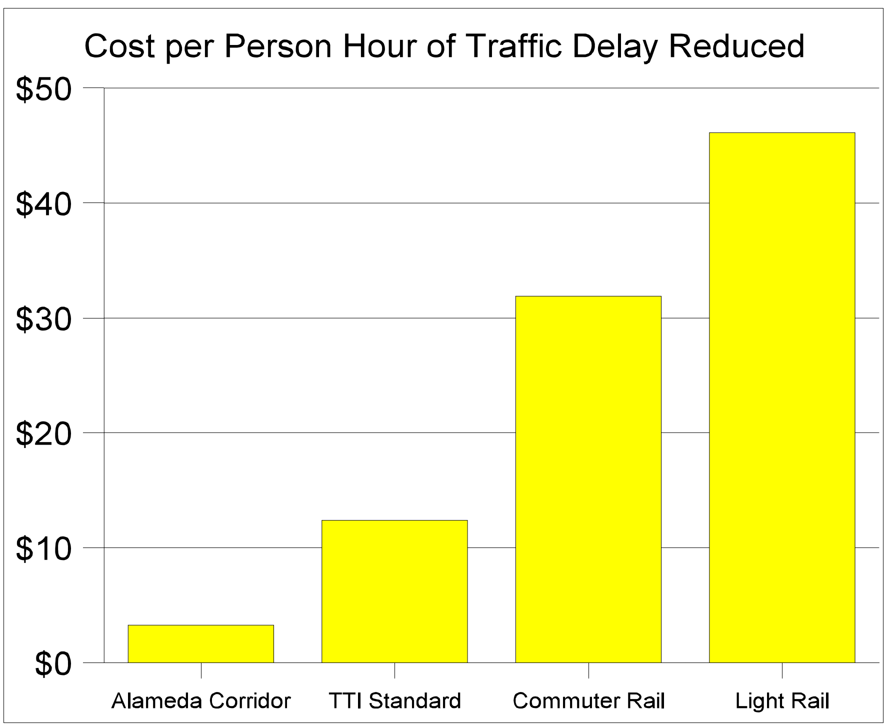

Figure 23
Estimated from FTA and ACTA data.

Example #1: Houston-to-Dallas Intermodal Upgrade

More modest freight improvement projects may also cost effectively reduce traffic reduction. For example, the Burlington Northern Santa Fe Railroad has proposed development of a new $60 million rail-truck intermodal system between Houston and Dallas. It is projected that this project would remove 88,000 annual truck trips in each of the two urban areas. This calculates to a government cost of less than $6 per urban trip removed,[95] which is lower than the cost per highway trip removed of most federally funded rail systems. If the analysis was limited to the two metropolitan areas involved, the subsidy cost would be less (some of the required improvements would be in portions of the project outside the two metropolitan areas).

Example #2: Austin Truckway

Exclusive truck facilities could also cost-effectively reduce urban traffic congestion.[96] From 1996 to 2020, through truck trips are projected to increase 125 percent on Interstate 35 in Austin.[97] This increased traffic would be the equivalent of adding nearly two full lanes of traffic for the length of I-35 through the Austin area.[98]

An exclusive truck freeway (truckway) could be built around the Austin area. If the facility was operated without tolls, it is not unreasonable to anticipate that 75 percent of the through truck traffic would use the new facility.[99] A four-lane truck freeway could be built for between $300 million and $500 million.[100]

Annually, it is projected that a 30-mile truckway through the Austin area would remove the equivalent of more than 400 million annual vehicle miles from Interstate 35 through Austin. This is approximately 20 times the vehicle mile[101] impact projected for the recently rejected Austin light rail system, which would cost from two to three times as much (Figure 24). Based upon these assumptions, the Austin truckway would be from 40 to 70 times as cost effective as the Austin light rail system with respect to removing traffic from roadways.

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[95] Based upon the passenger car equivalency of 3.8 for trucks and an average trip length of 10 miles in each urban area.

[96] A Dallas-Fort Worth-to-Laredo truck freeway has been proposed, which would operate through the Austin and San Antonio areas.

[97] *IH 35/SH 130 Through Truck Diversion Analysis*, Texas Department of Transportation, February 12, 1998.

[98] Assumes a passenger car equivalency of 3.8 for trucks and a 7,400 daily increase in through truck traffic trips (Texas Department of Transportation). The TTI estimates the capacity of a single freeway lane at 15,000 vehicular trips daily

[99] The Los Angeles area is considering development of truck-only freeways. Current planning assumptions are that 50 percent of all truck traffic would use these facilities, which would charge tolls. The 75 percent Austin assumption relates only to through trucks and assumes that no toll would be charged. It is possible that virtually all through truck traffic could be routed on the truckway.

[100] Based upon the range between the national cost for urban freeways per lane mile ($4.1 million) and the average of urban and rural costs ($2.1 million) in 1999 (estimated from Federal Highway Administration data).

[101] It is assumed that the 30-mile truckway would route trucks around the 25 most congested miles of Interstate 35. The vehicle mile reduction is based upon the 25 mile figure and a 3.8 passenger car equivalency for trucks.

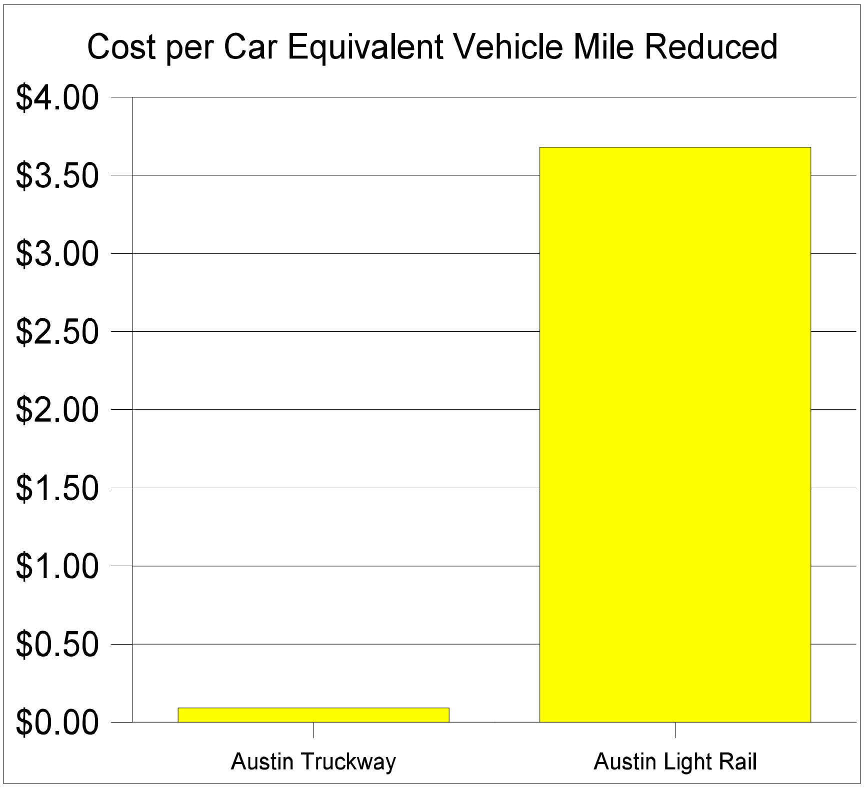

Figure 24
Method described in text.
Based upon the high cost estimate for the Austin Truckway ($500 million).

Example #3: Laredo Rail Grade Separation

Laredo, one of the nation's fastest-growing metropolitan areas, also has the highest volume of any port of entry on the U.S.-Mexican border. As noted above, both rail and truck freight traffic has increased substantially due to NAFTA, and substantial future increases are also expected. The high rail volume now causes inordinate traffic delay in the community because the rail lines operate across the community at grade. While no cost effectiveness estimate is available, grade separation of rail lines in Laredo would do much to reduce traffic congestion. Traffic conditions in Laredo have already been substantially improved by the new World Trade bridge that diverts truck traffic around the city rather than through it.

Analysis: Impact of Trucks and Transit on Traffic: Another analysis implies great potential for freight-related rail and trucking improvements. Generally, the benefits from reducing truck traffic appear to be greater than those achieved by transit,[102] by an overall ratio (truck-transit benefit ratio) of more than five to one (5.5:1) (Table 11).[103]

[102] This is not to suggest that there is not an important role for transit. It does seem likely, however, that freight-based projects hold more promise for traffic reduction than expensive new transit systems.

[103] As above, commercial trucks are assumed to be the equivalent of 3.8 cars in urban traffic.

★ Even in the 32 foreign urban areas with their comparatively high transit market shares, the truck-transit benefit ratio is estimated at 4.7:1 (Figure 25). If all trucks were removed, traffic would be reduced 38.8 percent, compared to the 9.2 percent traffic reduction attributable to transit.[104] A 100 percent increase in transit's market share would have the same impact on traffic as a 21.3 percent reduction in truck traffic.

★ Among the 13 U.S. urban areas included in the survey, the truck-transit benefit ratio is estimated at 19:1. If all trucks were removed, traffic would be reduced 28 percent, compared to the 1.5 percent traffic reduction attributable to transit. A 100 percent increase in transit's market share would have the same impact on traffic as a 5.3 percent reduction in truck traffic.

★ The only Texas urban area included in the international survey is Houston, where the impact of the truck-transit benefit ratio is estimated at 43:1. If all trucks were removed, traffic would be reduced 24.3 percent, compared to the 0.6 percent traffic reduction attributable to transit (Figure 26). A 100 percent increase in transit's market share would have the same impact on traffic as a 2.3 percent reduction in truck traffic.

Table 11
Truck-Transit Benefit Ratio

Category	Impact on Traffic Volumes if No Trucks	Impact on Traffic Volumes of Transit Use	Truck-Transit Benefit Ratio	Truck Traffic Reduction Equivalent to 100% Increase in Transit Use
45 International Urban Areas	-38.8%	-7.0%	5.5	18.0%
32 Urban Areas Outside the U.S.	-43.0%	-9.2%	4.7	21.3%
3 U.S. Urban Areas	-28.0%	-1.5%	18.8	5.3%
12 U.S. Urban Areas (Excluding New York)	-28.0%	-1.2%	23.5	4.3%
Houston	**-24.3%**	**-0.6%**	**42.6**	**2.3%**

Total roadway traffic volumes converted to passenger car equivalents.
Calculated from data in Kenworthy and Laube.

104 For the purposes of this analysis, all transit trips are presumed to reduce traffic. It is assumed that one automobile would be added to traffic for each 1.6 transit passengers, based upon the national vehicle occupancy rate (FHWA).

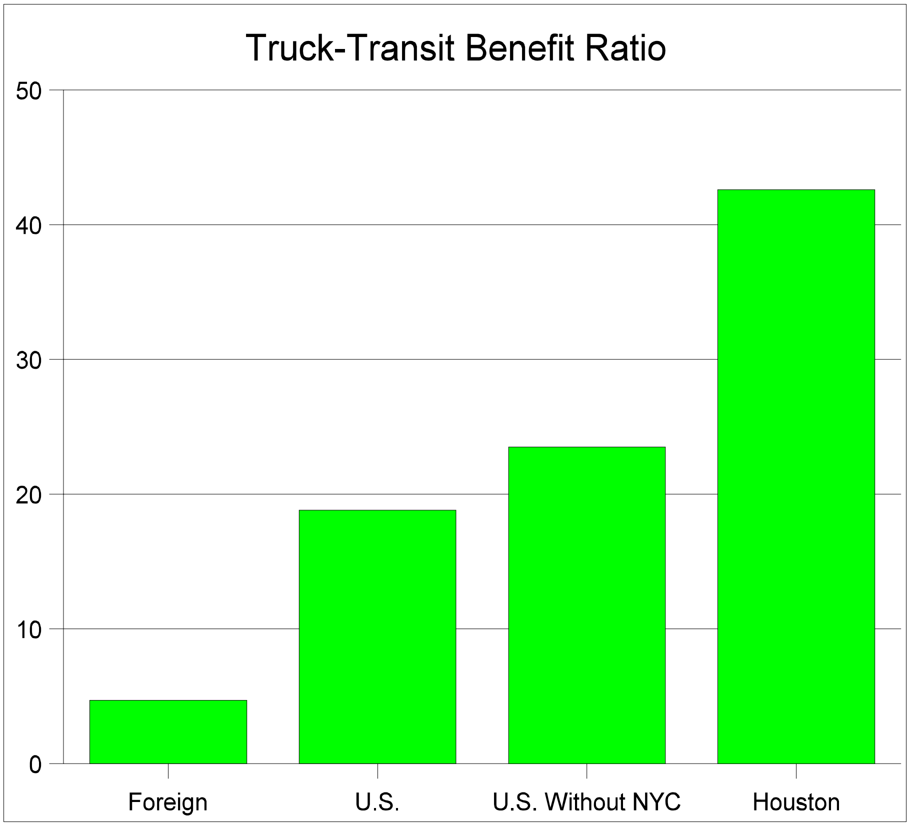

Figure 25
Method described in text and footnote.

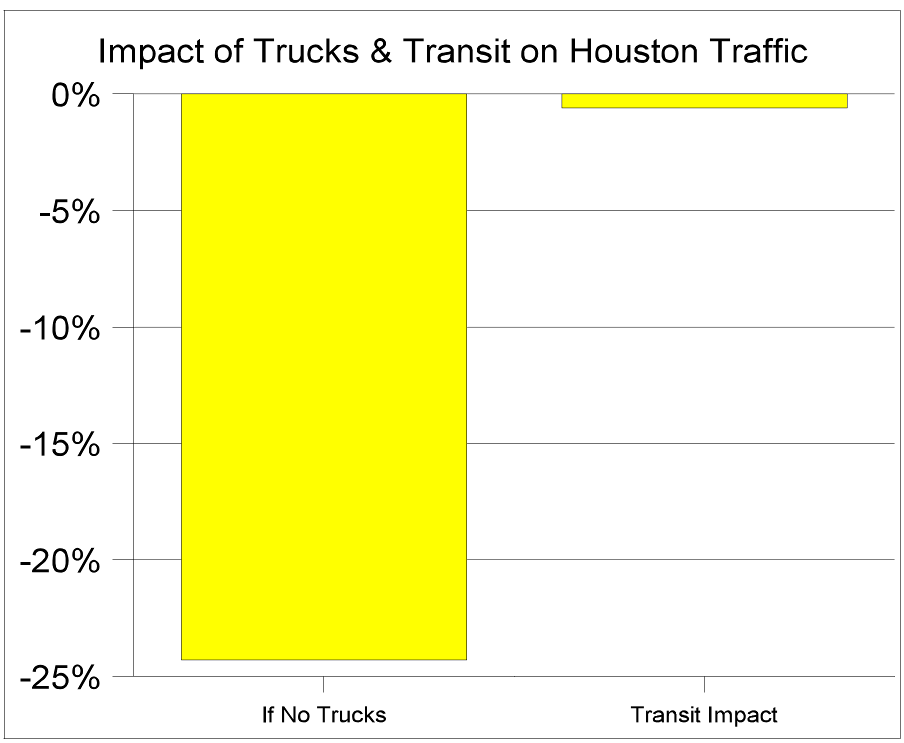

Figure 26
Method described in text.

Planning authorities in Texas metropolitan areas are projecting transit ridership increases of 25 to 70 percent over the next 20 years (Appendix). Based upon the Houston truck-transit benefit ratio,[105] the same traffic effect could be obtained by reducing truck traffic growth over the next 20 years by from 0.4 percent to 1.9 percent. This is the equivalent of from one to four months of truck traffic growth at the nationally projected annual rate (3.4 percent). This would require reducing future truck traffic growth by two to five trucks out of each 10,000 increase (0.02 percent to 0.05 percent). The impact of transit is small because its market share is so small.

The truck-transit benefit ratio is based upon total transit ridership, not just commuter rail ridership, which is the only form of transit that interferes with freight rail traffic. The benefits of trucks compared to commuter rail would be even higher. For example, the New York truck-transit benefit ratio is approximately 6:1, but would rise to 17:1 if only commuter rail were considered.

The Pivotal Position of Texas

Because so much of freight traffic through Texas is generated at Mexican border crossings, there is an unusual potential for reducing traffic congestion through freight rail projects. Railroad upgrades along border-oriented routes and new intermodal facilities further from the border could capture significant freight volumes that would be transferred to trucks much further into the state, bringing relief to roadways in both urban and rural areas.

BALANCED TRANSPORTATION POLICY

This analysis does not prove that all truck or rail freight projects are more efficient or effective in reducing traffic congestion and air pollution than major transit investments. However, it is clear that some are. Nor is it suggested that truck traffic should be removed, because there are a number of strategies by which truck traffic can be diverted or handled more effectively. The result, both for auto and transit bus service, would be beneficial. Generally, it seems clear that the net benefits of maintaining and improving the nation's freight rail system could outweigh any benefits that might be achieved by expanding commuter rail or intercity rail.

Generally, it seems clear that the net benefits of maintaining and improving the nation's freight rail system could outweigh any benefits that might be achieved by expanding commuter rail or intercity rail.

This report represents a first effort to begin to look at such a trade-off. The conclusion is that the data is of sufficient significance that public policy should no longer consider freight and transit traffic reduction strategies independent of one another.

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105 The Houston ratio is likely to be more favorable to transit for the other Texas metropolitan areas because of Houston's lesser reliability on trucks.

Government policies that stress development of new commuter rail and intercity rail systems have the potential, albeit unintended, to substantially increase highway traffic volumes by transferring freight traffic from rail to highways. This consequence (negative externality) of commuter rail is a particular problem because it is so difficult to add urban highway capacity, it is in the public interest for government to avoid programs that increase highway freight volume. This does not mean that government should favor rail freight over highway freight. It simply means that while seeking to deal with traffic congestion, government should rely on the policies that are most effective, rather than undertake short-sighted and counter-productive programs. Traffic congestion could be particularly worsened if federal law granted the Surface Transportation Board authority to overrule the commercial interests of the freight rail industry in preference for commuter rail services.

Moreover, from a public policy perspective, it may not be sufficient to financially compensate railroads to obtain commuter rail or intercity rail operating rights. For example, a railroad in a difficult financial condition might accept short-term cash from a government to accommodate commuter rail, while compromising its ability to maintain, much less expand, market share in the longer run. An analogous situation was pointed out in Surface Transportation Board documents to the effect that the Southern Pacific Railroad had sold a large rail yard in the Los Angeles area to obtain cash flow, with the effect that the railroad "falls on its face" in the area every autumn.[106]

State and local governments, which are generally not able to supply sufficient roadway capacity, should not undertake commuter rail or intercity rail projects that might result in substantially greater truck traffic.

A financially-stressed railroad could as readily reduce its long-term market share potential by accepting a short-term financial gain offered for commuter rail or intercity rail service offered by government. Moreover, governments are often constitutionally or statutorily prevented from incurring future financial obligations other than bonded indebtedness. A government may, for example, agree to fund future freight rail capacity improvements that would not have been necessary if additional passenger trains had not been placed on a route. Such obligations would be subject to future funding allocations and might not be considered priorities for governments facing more pressing concerns. The result would be a longer-term weakening of the freight rail industry and its ability to accommodate volume that would otherwise be forced onto roadways.

A balanced transportation policy is required that fully accounts for all of the costs and benefits of all strategies for reducing traffic congestion. It may be appropriate to discourage passenger rail programs that share freight rights of way (except where significant programs already exist). This would do much to ensure that government programs do not disadvantage freight railroads and that such programs do not inadvertently create more traffic than they remove. State and local governments, which are generally not able to supply sufficient roadway capacity, should not undertake commuter rail or intercity rail projects that might result in substantially greater truck traffic.

[106] *Union Pacific's Report on Service Recovery,* Union Pacific Corporation and Covington & Burling, submittal to the Surface Transportation Board, December 1, 1997, p. 43.

A public policy that forbids governments from implementing strategies that could increase traffic volumes by driving business from rail to trucks would be justified based upon the following factors:

★ Rail freight market share losses translate into truck traffic increases.

★ Truck traffic has a disproportionate impact on the already congested and difficult-to-expand urban roadway system.

★ Rail freight is at a continual competitive risk and is comparatively fragile. This is illustrated by the fact that freight rail has been losing market shares in virtually all high-income nations, including the United States. The experience of Japan and Europe indicates that freight rail market shares could fall considerably further and further implies that a healthy national freight rail system may be incompatible with an emphasis on commuter rail or intercity rail.

★ Freight rail market shares are projected to fall in the United States.

The private freight railroads are a national infrastructure resource that are important to controlling traffic congestion. Further, there are other potential advantages of a public policy that would forbid government actions that skew the freight market away from rail to truck.

The private freight railroads are a national infrastructure resource that are important to controlling traffic congestion.

★ Rail has a lower fatality rate than trucks. The freight railroad fatality rate was 0.73 per billion ton miles in 1998, one-seventh that of the 5.26 large truck rate (Figure 27).[107]

★ Rail moves freight with less energy (Figure 28). Freight railroads consumed 361 BTUs per ton mile in 1998, approximately one-eighth that of highway freight (2,850).[108]

★ Rail generally pollutes less than trucks (Figure 29). It is estimated that, per ton mile, trucks emit 37 percent more Hydrocarbons than rail (Figure 30), 1.97 times more Carbon Monoxide, and 4.56 times (Figure 31) more Nitrogen Oxides (NOx).[109]

★ Finally, as noted above, rail freight rates are lower than those of trucks, lowering ultimate product prices.

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[107] Calculated from U.S. Department of Transportation Bureau of Transportation Statistics National Transportation Statistics and Fatality Analysis Reporting System Database. It is notable that many truck-related fatalities are not the fault of truck drivers. Often the average non-professional driver is at fault. Similarly, a large percentage of train-related fatalities are not the fault of railroad employees.

[108] Calculated from U.S. Department of Transportation Bureau of Transportation Statistics National Transportation Statistics.

[109] C. Jake Haulk, *Inland Waterways as Vital National Infrastructure: Refuting "Corporate Welfare Attacks,"* Allegheny Institute, 1997.

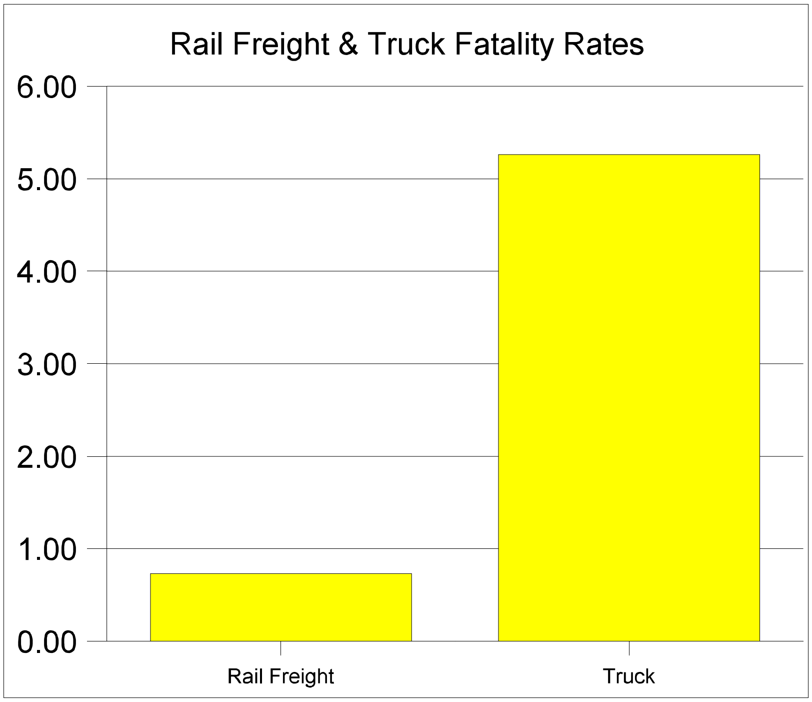

Figure 27
Fatalities per billion ton miles.
Calculated from Bureau of Transportation Statistics and U.S. Department of Transportation Fatality Analysis Reporting System data.

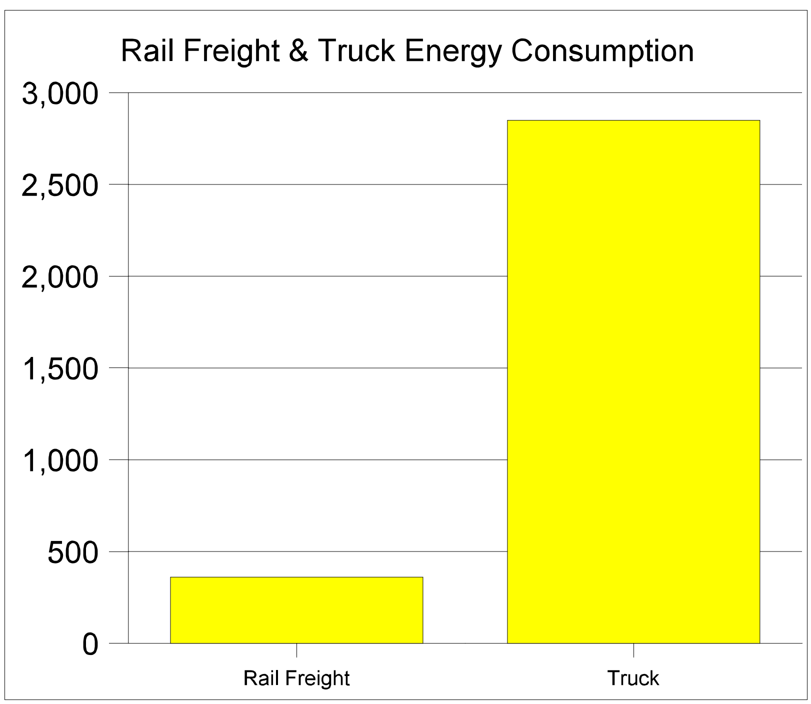

Figure 28
BTU's per ton miles.
Calculated from Bureau of Transportation Statistics data.

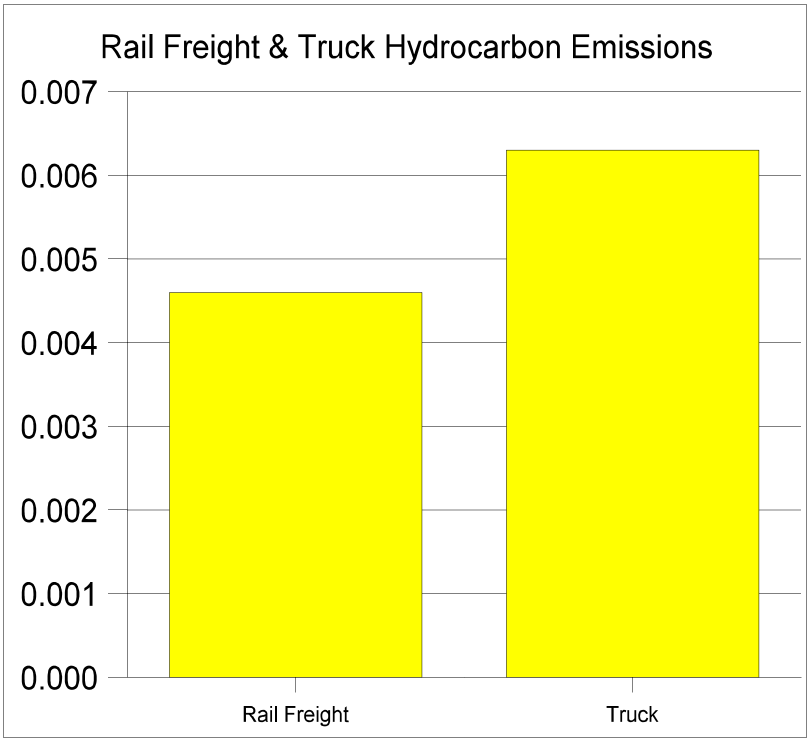

Figure 29
Pounds of pollutant per ton mile.
Calculated from Haulk.

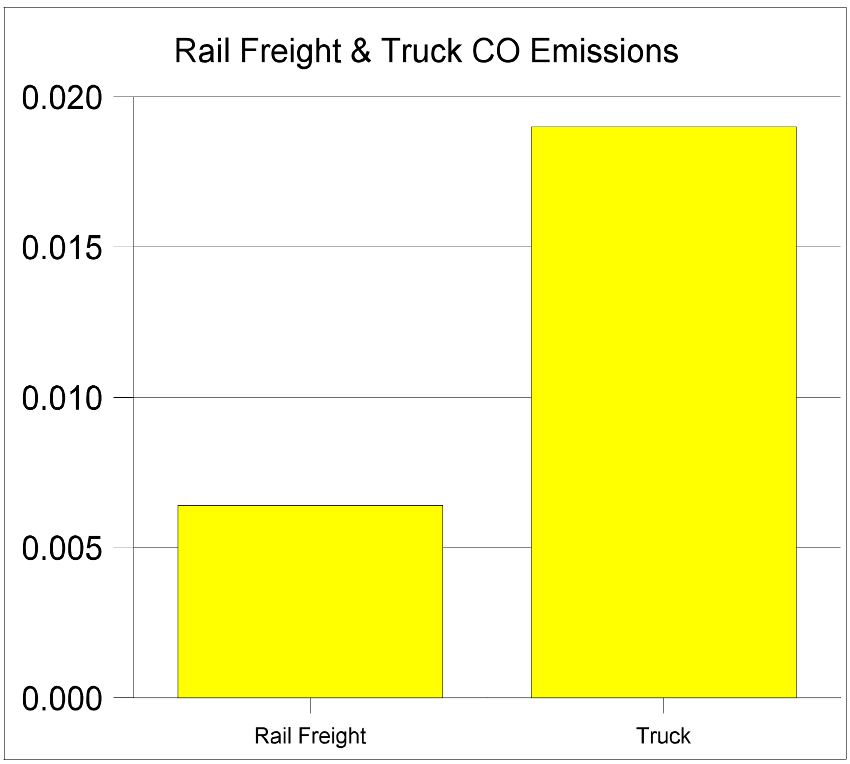

Figure 30
Pounds of pollutant per ton mile.
Calculated from Haulk.

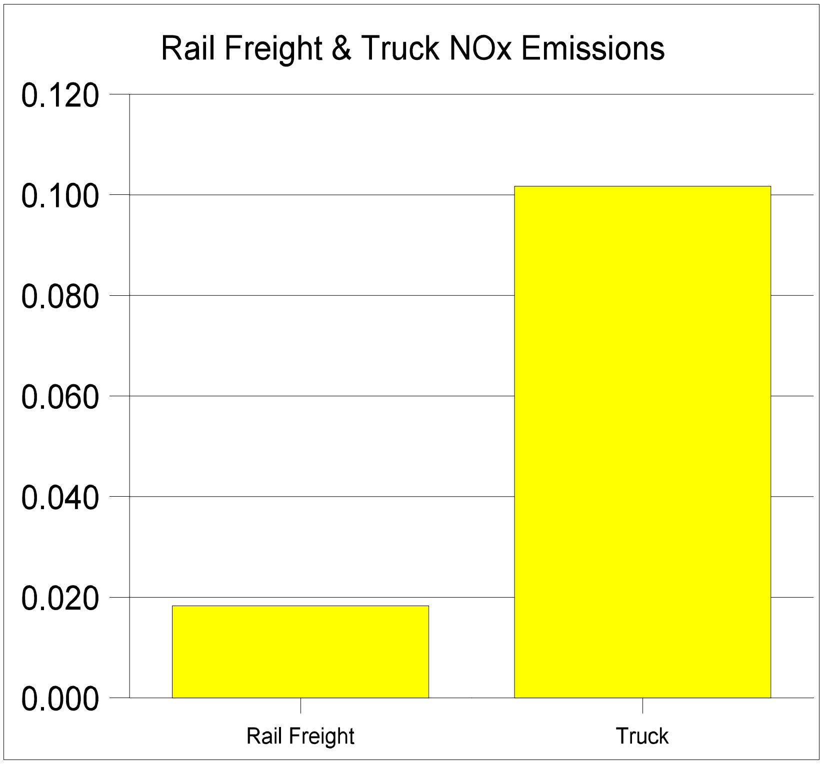

Figure 31
Pounds of pollutant per ton mile.
Calculated from Haulk

Currently, planning authorities are not required to consider freight alternatives that might be more effective in mitigating traffic congestion and air pollution than public transit projects. Moreover, despite their potential cost effectiveness, such freight projects are not eligible for FTA funding that has traffic congestion relief as a principal purpose.

Urban transit funding is provided primarily to serve two basic objectives:

★ The first objective is providing mobility to people who have limited access to automobiles, such as low-income citizens and the disabled. These market segments are served by bus systems that provide comparatively comprehensive service in regional cores (generally central cities) and by dial-a-ride systems, which provide service from door to door, largely for those residents eligible for Americans with Disability Act service.

★ The second objective is alleviation of urban traffic congestion. To accomplish this goal, a number of cities have built urban rail systems. However, virtually no improvement in traffic congestion or air pollution can be attributed to new rail systems constructed in recent decades.[110]

[110] In fact, from 1982 to 1997, the Roadway Congestion Index increased more in urban areas building light rail than in those that did not. This does not necessarily indicate that rail strategies increase traffic congestion; it is rather to suggest that they have little or no impact (see Thomas A. Rubin and Wendell Cox, *Trolly Folley*, Texas Public Policy Foundation, 2000).

As the comparison of Houston's light rail system and the Los Angeles Alameda Corridor project seems to indicate, transit funding's traffic congestion relief objective may be more effectively met in some cases through freight programs. Such projects could include:

★ Major railroad grade separation projects, such as the Alameda Corridor.

★ Railroad capacity enhancements that would increase freight operating speeds and assist railroads in maintaining their contribution to roadway traffic reduction. The New York Harbor rail tunnel would be an example of such a project.

★ Special truck lanes and express roadways that would expedite trucks around urban traffic congestion. The urban portions of the proposed Dallas-Fort Worth-to-Laredo truck freeway would be an example.

★ Intermodal truck-rail projects that reduce truck travel in urban areas, such as the proposed Houston-to-Dallas intermodal upgrade.

Every year, hundreds of millions of dollars in federal taxes and local sales taxes in Houston and Dallas are being expended on the construction of new rail systems.

Where the public objective of reducing traffic congestion or limiting its future growth can be better met by implementing freight improvement projects, then these funds should be made available. Both federal and local planning processes should require highway freight and rail freight projects to be included in alternatives analyses. For example:

★ Rail freight projects could be funded where they can be shown to be the most cost effective in reducing transportation delay (non-user subsidy per hour of delay reduction). The local matching funds would be provided by local governments. It is important to understand that the principal public purpose of such a program would be the improvement of traffic congestion, not the private gain of the freight railroads. The private benefits received by the freight railroads through such a program would be ancillary and passed on to consumers in lower product prices.[111]

★ Highway freight projects could be funded where they are the most cost effective in reducing urban transportation delay (non-user subsidy[112] per hour of delay reduction). The required matching funds could be provided from the highway user fees that are currently paid by trucking companies, or by local or state governments. As in the case of the freight rail improvements, the principal public purpose of such a program would be the improvement of traffic congestion, not the private gain of trucking firms. The private

[111] This would not preclude freight railroad financial participation where it seeks additional private benefits that do not improve traffic congestion.

[112] Fuel taxes dedicated to highway improvements are user fees, not subsidies (just as payment to a publicly owned electric utility is a user fee, not a subsidy).

benefits received by the trucking companies through such a program would be ancillary and passed on to consumers in lower product prices.[113]

★ Cost-effective intermodal projects could be funded with matching funds obtained through public-private partnerships, user fees from the trucking industry, and state and local governments.

★ Programs such as these and other freight improvement programs could be melded together into regional freight transportation improvement programs. Transit's impact on traffic congestion is generally limited to downtown-oriented corridors (Appendix). Downtown areas continue to lose employment market shares, as suburban job growth continues at much higher rates. As a result, the worst traffic congestion in urban areas is often in areas far from downtown. Comprehensive freight improvement programs would have the potential to improve traffic congestion throughout the entire urban area, not just in downtown-oriented corridors.

In each case, FTA assistance could also be made available through loans, similar to the Federal Department of Transportation participation in the Alameda Corridor project, or through grants such as those provided for urban rail projects.

Such a policy initiative would be consistent with recent project evaluation revisions at the FTA. FTA has revised its major investment project cost effectiveness evaluation process to rely on the cost per hour of personal transportation delay achieved by the proposed improvement. Changes that would make major funding available to traffic-mitigating freight projects could be made with respect to local sales taxes in Texas metropolitan areas.

Similarly, in Texas, local transit and transportation sales taxes could be used to fund freight projects where the traffic congestion relief impacts are superior to transit projects.

A National Program: Not all projects, however, yield most of their costs or benefits at the local level. For example, a local commuter rail program that retards the general competitiveness of the freight rail system could impose most of its costs (externalities) outside the urban area in which the project is developed. The impact from a single project might not be significant with respect to rail's competitiveness. The combination of a number of projects spread around the nation could, over the longer term, be a significant factor in retarding the competitiveness of freight rail and cause a transit-induced transfer of tonnage from rail to trucks.

Similarly, a local operational improvement that improves the general competitive position of freight rail may result in greater total benefits to urban areas other than the area in which the project is implemented. But the combination of a number of such projects could make a very real difference in the longer run in maintaining freight rail's market share and avoiding an inordinate increase in truck freight dependence.

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[113] This would not preclude trucking industry financial participation where it seeks additional private benefits that do not improve traffic congestion.

Because each truck has a much greater impact on congestion than a car, this could significantly worsen traffic congestion in urban areas throughout the nation. The public interest in effectively managing the growth of truck freight traffic argues for public policy that seeks to reduce the impact of truck traffic in urban areas through programs that maintain freight rail's competitiveness, as well as programs that provide exclusive facilities that expedite truck movement and thereby reduce truck volumes on general purpose roadways.

Virtually all of the new project major investment funding from the federal government is discretionary, rather than a formula that creates entitlements for individual states. Through its quarter century history, such funding has been distributed based upon both objective analysis and political pressure. There is no question, however, that the program has failed to deliver the greatest amount of traffic congestion relief for the funding available. Transit funding of major investments around the nation has tended to be skewed toward what are considered more attractive, but far more expensive-than- necessary improvements, especially urban rail systems (Appendix). There is a need for a much better prioritized federal program that distributes funding based upon the extent of need and the potential for improvement. For example, FTA might develop a multi-year national congestion relief program that identifies the areas of greatest urban traffic congestion and develops programs for improvement, in cooperation with state and local agencies. Such a program would be more like the federal interstate highway system than the present FTA grant system. A significant portion of FTA major investment funding, perhaps 50 percent or more, could be committed to such a program. Further, there is a need for provisions to ensure the greatest traffic relief results in state and local decision making as well.

Transit congestion relief funding should be equally available to passenger and freight projects based upon their comparative effectiveness in reducing or containing traffic congestion.

An Urban Traffic Improvement Program: An urban traffic improvement policy, composed of the following principles, is recommended for the federal, state, and local level:

★ Urban transportation planning should routinely solicit and consider all potential passenger and freight alternatives for reducing traffic congestion.

★ Transit congestion relief funding should be equally available to passenger and freight projects based upon their comparative effectiveness in reducing or containing traffic congestion.

★ Development of any major investment (passenger or freight) should proceed only if a rebuttable finding (legally challengeable) is made that the project is more cost effective in reducing traffic congestion than any other project considered.

★ To preserve the competitiveness of freight rail, projects (commuter rail or intercity rail) that require use of active freight rail rights of way should not be considered except in corridors that already have significant passenger rail volumes[114] and where a rebuttal (legally challengeable on a factual basis) finding is made that neither the present nor future competitiveness of the rail freight system, locally, regionally, or nationally, would be reduced by the project.

★ A federal (FTA) program should be developed that identifies the most critical urban traffic reduction needs and prioritizes projects to achieve the greatest return.

To minimize the potential for overall societal economic loss, a rebuttal finding would be required that any project have a forecast cost per hour of traffic delay reduced that is less than the personal economic cost of such delay.[115]

[114] This criteria might require that a certain percentage of pre-existing rail traffic be passenger, or a number of trains per day or peak period might be used. The purpose would be to not unreasonably constrain expansion of major systems, such as the Northeast Corridor and the large commuter rail systems in New York, Chicago, and Philadelphia.

[115] As noted above, TTI estimates this figure at $12.40 (1999).

APPENDIX

TRAFFIC CONGESTION AND PASSENGER RAIL

There is a popular conception that mass transit improvements, especially urban rail systems (light rail and commuter rail) and intercity rail (such as high-speed rail) can play a significant role in reducing traffic congestion and air pollution. While such a perception seems plausible on the surface, an examination of the issue indicates little such potential.

Transit is about Downtown: The impact of transit service on peak traffic congestion is largely limited to downtown areas (central business districts). What makes peak hours more congested is the fact that such a large percentage of work trips are concentrated in these morning and evening time periods. Transit carries more than 50 percent of work trips to the large downtown areas of New York, Chicago, Brooklyn, and San Francisco. But, transit's work trip market share is much smaller elsewhere, at between 15 percent and 25 percent in downtowns such as Portland, Atlanta, Minneapolis, and Denver. Outside the major downtown areas, transit carries less than five percent of work trips. Even in New York, with by far the nation's most dense large central city, less than five percent of work trip travel to suburban locations is by transit. This sprawling suburban area has 60 percent of the metropolitan area's employment,[116] more than three times the employment in Manhattan (which is itself the world's second-largest downtown area).[117]

Indeed, even the large suburban employment centers (some of which rival downtowns in size) often have work trip market shares of one to five percent.[118] The reason for this is that transit agencies (justifiably) focus their service on downtown areas, where demand is much more concentrated than in other areas. Downtown workers thus have much better transit service that can be competitive with automobile travel. But throughout the rest of the urban area, auto competitive transit service is largely not available.

Transit Choice in Portland: The provision of "transit choice" (the choice of automobile competitive transit by urban residents) is often cited as justification for building expensive passenger rail systems. However, because transit service is so concentrated in central areas and so sparse elsewhere, there is little genuine transit choice. This is exemplified by Portland's aggressive transit improvement strategies.

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116 All data calculated from 1990 U.S. Census data.

117 The largest central business district in the world is in Tokyo.

118 Internet: www.demographia.com/dm-noncbd.htm. Even large suburban employment centers located along new rail lines tend to have small transit work trip market shares. For example, Walnut Creek, built along San Francisco's BART, had a 4.2 percent work trip market share in 1990 (latest data available).

- ★ Automobile competitive transit service[119] (transit choice) is available to downtown (13 percent of jobs) from only 78 percent of residences within the Portland area.[120]
- ★ Less than five percent of local residents have auto competitive transit access to the 87 percent of employment outside the downtown area.

Further, Portland's long-term (2020) regional transportation plan projects that a smaller percentage of jobs and residences will have transit service in 2020, after significant expansion of transit service and comparatively interventionist land use regulations.[121]

The concentration of transit ridership in the Portland regional core (largely dominated by downtown) is illustrated by the fact that less than one percent of the developed land area (urbanized area) accounts for more than 50 percent of transit commuting (Figure 32). Transit commuting densities (transit commuters per square mile) in the 87 percent of the urban area more than three miles from downtown is less than 1/200th of the downtown rate (Table 12). Barely 30 commuters per day per square mile use transit to reach their employment locations outside the three-mile ring.

[119] Peak travel periods during weekdays.

[120] Based upon an analysis of transit service to 63 suburban locations. Transit service was considered automobile competitive if it less than 30 minutes, approximately 30 percent more than the average single-occupant automobile commute time.

[121] Metro, *2000 Regional Transportation Plan*, August 10, 2000.

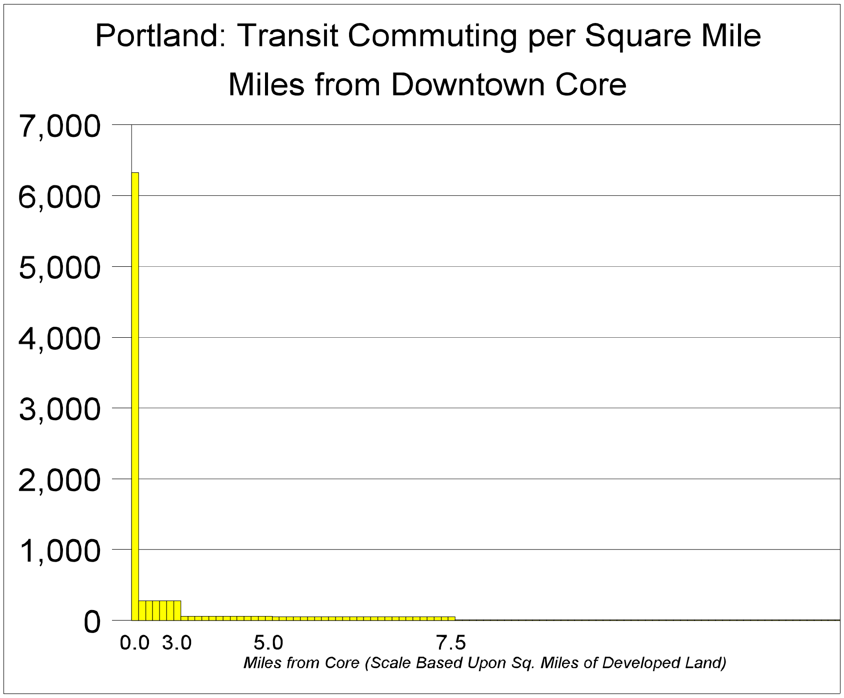

Figure 32
Estimated from 1990 U.S. Census data.
Data for outside 7.5 miles is barely visible (13 commuters per square mile daily).

Table 12
Portland Transit Commuting by Ring from Downtown

Ring	Share: Land Area	Share of Employment	Share of Transit Commuting	Commuters per Square Mile	Transit Work Trip Market Share
Inside 1 Mile	0.8%	22.9%	52.7%	6,323	14.9%
1 - 3 Miles	6.5%	14.2%	18.4%	276	8.4%
3 - 5 Miles	13.0%	10.9%	7.6%	57	4.5%
5 - 7.5 Miles	25.3%	30.7%	13.9%	53	2.9%
Outside 7.5 Miles	54.5%	21.3%	7.4%	13	2.2%
Urbanized Area	100.0%	100.0%	100.0%	97	6.5%
Developed from 1990 U.S. Census data.					

Transit in Chicago: The downtown nature of transit is also illustrated by Chicago. The fact that transit ridership is significant enough to make a difference in traffic is illustrated by Chicago, which is much more dense than Portland and was built around a more comprehensive transit system, much of which is commuter rail. Chicago has the nation's second-largest downtown area with nearly 500,000 employees. Nearly 80 percent of commuter rail riders in Chicago travel to downtown, which covers only 0.1 percent of the Chicago urbanized area. Downtown itself represents only 15 percent of the urbanized area's employment. The other 85 percent of jobs are located in the 99.9 percent of the urbanized area outside downtown. The much lower employment densities outside the downtown area can simply not be made accessible to automobile competitive transit service.[122] As a result, nearly 80 percent of commuter rail employment trips are to or from the downtown area. Overall, approximately 50 percent of transit commuters work downtown (Figure 33).

The density of transit commuting to downtown is more than 200 times that of the three- to five-mile outside downtown ring, and 2,000 times the rate for the ring outside 7.5 miles from downtown (Table 13). This outer ring represents nearly two thirds of the area's jobs. Transit commuting in the outer ring is higher than in Portland, but still only 67 commuters daily per square mile.

Finally, since 1980, employment has increased nearly 25 percent in the Chicago metropolitan area. But the growth has been largely outside the core, and as a result, commuter rail's market share has fallen approximately 30 percent, mirroring the passenger rail market share losses that have occurred in Europe and Japan.

Whether in Portland, Chicago, or elsewhere, sufficient volumes of automobile competitive transit are simply not available to provide traffic relief elsewhere than downtown in the urban area.[123]

[122] Internet: www.publicpurpose.com\db-chicrt.htm.

[123] The truck-transit benefit ratio is estimated at 9.2 percent in Chicago and 32.0 in Portland.

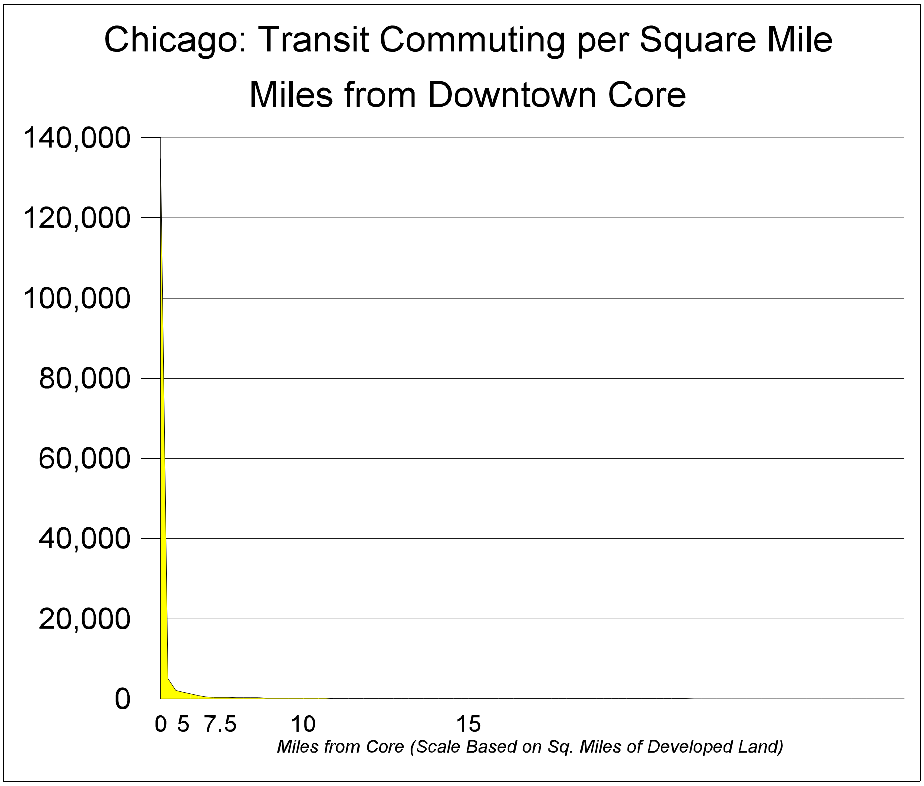

Figure 33
Estimated from 1990 U.S. Census data.
Data for outside 7.5 miles is barely visible.

Table 13
Chicago Transit Commuting by Ring from Downtown

Ring	Share: Land Area	Share of Employment	Share of Transit Commuting	Commuters per Square Mile	Transit Work Trip Market Share
Downtown	0.1%	15.1%	50.3%	134,819	52.7%
1 - 3 Miles	1.1%	9.3%	17.2%	5,160	29.4%
3 - 5 Miles	2.6%	4.0%	4.9%	610	19.5%
5 - 7.5 Miles	5.7%	8.1%	8.6%	488	16.8%
Outside 7.5 Miles	90.6%	63.6%	19.0%	67	4.7%
Urbanized Area	100.0%	100.0%	100.0%	321	15.8%
Developed from 1990 U.S. Census data.					

New Rail Transit and Traffic Congestion: The Record: Moreover, the experience of new urban rail systems (commuter rail, light rail, and subways) in the United States over the past 20 years provides virtually no evidence that transit improvements can be an important strategy for reducing traffic congestion. Among the 13 urban areas that have built urban rail:[124]

[124] This analysis assumes that all transit trips would otherwise be made by automobile at an occupancy ratio of 1.6 (national urban average).

★ Urban rail has accounted, on average, for only 0.8 percent of new urban travel (Figure 34). Washington, D.C., which has spent more than $10 billion to build more than 150 miles of metro and commuter rail, has captured the highest (though still small) share of new travel, at 2.0 percent (Figure 35). Los Angeles, which has spent more than $7.5 billion building approximately 40 miles of light rail, 20 miles of metro and 400 miles of commuter rail, has captured 0.1 percent of new travel.

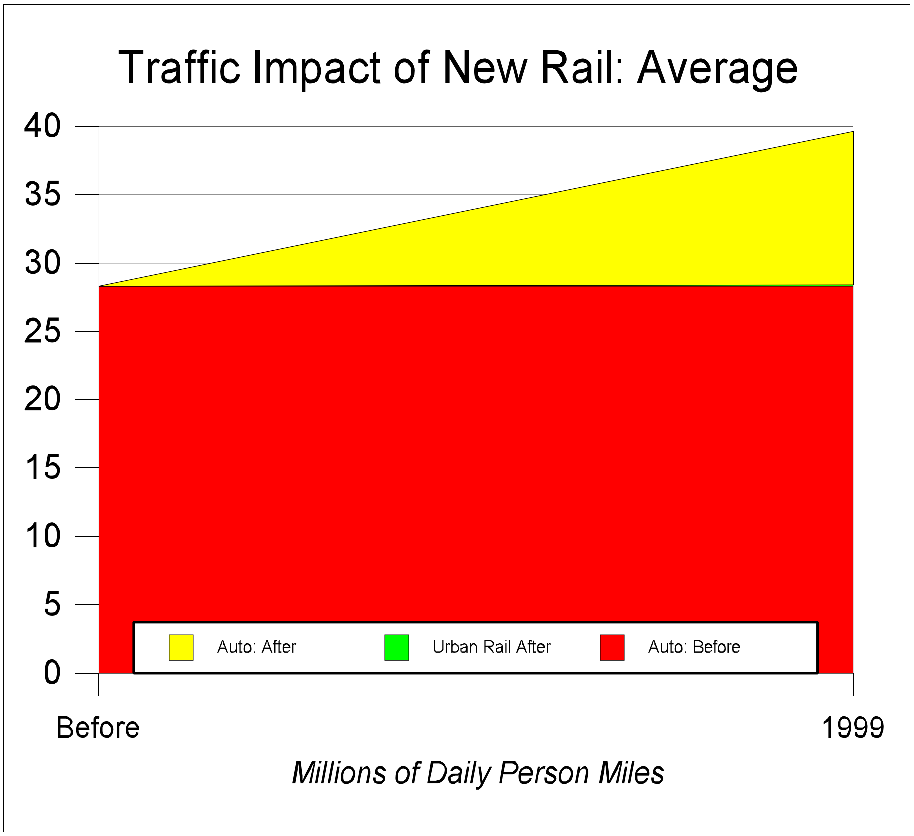

Figure 34
Calculated from National Transit Database and Texas Transportation Institute data.
"New rail trips" is not easily visible because it is so small.

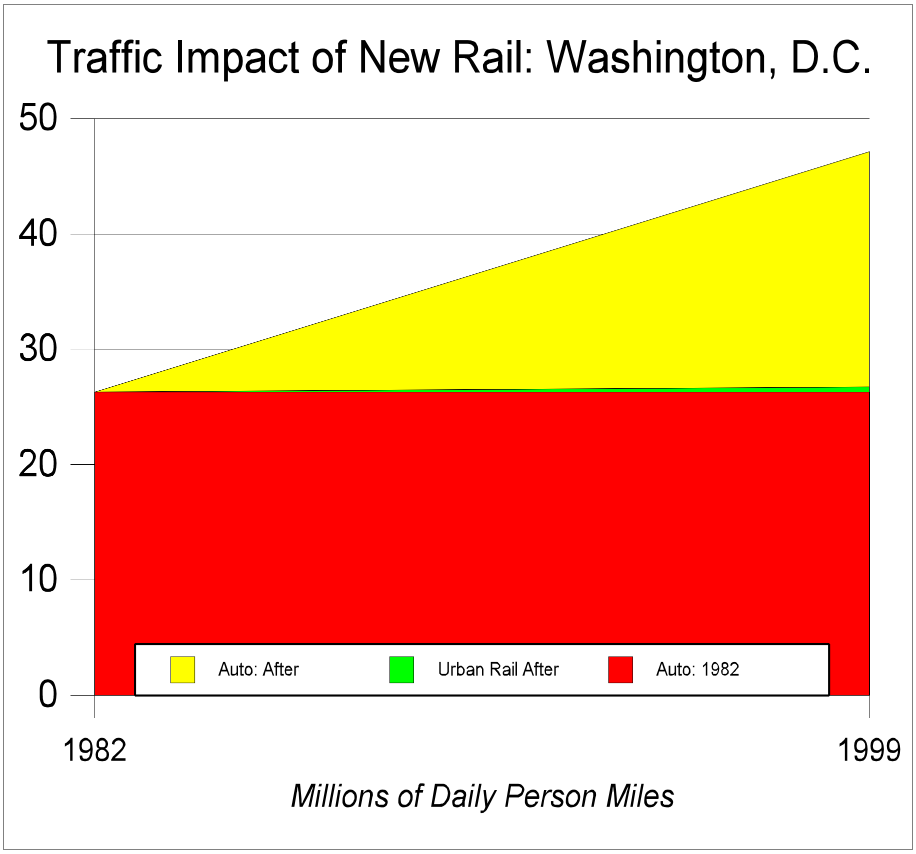

Figure 35
Calculated from National Transit Database and Texas Transportation Institute data (1982 is earliest data available).
"New rail trips" is not easily visible because it is so small.

Transit's Limited Impact on Future Traffic Congestion: Further, planning reports prepared for future transit improvements project similar minuscule results. Again, Portland has adopted the nation's most activist land use policies and has aggressive policies in place to build new urban rail lines and encourage public transit ridership. Land use policies, like those adopted by the city of Austin, seek to reduce the demand for driving by locating activities closer to residences, making long drives less necessary, and making it possible to walk and bike to more locations.[125] Transit ridership is projected to increase a substantial 70 percent. But, because transit ridership represents such a small share of travel in Portland, transit's market share is projected to be only six percent (up from the current three percent). Walking and biking would increase from five percent to six percent. As in the past, the overwhelming majority of travel

[125] These policies are called "smart growth" or "new urbanism" by their proponents.

growth is projected to be accommodated by automobiles (Figure 36).[126] At the same time, per capita delays in traffic congestion are projected to increase 350 percent.[127]

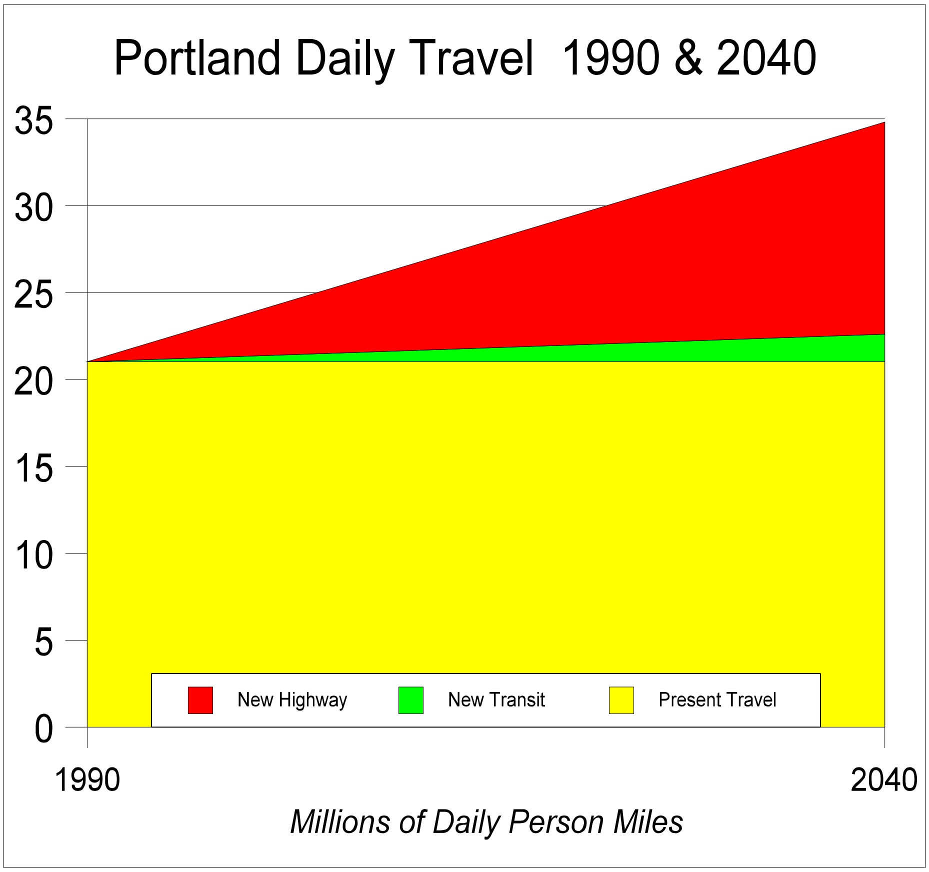

Figure 36
Estimated from data in *2040* Plan.

It is not realistic to assume that transit projects or transit expansion can have a more significant impact in Texas metropolitan areas than the meager results that are projected in Portland, with aggressive plans for service expansion and land use controls. Indeed, despite plans to build and expand urban passenger rail projects, regional planning organizations project virtually no impact on regional travel patterns.

126 A principle of the currently in vogue "smart growth" and "new urbanist" planning is that jobs, activity centers, and residences should be located closer together, which it is presumed would reduce travel distances and times. The evidence does not support this view in medium and large metropolitan areas. Stockholm, for example, undertook a prescriptive policy to develop new towns that would be comparatively self contained with respect to jobs and residences. Decades later, the share of residents who work in adjacent employment centers is far below what was anticipated. This is to be expected, since people tend to view the entire metropolitan area as an employment market, and factors other than employment location are often more important in accepting employment. See Peter Hall, *Cities in Civilization*, (New York: Pantheon Books), 1998, Chapter 27.

127 Metro.

★ Austin projects transit ridership increases of nearly 40 percent through 2020, yet in the face of the continuing increase in automobile usage, will see its transit market share rise from only 1.1 percent to 1.6 percent.

★ Dallas-Fort Worth, Houston, and San Antonio project transit ridership increases of from 25 percent to 75 percent but will see their already minuscule market shares (approximately one percent) remain unchanged.

THE LIMITATIONS OF CHARTS

The old Chinese proverb says that a "picture is worth a thousand words." Because visual images can be so effective, authors often rely upon graphic charts to make points that are less obvious when stated quantitatively in the text.

However, there are serious limitations to charts, especially where the data being compared are of such a great difference that critical figures are simply not visible. This report contains a number of such instances, namely:

★ Figure 2: The air freight share is so small that it cannot be seen.

★ Figure 12: The U.S. passenger rail market share is so small as to be nearly invisible in relation to rail freight and European passenger rail market shares.

★ Figure 19: The NOx reduction cost effectiveness of Houston's light rail light is nearly invisible in relation to that of the Alameda Corridor freight project in Los Angeles.

★ Figure 29: The transit commuters per square mile in Portland are not visible beyond 7.5 miles from downtown.

★ Figure 30: The transit commuters per square mile in Chicago are not visible beyond 7.5 miles from downtown.

★ Figure 31: The new travel attributable to new urban rail systems is barely visible in relation to total travel.

★ Figure 32: The new travel attributable to Washington's urban rail system is barely visible in relation to total travel.

The small figures are difficult to portray on a chart. However, their imperceptibility itself is significant.

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Wendell Cox is principal of Wendell Cox Consultancy, an international public policy firm. He has provided consulting assistance to the United States Department of Transportation and was certified by the Urban Mass Transportation Administration as an "expert" for the duration of its Public-Private Transportation Network program (1986-1993). He has consulted for public transit authorities in the United States, Canada, Australia, and New Zealand, and for public policy organizations.

Mr. Cox served three years as the Director of Public Policy at the American Legislative Exchange Council, where he oversaw the development of state model legislation and policy reports. He serves as a member of the Amtrak Reform Council, having been appointed by the U.S. Speaker of the House of Representatives. Mayor Tom Bradley appointed him to three terms on the Los Angeles County Transportation Commission, where he authored the tax amendment that provided the initial funding for building light rail and the subway.

He was elected chairman of the American Public Transit Association Planning and Policy Committee (comprised of transit planning department officials) and the American Public Transit Association Governing Boards Committee (comprised of transit board members). He was recently appointed as a visiting professor at the Conservatoire National des Artes et Metiers in Paris (a national university).