NEW MEXICO DEPARTMENT OF TRANSPORTATION

RESEARCH BUREAU

Innovation in Transportation

ESTABLISHING FREIGHT CORRIDORS

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New Mexico Department of Transportation
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In Cooperation with:
The US Department of Transportation
Federal Highway Administration

Final Report NM04MMT-03

JUNE, 2007

1. **Report No.**	2. **Government Accession No.**	3. **Recipient's Catalog No.**
NM04MMT-03		

4. **Title and Subtitle**	5. **Report Date**
Activities Research Report, Establishing Freight Corridors	March 2006
	6. **Performing Organization Code** NM04MMT-03

7. **Author(s)**	8. **Performing Organization Report No.**
Alliance for Transportation Research Institute University of New Mexico 801 University Boulevard SE, Suite 302 Albuquerque, NM 87106	

9. **Performing Organization Name and Address**	10. **Work Unit No. (TRAIS)**
Alliance for Transportation Research Institute University of New Mexico 801 University Boulevard SE, Suite 302 Albuquerque, NM 87106	11. **Contract or Grant No.** CO 4616

12. **Sponsoring Agency Name and Address**	13. **Type of Report and Period Covered**
Research Bureau New Mexico Department of Transportation P. O. Box 94690 Albuquerque, NM 87109-4690	Final Report January 2005 – March 2006
	14. **Sponsoring Agency Code**

15. **Supplementary Notes**

16. **Abstract**

The NM DOT Research Bureau requested that the ATR Institute (ATRI) assist them in research which would identify the factors for establishing freight corridors for rail and truck across New Mexico; gain an understanding of multimodal planning for the freight industry, including freight patterns; and to anticipate and best utilize existing freight infrastructure. The research would provide recommendations to integrate design, planning, and maintenance to meet freight projections and future freight operations. The freight corridor concept would include NM DOT utilization of freight projections within the design plans, utilization plans, and maintenance projections. The research would look at a concept for monitoring freight corridors with consideration for public safety and provide a brief benefit analysis for multimodal freight corridors from other state studies.

17. Key Words	18. **Distribution Statement**
Freight Corridors, Railroads, Trucking, Traffic Patterns, Multimodal	Available at the New Mexico Department of Transportation

19. **Security Classif. (of this report)**	20. **Security Classif. (of this page)**	21. No. of Pages	22. **Price**
Unclassified	Unclassified	168	

Form DOT F 1700.7 (8-72)

FINAL REPORT

ESTABLISHING FREIGHT CORRIDORS

by

ATR Institute
Department of Civil Engineering
University of New Mexico

Report NM04MMT-03

A Report on Research Sponsored by

New Mexico Department of Transportation
Research Bureau

in Cooperation with
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Federal Highway Administration

June 2007

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PREFACE

The research reported herein describes the identifying factors that are required for the NM Department of Transportation to develop a plan to establish transportation freight corridors across the State. It includes recommendations for gaining an understanding of the processes necessary for a Department commitment to providing resources for launching a multimodal freight corridor plan and to incorporate freight corridor planning into design and utilization of future freight operations.

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DISCLAIMER

This report presents the results of research conducted by the author(s) and does not necessarily reflect the views of the New Mexico Department of Transportation. This report does not constitute a standard or specification.

ABSTRACT

The New Mexico Department of Transportation (NM DOT) Research Bureau requested that the ATR Institute (ATRI) assist them in research which would create a freight concept for the State and identify the factors needed to commence a planning process for establishing freight corridors for rail and truck across New Mexico. The research objective also provided a current understanding of best practices in other states' multimodal planning for the freight industry, including data collection and funding methodologies, cost and benefits analysis, and utilization of existing freight infrastructure to support a freight corridor concept. Considerations for public safety in establishing freight corridors were among the issues researched. Recommendations were made on how to integrate design, planning, and maintenance to meet future freight operations. The freight corridor concept would include how NM DOT could develop and utilize freight projections within their design and utilization plans and commence formal policy-making toward a significant commitment to rail and truck freight in the State of New Mexico.

ACKNOWLEDGEMENTS

The ATR Institute would like to acknowledge the NM DOT Research Bureau's efforts to shed light on the increasingly important issues of commercial vehicle and rail freight transportation in the State of New Mexico and provide direction on how New Mexico can respond to this critical national transportation need. In particular, thanks go to Mr. Rais Rizvi, Research Engineer, who provided clarification of the goals and objectives to the research and worked with the ATR Institute team toward a successful conclusion.

Acknowledgements are given to Mr. Joseph Maestas, previously (2006) the Planning and Program Management Team Leader, Federal Highway Administration, New Mexico Division, and Mr. Ernesto Acosta, Federal Highway Administration, Freight Office Intern, NM Division, who both worked collaboratively with the ATR Institute project team to provide freight assessment needs of the State.

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INTRODUCTION

The New Mexico Department of Transportation (NM DOT) Research Bureau requested that the ATR Institute (ATRI) assist them in research which would identify the factors for establishing freight corridors for rail and truck across New Mexico; gain an understanding of multimodal planning for the freight industry, including freight patterns; and to anticipate and best utilize existing freight infrastructure. The research would provide a freight corridor concept to include recommendations to integrate freight projections and future freight operations into design, planning, and maintenance. Objectives included the concept for monitoring freight corridors with consideration for public safety and provide a brief benefit analysis for multimodal freight corridors from other state studies. The NM DOT signed an Action Plan with the ATRI to commence the research in January 2005. Due to major changes in the Research Bureau staff, no major activities within the first two quarters were conducted.

Judith Espinosa is the Principal Investigator and Senior Researcher on this project and oversees the project direction and milestones and works to head the ATRI Freight Corridor team to provide research guidance and final direction for fulfilling the goals. Other staff and students on the Freight Corridor team who contributed to the research were Geri Knoebel, Senior Researcher and Sr. Program Manager; Judy Madewell, Program Coordinator. Freight Corridor Project staff met approximately every three weeks to review activities and ensure objectives were being met.

This research project is timely because the U. S. Department of Transportation (US DOT) predicts steadily increasing rates of freight growth over the next twenty years. US DOT statistics show that 2004 was a banner year for all forms of freight; however, rates

vary considerably throughout various regions. It appears that North American Free Trade Agreement (NAFTA) freight growth has begun to level off due to changing manufacturing and market conditions. Asian traffic, (i.e., freight originating in Asian countries) is growing considerably. That being the case, the North/South corridors created by NAFTA traffic flows may change to an East/West flow as new commodities stream in from the Asian nations.

Before the reauthorization of the Transportation Equity Act for the 21st Century (TEA-21) to the Safe, Accountable, Flexible and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), the US DOT had also been promoting increased state Department of Transportation (DOT) commitment to multimodal freight staffing and funding noting that states would have additional responsibilities for congestion mitigation, to the public, and to infrastructure development as freight traffic increases in the next decades. SAFETEA-LU provided certain provisions recognizing freight traffic including the Freight Intermodal Distribution Pilot Grant Program, the Freight Planning and Capacity Program, and the National Cooperative Freight Research Program, to name a few.

Summary of the Current State of Freight Planning in New Mexico

The NM DOT has looked at some freight planning in *New Mexico 2025: Statewide Multimodal Transportation Plan* (*2025 Multimodal Plan*) where it identifies long range objectives, including providing for "mobility confidence for the interstate trucking industry." The *2025 Multimodal Plan* also provides for implementation strategies. As part of the *2025 Multimodal Plan*, NM DOT has identified strategic transportation corridors, some of which have a direct connection to multimodal facilities and that also

connect directly to a Port of Entry, another state, or a national recreation facility or attraction. Rail freight corridors are generally identified in the *2025 Multimodal Plan* with general statistics for each.

To work collaboratively on freight issues, Mr. Joseph Maestas, Program Manager and Mr. Ernesto Acosta, Intern 2005 both of the Federal Highway Administration (FHWA) New Mexico Division met regularly with the ATRI freight corridor team. It was agreed that this collaboration between FHWA-NM and ATRI could be useful for the transportation freight work being done by both entities. In January 2006, Mr. Acosta presented "A Comprehensive Freight Planning Assessment for New Mexico" at the UNM School of Engineering and ATRI sponsored *Forty-Third Paving and Transportation Conference 2006,* Albuquerque, NM . Ernesto Acosta's report focuses on four freight-related studies of relevance to New Mexico freight planning: the National I-10 Corridor Study, the Ports-to-Plains Trade Corridor, the Trans-Texas Corridor, and the CANAMEX Corridor. Both the I-10 Corridor and the Ports-to-Plains Corridor include New Mexico as a part of multi-state initiatives. The Ports-to-Plains Corridor focuses specifically on economic development in the communities along the corridor. The Trans-Texas Corridor study looks at building a multi-lane, multimodal trade corridor using existing infrastructure, and the CANAMEX Corridor is of relevance because of the border trade aspect that the state of Arizona has in common with New Mexico.

The ITS Deployment Program Cooperative Agreement with ATRI and FHWA in Santa Teresa, New Mexico features comprehensive state-of-the-art Intelligent Transportation Systems (ITS). Under this research technologies tested and implemented will range from systems access at the point of origin; GPS and RFID to track movements

from point of origin to the border; electronic container and truck door seals to monitor trailers; a role-based application to capture participants' key information; and an event-based architecture and software system to combine automated and non-automated data into a single, comprehensive view of each shipment. Several of the activities are due to be completed by year-end 2006, including pilot tests to show shipment movements.

BACKGROUND

GENERAL U.S. FREIGHT CONSIDERATIONS

> "Freight movement is different from passenger travel in many respects. Freight movement is more heterogeneous and changes more dramatically in short periods of time. In most localities, the majority of freight activity involves external movements rather than internal movements."

Source*:* U.S. Department of Transportation. *Freight Data for State Transportation Agencies: A Peer Exchange*. Transportation Research Circular Number E-C080.

US DOT recognizes that the smooth flow of freight in the United States (U.S.) and across its borders is important to the nation's economy. In recent years, increases in the volume of freight have strained the transportation network in some locations and exacerbated conflicts between the traveling public and freight carriers. Increased travel times have created congestion which has increased travel times resulting in raising costs for shippers. Growing international trade has also changed the geography of freight movements within the United States, placing greater pressure on gateways, ports, and border crossings—nodes in the system that are potential bottlenecks for the movement of freight. As a border state of Mexico, New Mexico can position itself to take advantage of the increased commodities flow from Mexico into the United States.

Understanding future freight activity is important for matching infrastructure supply to demand and for assessing investment and operational strategies for all modes, particularly the rail and highway connectors which can create multimodal opportunities. For New Mexico, it is particularly important to identify increased rail freight flows in its growing urban centers and outlying rural towns

US DOT recognizes that the smooth flow of freight in the United States and across its borders is important to the nation's economy. US DOT predicts steadily

increasing rates of rail and truck freight growth over the next twenty years. By 2020, the value of domestic and international truck and rail freight in the United States is projected to increase from $9 billion to $30 billion.

For state DOTs, freight planning is often only addressed in their long range plans. This planning tends to be reactive rather than proactive and is complicated by the difficulty to effectively quantify potential benefits of freight improvements. To the general public, passenger travel and public transit have more importance than freight. Often times, freight is perceived as benefiting the private sector freight community. Another difference is that passenger trips often begin and end within a jurisdiction while truck freight is frequently interregional.

Freight transport has changed dramatically over the past several decades. Multimodalism has increased the efficiency of goods movement in freight transportation and has created a system in which containers can be moved from one mode to another without "breaking" and repacking crates. Deregulation of motor carriers and railroads revised freight rates and led to greater competition and lower shipping costs. Just-in-time freight shipments have reduced inventories and merchandise is "warehoused" in trucks moving along highways. The overall demand for goods is greater, which is increasing the demands on the transportation network.

Understanding future freight activity is important for matching infrastructure supply to demand and for assessing investment and operational strategies. To help decision-makers identify areas in need of capacity improvements, US DOT created the Freight Analysis Framework (FAF), a comprehensive database and policy analysis tool, to examine geographic relationships between freight movement and infrastructure

capacity. FAF was developed from several private and government databases, including the Bureau of Transportation Statistics' (BTS) Commodity Flow Survey. FAF provides detailed state-by- state information on freight flows for the truck, rail, water, and air modes and for various commodities. It also forecasts freight activities for 2010 and 2020.

Through FAF data and cooperation with the public and private sectors, FHWA has identified key issues facing the freight transportation industry including congestion and expanding capacity needs; improving systems operations; planning and financing freight projects; the safety and environmental effects of freight transport; national security; and building professional capacity in the freight sector.

According to FHWA's FAF National Summary, the U.S. transportation system carried over 15 billion tons of freight, which was valued in 1998 at over $9 trillion. Total domestic freight movements accounted for nearly $8 trillion of the total value of shipments. By 2020, the U.S. transportation system is expected to handle $20 trillion in domestic freight and another $10 billion in international cargo valued at over $30 trillion. Figure 1 shows the projected growth in U.S. domestic freight shipments by 2020.

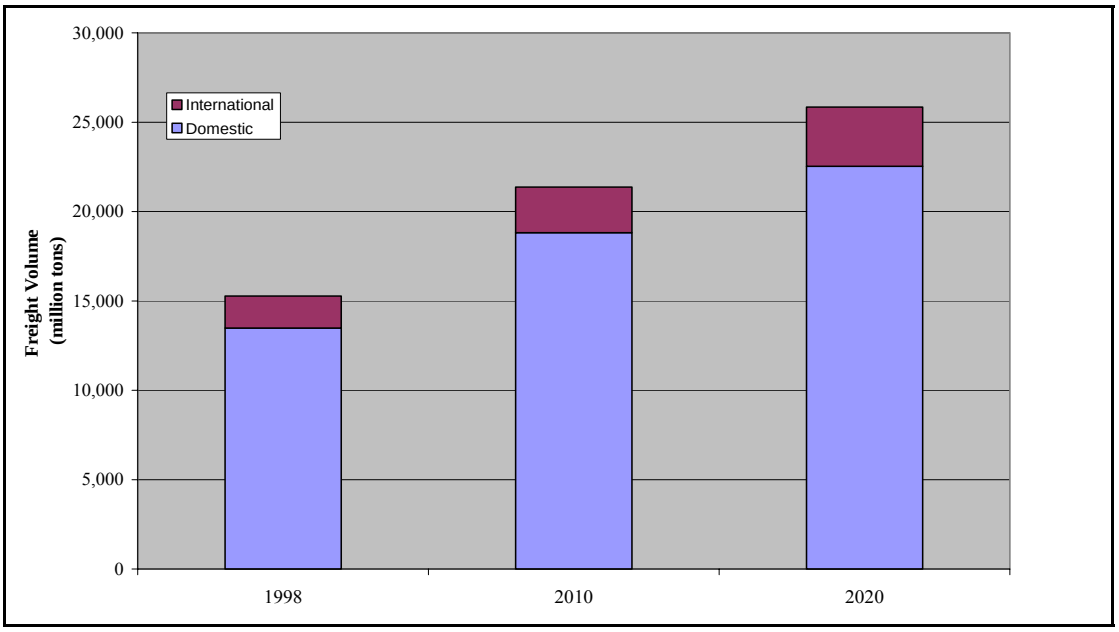


FIGURE 1 U.S. Domestic Freight Shipments by Tons, 1998, 2010, 2020.
Source: U.S. Department of Transportation, FHWA, Freight Management Operations. www.ops.fhwa.dot.gov/freight_analysis/freight_story/key.htm

The nation's highway system and enormous truck fleet moved 71 percent of the domestic and international tonnage and 84 percent of the total value of U.S. shipments in 1998. Although trucks made the vast majority of local deliveries, they also carried large volumes of freight between regional and national markets. Water and rail also moved significant shares of total tonnage, but they accounted for much smaller shares when measured on a value basis. As expected, air freight moved less than 1 percent of total tonnage but carried 12 percent of the total value of shipments in 1998.

Table 1 shows the movement of domestic and international freight projections to 2020 by mode which indicates that trucks transported a large percentage of the tonnage and value of shipments, followed by rail (tonnage) and air (value).

TABLE 1 Domestic and International U.S. Freight Shipments by Tons and Value for 1998, 2010, 2020.

Mode	Tons (millions)			Value (billions $)		
	1998	2010	2020	1998	2010	2020
Total	15,271	21,376	25,848	9,312	18,339	29,954
Domestic						
Air	9	18	26	545	1,308	2,246
Highway	10,439	14,930	18,130	6,656	12,746	20,241
Rail	1,954	2,528	2,894	530	848	1,230
Water	1,082	1,345	1,487	146	250	358
Total, Domestic	13,484	18,820	22,537	7,876	15,152	24,075
International						
Air	9	16	24	530	1,182	2,259
Highway	419	733	1,069	772	1,724	3,131
Rail	358	518	699	116	248	432
Water	136	199	260	17	34	57
Other [a]	864	1,090	1,259	NA	NA	NA
Total, International	1,787	2,556	3,311	1,436	3,187	5,879

Note: Modal numbers may not add to totals due to rounding. NA = Not Available. The "Other" category includes international shipments that moved via pipeline or by an unspecified mode. Source: U.S. Department of Transportation, Federal Highway Administration, Freight Management and Operations. [on-line]. Freight Shipments by Weight and Volume: 1998, 2010, 2020.
www.unm.edu/~atr/HowDoesATraditionalHighwayDept.pdf

According to the FAF forecasts for 2020, there will be significant growth in freight movements in all modes. Specifically, freight transportation growth is anticipated to be in the following areas:

- By tonnage, projected domestic freight in the U.S. will grow by more than 67 percent, increasing from 13.5 billion tons in 1998 to 22.5 billion tons in 2020. Freight value for the same period is projected to double from $7.9 billion to $24.1

- trillion. The forecast shows that the air and truck modes will experience the largest increases.
- Trucks are expected to move 74 percent more tons in 2020 than in 1998, capturing a somewhat larger share of total tonnage. For that forecast period, the freight value market share for trucking will remain basically the same while the value will be tripling, increasing by $16 trillion dollars.
- Domestic air cargo tonnage is projected to nearly triple over this period, although its share of total tonnage is expected to remain small.
- While volumes moved by the rail and domestic water modes are also projected to increase over the forecast period, they will not grow as dramatically primarily because of anticipated slower growth in demand for many of the key commodities carried by these modes.
- International trade accounted for 12 percent of total U.S. freight tonnage in 1998 and is forecast to grow at a faster rate than domestic trade and is anticipated to increase from 1.7 billion tons to 3.3 billion tons by 2020. This growth in international trade is likely to present challenges to U.S. ports and border gateways.

According to the FHWA this enormous growth in freight movements will not only significantly contribute to the nation's congestion problems due to lack of capacity and travel time delays but will also create transportation challenges for:

- Private sector operations;
- Transportation planning by state DOTs, Metropolitan Planning Organizations (MPO), and Regional Planning Organizations (RPO);

- Financing significant transportation infrastructure improvements;
- Safety issues for transportation operations and planning;
- National security concerns;
- Environmental impacts of each mode used in freight operations; and
- Professional capacity building for freight operations within state DOTs.

The severity of congestion projected for 2020 truck traffic in National Highway System (NHS) roadways is depicted in Figure 2. There are five roadway segments in New Mexico that are expected to approach capacity by 2020 and five segments that are anticipated to exceed capacity.

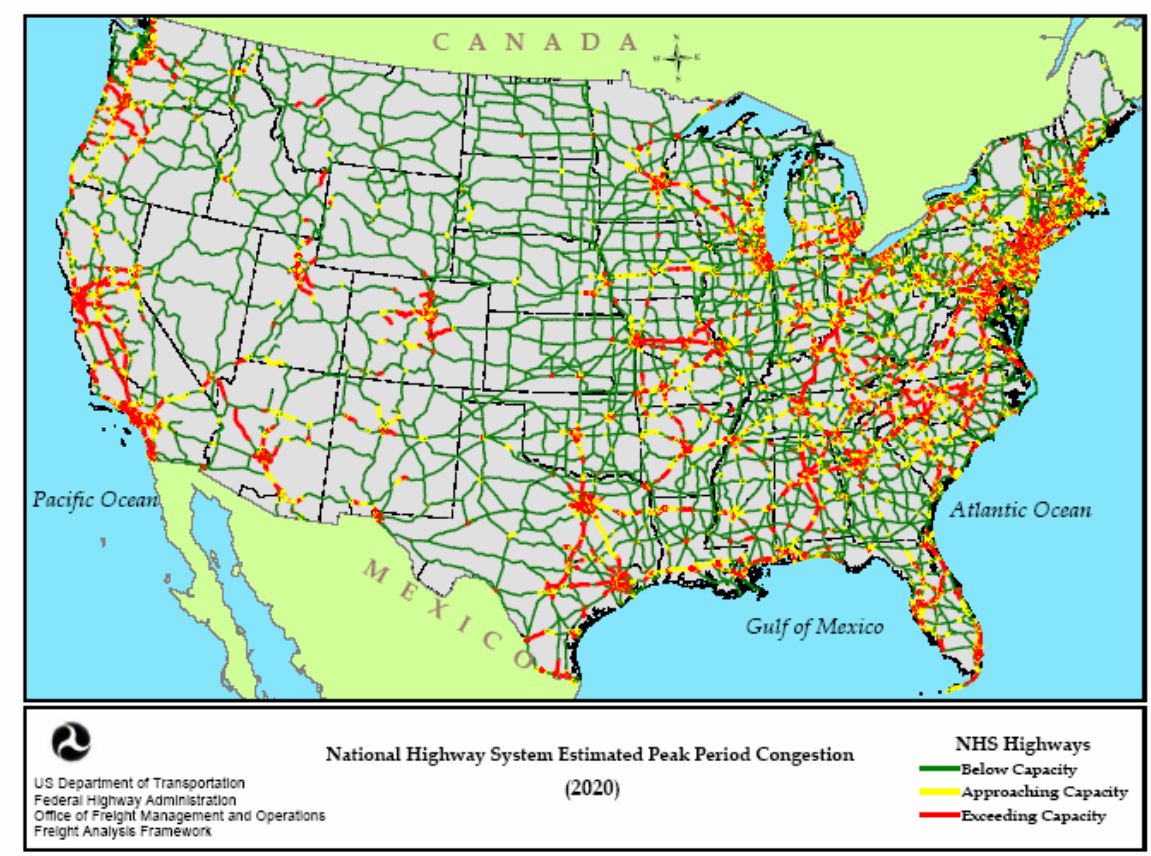


FIGURE 2 National Highway System Estimated Peak Period Congestion 2020. Source: U.S. Department of Transportation, FHWA, Office of Operations. www.ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/images/nhs_congestion_2020.pdf

The value and weight of freight is a factor in determining the mode that commodities are shipped. Changes in the U.S. economy including imports can impact the utilization of freight modes and its effects on the U.S. transportation system. The top three commodities by value are pharmaceutical products, electronic, electrical and office equipment and transportation equipment. Figure 3 shows the top ten commodities value by weight.

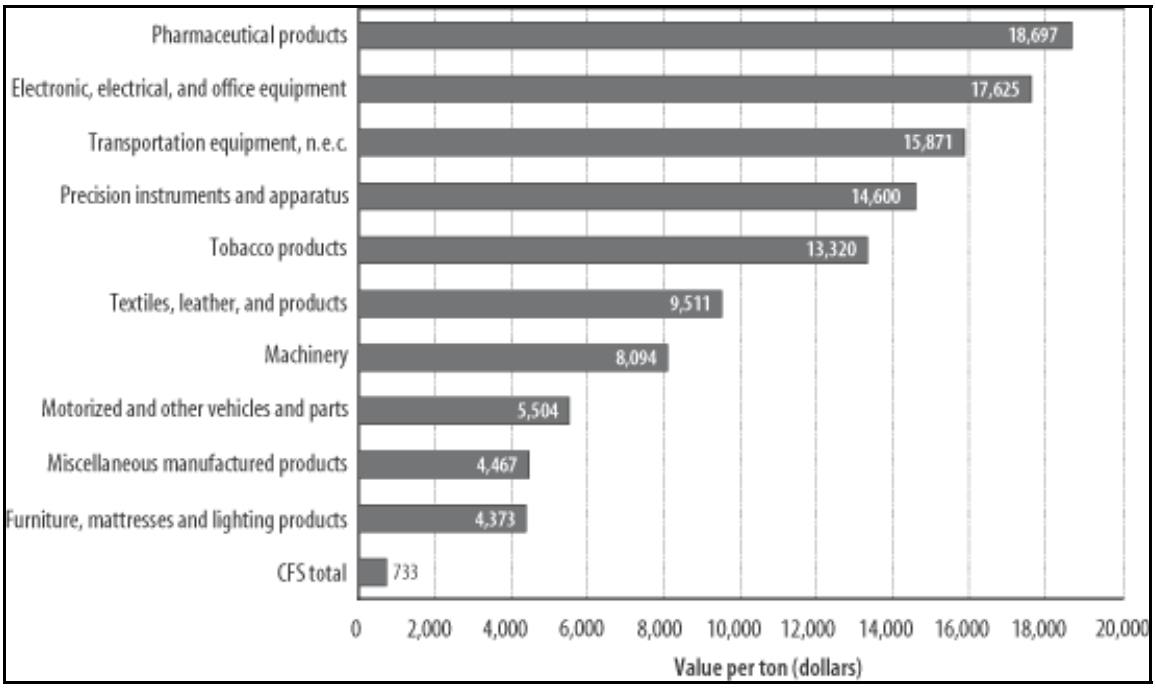


FIGURE 3 Top 10 Commodity Groups Ranked by Value Per Ton: 2002.
Source: U.S. Department of Transportation, Bureau of Transportation Statistics. (2002). www.bts.gov/publications/freight_shipments_in_america/html/figure_13.html

Another perspective on freight transportation movements is the breakdown of shipped commodities by weight and value by mode. As noted in Table 2, rail tends to ship heavy weight commodities while trucking transports lighter weight, higher value commodities.

TABLE 2 Top 5 Freight Shipments by Tonnage and Value.

Rail			Truck		
Commodity	**Tons (billions $)**		**Commodity**	**Value (billions $)**	
	1997	**2020**		**1997**	**2020**
Gravel & crushed stone	1,817	1,866	Electronic, electrical, & office equipment	894	891
Coal	1,215	1,240	Mixed freight supplies & food	233	840
Gasoline & aviation fuel	877	1,064	Motorized & other vehicles	569	749
Nonmetallic mineral products	909	968	Machinery	418	484
Cereal grains	486	561	Pharmaceutical products	226	479

Source: U.S. Department of Transportation, Bureau of Transportation Statistics. (2002). *2002 Commodity Flow Survey*. www.bts.gov/publications/commodity_flow_survey/

Freight movements generate significant freight planning issues for state DOTs and Metropolitan Planning Organizations (MPO). Generating additional road capacity is being increasingly limited as an option for addressing the additional truck and rail freight volumes of the future. Table 3 lists issues impacting freight transportation which will need to be addressed through short term and long term freight planning efforts.

TABLE 3 Rail and Truck Freight Planning Issues for State DOTs and MPOs.

Physical Limitations: Delivery and Collection	
Structural vertical clearance for double-stacking & railroad electrification	Land-side access to airports and harbors
Peak and off-peak delivery of freight	Road access to rail terminals
Structural vertical clearance for truck movements	Loading facilities- multimodal, single mode
Freight delivery at major centers of activity	Parking restrictions for freight deliveries
Horizontal radii limiting truck movement highway access to multimodal facilities	Downtown congestion
Structural integrity and remaining pavement life	Truck delivery and loading interference with street traffic
Bridge or road weight restrictions	
Accessibility and Safety	
Accessibility time and cost to multimodal facilities	Highway-Railroad crossing safety
Designated truck routes	Hazardous materials shipment
Transferability and Coordination: Legal and Regulatory	
Movement interference between modes at highway-railroad crossings	Truck weight limitations
Movement interference between modes at highway-waterway crossings	Liability of freight rail lines for transit usage
State multimodal trust funds & funds eligibility	Highway-ferry boat transfer delays
Congestion and delays created by drayage	
Economics and Environmental	
Economics tradeoffs between modes and combinations of modes	User fees and subsidization of transportation modes
Air, noise, and wetland impacts of multimodal facilities	Economic impact of railroad abandonment

Source: US Department of Transportation, Travel Mode Improvement Program. tmip.fhwa.dot.gov/clearinghouse/docs/quick/ch6.stm#t6.2

Southwest Region Truck Freight Movements by State

Freight truck movements in the Southwest region provide a perspective on traffic flows for New Mexico truck freight movements. The profile of the Southwest region tends to be less densely populated areas with fewer economic centers and more distance between urban centers than many other states. See Table 4 for the Region's truck traffic by weight for freight that leaves, enters, stays within or goes through the various states.

TABLE 4 Southwest Region Truck Freight Movements by Tonnage (in millions) by State, 1998, 2020.

State	Leaving	Entering	Within	Through	Total
Arizona	22.6	31.8	96.8	118.4	269.6
Colorado	22.0	25.7	94.8	89.8	232.3
New Mexico	12.1	17.0	21.7	148.2	199.0
Texas	154.2	201.1	652.8	230.6	1,238.7
Utah	17.7	18.0	43.0	240.0	318.7

Source: U.S. Department of Transportation FHWA, Office of Operations**.**
www.ops.fhwa.dot.gov/freight/freight_analysis/state_info/new_mexico/truckflow_nm.htm

The truck freight volume in Texas far exceeds any other state in the Southwest Region, it is included because it borders with New Mexico. New Mexico has the lowest tonnage of freight going into or out of the state. Like Utah, the vast majority of commercial truck freight goes through the state. Another important perspective on these freight truck movement flows is the percentage for each of freight movement flows that are within a state, and going into, from, or through a state as can be seen in Figure 4 below:

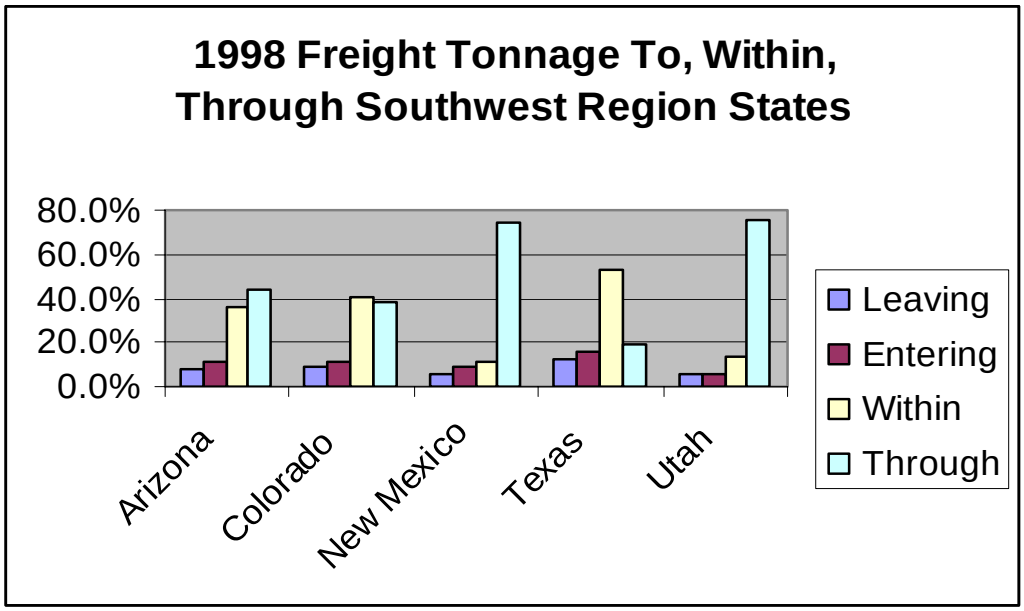


FIGURE 4 1998 Freight Tonnage Leaving, Entering, Within, and Through Southwest Region States.
Source: U.S. Department of Transportation FHWA, Office of Operations**.**
www.ops.fhwa.dot.gov/freight/freight_analysis/state_info/new_mexico/truckflow_nm.htm

Also of significance for freight planning in the region is the anticipated growth in truck freight volumes from 1998 to 2020 as can be seen in Figures 5 and 6.

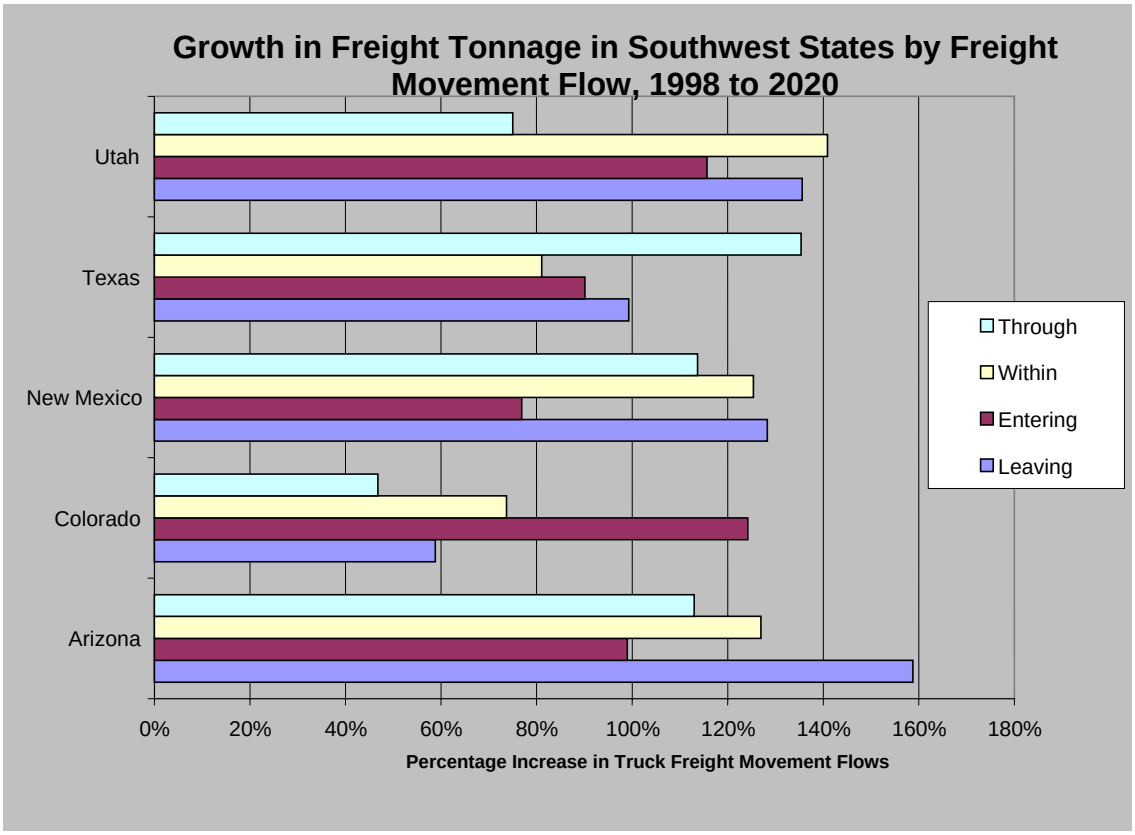


FIGURE 5 Growth in Truck Freight Tonnage by Freight Movement Flow, 1998 to 2020.

Source: U.S. Department of Transportation FHWA, Office of Operations**.** www.ops.fhwa.dot.gov/freight/freight_analysis/state_info/new_mexico/truckflow_nm.htm

Freight traffic growth by 2120 in these Southwest states ranges from 67% (Colorado) to 120% (Arizona). Two states, New Mexico and Arizona, expect freight truck tonnage to more than double over the next twenty years. This growth in regional truck freight traffic will result in more "through" truck traffic in New Mexico.

TABLE 5 Truck Tonnage by States in Southwest Region 1998, 2020 Truck Tonnage by State (1998).

State	Leaving	Entering	Within	Through	Total	Leaving	Entering	Within	Through	Total
Arizona	22,620,962	31,771,669	96,805,839	118,407,516	269,605,986	8.4%	11.8%	35.9%	43.9%	100.0%
Colorado	21,992,597	25,701,908	94,789,828	89,803,675	232,288,008	9.5%	11.1%	40.8%	38.7%	100.0%
New Mexico	12,148,293	16,978,348	21,734,274	148,155,876	199,016,791	6.1%	8.5%	10.9%	74.4%	100.0%
Texas	154,217,270	201,145,453	652,782,374	230,575,424	1,238,720,522	12.%	16.2%	52.7%	18.6%	100.0%
Utah	17,753,651	17,972,480	43,043,475	239,995,480	318,765,086	5.6%	5.6%	13.5%	75.3%	100.0%

Truck Tonnage by State: 2020

State	Leaving	Entering	Within	Through	Total	Leaving	Entering	Within	Through	Total
Arizona	58,543,123	63,349,035	219,370,111	251,616,162	592,878,430	9.9%	10.7%	37.0%	42.4%	100.0%
Colorado	34,930,278	57,621,758	164,671,509	131,836,621	389,060,167	9.0%	14.8%	42.3%	33.9%	100.0%
New Mexico	27,730,469	30,035,026	48,981,825	316,644,606	423,391,926	6.5%	7.1%	11.6%	74.8%	100.0%
Texas	307,352,186	382,457,415	1,182,149,442	542,821,743	2,414,780,787	12.7%	15.8%	49.0%	22.5%	100.0%
Utah	41,834,031	38,772,123	103,703,146	420,038,151	604,347,451	6.9%	6.4%	17.2%	69.5%	100.0%

Growth in Truck Tonnage by State: 1998 to 2020

State	Leaving	Entering	Within	Through	Total	Leaving	Entering	Within	Through	Total
Arizona	35,922,160	31,577,366	122,564,272	133,208,646	323,272,444	158.8%	99.4%	126.6%	112.5%	119.9%
Colorado	12,937,681	31,919,850	69,881,682	42,032,946	156,772,159	58.8%	124.2%	73.7%	46.8%	67.5%
New Mexico	15,582,176	13,056,678	27,247,551	168,488,730	224,375,135	128.3%	76.9%	125.4%	113.7%	112.7%
Texas	153,134,916	181,311,962	529,367,068	312,246,319	1,176,060,265	99.3%	90.1%	81.1%	135.4%	94.9%
Utah	24,080,380	20,799,643	60,659,672	180,042,671	285,582,365	135.6%	115.7%	140.9%	75.0%	89.6%

Source: U.S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Tonnage Origin-Destination Database, Final 2002. www.ops.fhwa.dot.gov/freight

New Mexico Truck and Rail Freight for Corridor Considerations

Over the next twenty years, New Mexico expects freight shipments to nearly double, increasing from 78 million tons to 144 million tons. Table 6 below shows that most of this growth will be realized on the highways in truck traffic. This increase in shipments will significantly impact New Mexico's overall transportation system infrastructure and multimodal connections. The value of 2020 shipments will almost triple from $45 billion in 1998 to $162 billion in 2020. Overall, trucks transport a large percentage of the tonnage and value of shipments, followed by rail (tonnage) and air (value).

TABLE 6 New Mexico Freight Shipments by Tons and Value for 1998, 2010, 2020.

	Tons (millions)			Value (billions $)		
	1998	**2010**	**2020**	**1998**	**2010**	**2020**
State Total	78	110	144	45	94	162
By Mode						
Air	<1	<1	<1	5	14	27
Highway	51	79	107	36	73	124
Rail	22	30	37	4	7	11
By Destination/ Market						
Domestic	71	106	138	44	92	158
International	2	3	5	1	2	4

Source: U.S. Department of Transportation, Federal Highway Administration, Freight Management and Operations. ops.fhwa.dot.gov/freight/freight_analysis/state_info/new_mexico/nm3.pdf

Much of the growth in truck traffic over the next twenty years is expected throughout the state with much of the growth occurring in urban areas and on the Interstate highway system (Figures 6 and 7). According to the *2025 Multimodal Plan*, the most heavily traveled commercial truck routes are: I-40, I-10, US 54, and US 70.

Truck traffic moving to and from New Mexico in 1998 accounted for 8 percent of the average annual daily truck traffic (AADTT) of the total FAF road network.

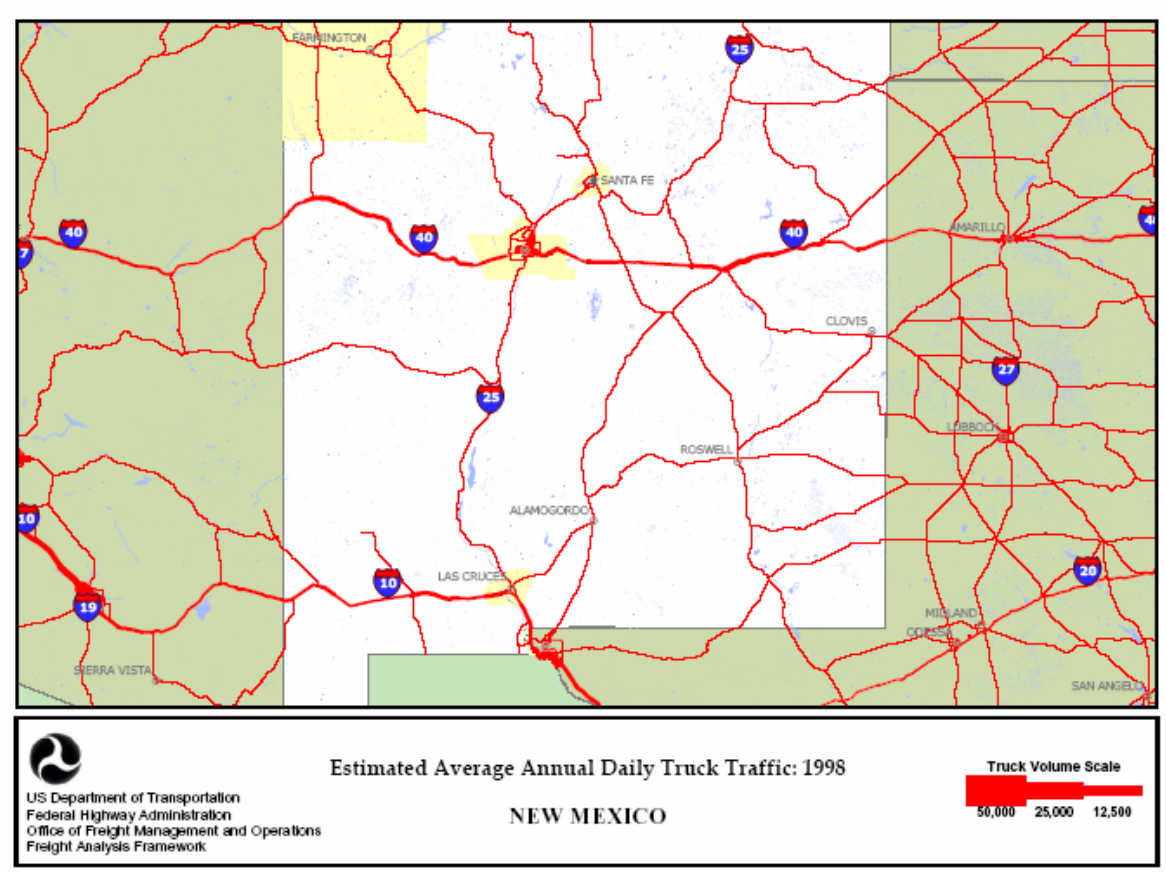


FIGURE 6 Estimated Average Annual Daily Truck Traffic 1998.
Source: U.S. Department of Transportation, Federal Highway Administration, Freight Analysis Framework.
ops.fhwa.dot.gov/freight/freight_analysis/state_info/new_mexico/nm_98.pdf

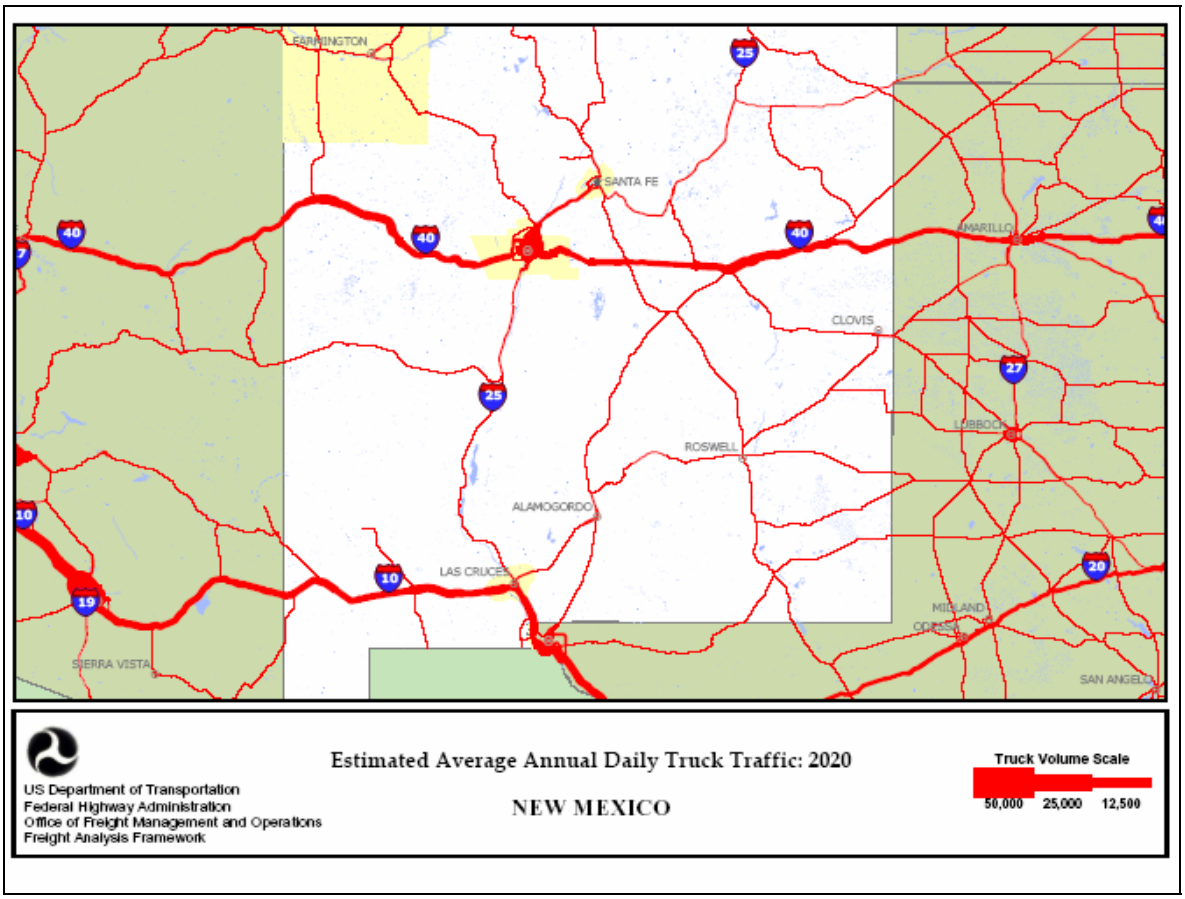


FIGURE 7 Estimated Average Annual Daily Truck Traffic 2020.
Source: Source: U.S. Department of Transportation, Federal Highway Administration, Freight Analysis Framework. ops.fhwa.dot.gov/freight/freight_analysis/state_info/new_mexico/nm_20.pdf

Another important perspective on New Mexico freight transportation is the commodities that are being shipped. Table 7 shows the top five commodity groups shipped to, from, within, and through New Mexico by mode. By weight, the top commodities are farm and coal products. On the other hand, the top commodities by value are transportation equipment and chemical products.

TABLE 7 Top Five Commodities Shipped To, From, and Within New Mexico by All Modes: 1998 and 2020.

Commodity	Tons (millions)		Commodity	Value (billions $)	
	1998	2020		1998	2020
Farm Products	13	16	Transportation Equipment	7	17
Coal	11	14	Chemicals/Allied Products	6	21
Clay/Concrete/Glass/Stone	10	28	Farm Products	5	8
Chemicals/Allied Products	7	16	Food/Kindred Products	5	19
Nonmetallic Minerals	6	10	Secondary Traffic[a]	5	21

[a] Secondary traffic is defined as freight flows to and from distribution centers or through intermodal facilities. No commodities are assigned to this intermediate step in the transportation process.

Source: U.S. Department of Transportation, Federal Highway Administration. ops.fhwa.dot.gov/freight/freight_analysis/state_info/new_mexico/nm3.pdf

Brief profiles of truck and rail freight in New Mexico show the importance of the freight industry to transportation and the New Mexico economy. New Mexico's geographic location places it on a crossroads of high volume freight movements and has been long recognized as a "bridge state." The vast majority of truck flows *through* the state rather than freight shipments having either an origin or a destination in New Mexico. (See Figure 8.) Freight movement flows through the state do not enter into the economy through sales or job creation.

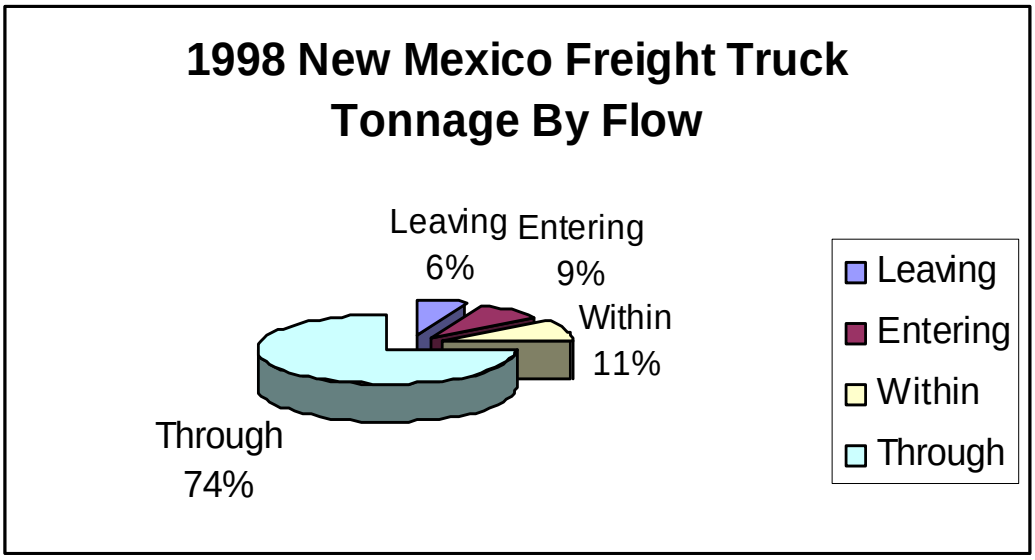


FIGURE 8 1998 New Mexico Freight Truck Movement Flows.
Source: U.S. Department of Transportation, Federal Highway Administration,.
www.ops.fhwa.dot.gov/freight/freight_analysis/state_info/new_mexico/nm_98.pdf

Growth in truck freight shipments will increase by 110% over the next twenty years and the value of those shipments will increase by 244% from $36 trillion dollars to $124 trillion (Table 8 below). This growth will have significant impacts on the state's multimodal transportation system planning and infrastructure.

TABLE 8 New Mexico Freight Truck Transport by Tons and Value.

Freight Rail New Mexico	Tons (millions)	Value (billions $)
1998	51	36
2010	79	73
2020	107	124

New Mexico's economy and transportation network is greatly influenced by the trucking industry as can be seen in Figure 9.

New Mexico Truck Freight Profile

- Commercial Truck Traffic (2002): 18.8% of Vehicle Miles Traveled in New Mexico
- Heavily used commercial truck routes: I-40, I-10, US 54, and US 70
- Freight Traffic by Truck (1998):
    - Into State: 17 million tons
    - Leaving State: 12 million tons
    - Within State: 22 million tons
    - Flow through state: 148 tons
- Trailer and semi-truck registrations (2004): 43,558
- Transportation and Warehouse Establishments (2004): 1,239
- Transportation and Warehouse Employees (2004): 16,005
- Commercial Truck Transportation:
    - Establishments (2004): 1239
    - Employees (2004): 16,005

FIGURE 9 New Mexico Truck Freight Profile.

While rail freight has a smaller market share of freight transportation in New Mexico than trucking, it is anticipated to grow steadily from 22 million tons in 1998 to 37 million tons in 2020. (See Table 9.) At the same time, the value of shipments is expected to increase by 175% by 2020.

TABLE 9 New Mexico Freight Rail Transport by Tons and Value.

Freight Rail New Mexico	Tons (millions)	Value (billions $)
1998	22	4
2010	30	7
2020	37	11

The top commodity for rail shipments terminating in New Mexico is farm products with 3.3 million tons of farm products shipped in 2003. The top rail shipment originating in New Mexico is coal at 14.5 million tons (2003).

To accommodate increased freight projections around the nation and eliminate a significant New Mexico bottleneck for freight operations, the BNSF has begun construction of a second main rail line in New Mexico, i.e., double-track its entire 2,100 mile *Transcon* main line. This will increase system capacity for up to 80-100 trains per day. Part of the project is construction of double track through Abo Canyon (located east of Belen on the Clovis track). The Abo Canyon project will significantly improve rail freight system performance by removing the current bottleneck and slower rail speeds at that location. Anticipated rapid growth of freight traffic in the Port of Los Angeles will be better served in New Mexico. The project is due to be completed in 2007.

Figure 10 provides a general profile of rail freight scale of operations in New Mexico.

- Ten existing New Mexico railroad companies (freight, passenger, excursion, industrial switching)
- 2,984 track miles (including 584 miles of branch lines)
- 84 depots/stations (several are historic, undergoing renovation as multimodal centers)
- Two Amtrak lines (east/west—serving seven New Mexico cities, Los Angeles, Chicago, and Miami)
- Seven Amtrak stops (Gallup, Albuquerque, Lamy/Santa Fe, Las Vegas. Raton, Lordsburg, and Deming)
- Public highway/railroad crossings: 784. Private crossings: 311. Total crossings: 1,095
- Rail employees: 3,987
- Tons outbound: 3,982,457
- Tons inbound: 8,432,345
- Connections to all other states and the Republic of Mexico

FIGURE 10 New Mexico Railroad Freight Profile.

NM DOT's multimodal planning process should anticipate increases in rail and truck freight traffic in and through the state and be prepared to exploit economic development opportunities related to international and domestic commodity flow projections.

Freight in New Mexico

Multimodal Summit

In 2003, under the direction of Governor Richardson, the Department changed its focus from a highway department to a department of transportation with consideration given to all modes of transportation. This multimodal approach to transportation system planning and project delivery will allow for innovative approaches for economic

development, trade and a sustainable environment. The Department became the New Mexico Department of Transportation.

In order to assist the NM DOT in this transition to a multimodal department, the NM DOT Multimodal Summit was held in 2003 to learn from the Department's stakeholders, to identify issues, and to develop ways to integrate the different transportation modes into a transportation system. The proceedings from this Summit were reported and summarized in the NM DOT Research Bureau report entitled *How Does a Traditional State Highway Department Become a True Department of Transportation: A Case Study in State DOT Organizational Change*.

As a part of these proceedings, a Summary Report of Input to the Multimodal Steering Committee from Modal Constituencies was developed for aviation, sustainable communities, Tribal, transit and light rail, and truck and rail. Table 10 summarizes input from truck and rail stakeholders on the multimodal vision, policy framework, performance measures and investment strategies for these two modes. These considerations are still viable as the NM DOT determines its approaches to truck and rail freight transportation in the state.

TABLE 10 Summary Report of Input to the Multimodal Steering Committee from Modal Constituencies at the Multimodal Workshop.

APPENDIX B: Summary Report of Input to the Multimodal Steering Committee from Modal Constituencies at the Multimodal Workshop (03/27/03) (continued)				
Mode	**Multimodal Vision**	**Policy Framework**	**Performance Measures**	**Investment Strategies**
Truck and Rail	• Airports connect with rail, transit, bus to move people more efficiently (plus baggage) • Intercity travel corridors –create and improve through intermodalism • Create awareness of travel between regions—how it effects energy consumption, economic vitality, and public and environmental health • Transportation security—redundant and reliable • Reliability for goods delivery – just in time • Alternative transportation routing for commercial trucking • Think regionally and nationally to move goods through NM • Plan for 50-100 years into the future • "Invent a transportation system that everyone can use" • Develop Mexico to Denver corridor – population centers • Consider all possibilities despite lack of monies or other barriers • Do not take the path of least resistance • Energy security	• Our transportation system has become the commercial storage of the past • Create ITS possibilities for commercial trucking • Reinvest in current rail and trucking – cannot continue to build new capacity • Maintain the beauty of ruralness – accommodate without change • Research and Planning integrated into solution development • Changes must take place in NMDOT • Change how evaluate new projects • Change for NMDOT to be at forefront in transportation • Develop cutting-edge transportation delivery • Stop trying to build way out of more congestion – can't have more capacity (expensive and impossible) • Need long term solutions • Focus on moving people and cargo not vehicles • Reduce economic vulnerability through redundancy of modes	• No new capacity – develop alternatives to that • Collect data and qualitative information to achieve transportation goals • Consider land use (would be derelict if did not) • Interagency agreements and coordination • Number of new rail projects undertaken • Number of rail passengers • Increased number of truck traffic • Air quality • Use of alternative Energy resources • Reduce barriers to intermodal transport • Correct inefficiencies to reduce passenger/user costs • Develop Criteria on how to handle increased truck traffic in the next two decades	• Long term investments for Amtrak • ITS for trucking and other commercial • Improve customer choices and convenience • ITS for security of cargo • Develop stable funding for rail and interconnection of modes • Invest in alternative transportation routes for trucking • Invest in interoperable systems between urban and rural, urban and urban, and rural to rural

Source: *How Does a Traditional State Highway Department Become a True Department of Transportation: A Case Study in State DOT Organizational Change.* New Mexico Department of Transportation. (2003). www.unm.edu/~atr/HowDoesATraditionalHighwayDept.p

New Mexico 2025 Statewide Multimodal Transportation Plan

The 2025 *Multimodal Plan* includes objectives and implementation strategies for the state's transportation system. In the 2025 *Multimodal Plan,* the NM DOT is committed through its Guiding Principles to develop accessible, connected, sustainable, and efficient multimodal opportunities. Economic vitality embraces investing in transportation for the economic growth of New Mexico, and maintaining and improving the movement of goods and services within and across the state.

For truck and rail relating to freight transportation, the 2025 *Multimodal Plan* includes long range objectives and implementation strategies. The major objectives and strategies are listed below.

Commercial Truck

- **Long Range Objectives**
  - Provide adequate infrastructure for commercial trucking.
  - Respond to changing truck infrastructure needs on a timely basis.
  - Provide mobility confidence for the interstate trucking industry.

- **Implementation Strategies**
  - Design highways for projected truck loading.
  - When truck loading stresses a four-lane highway, make reconstruction of the outside lane in each direction of the route a priority.
  - Make use of ITS technology and incident management practices to route commercial traffic around trouble spots smoothly and in a timely fashion.
  - Add passing lanes on rural truck routes at regular intervals.
  - Widen all rural highways to a minimum of 12' driving lanes with shoulders as soon as possible.

Rail Freight

- **Long Range Objectives**
  - Promote the coordination, improvement and development of passenger and freight rail services within the state.
  - Develop and maintain current and historic data regarding the railroad companies operating within the state.
  - Improve highway and rail safety.

- **Implementation Strategies**
  - Serve as liaison between private and public sector transporters and state government to promote safe, efficient and economical transportation of passengers and freight.
  - Obtain and analyze data, promote safety activities and establish linkages among public and private transportation interests in support of rail system improvements.
  - Perform appropriate coordination and communication among all stakeholders.
  - Coordinate with private and public sector elements involved with statewide rail transportation to encourage necessary system improvements.
  - Facilitate activities among a variety of stakeholders, including passengers, shippers, companies, communities, state and federal agencies to address local and national rail-related issues.

RESEARCH LITERATURE REVIEW

ANALYSIS MATRIX OF EXISTING FREIGHT CORRIDOR STUDIES

A review of the literature has shown that the US Department of Transportation (USDOT) predicts steadily increasing rates of freight growth over the next twenty years. USDOT statistics show that 2004 was a banner year for all forms of freight. To commence its activities, the ATRI Freight Corridors team completed an extensive literature review of all states in the nation which have developed research, pilot demonstrations, data collection and planning documents for both commercial vehicle and rail freight in their states and region. Literature from the review was compiled into a matrix describing freight corridor projects and practices in approximately thirty-five studies of national prominence.

The matrix, titled *Establishing Freight Corridors in New Mexico: Analysis of Existing Freight Plans in Other States*, examines other states' treatment of several factors related to the development of freight corridors and can be found in Appendix A of this report. The completed matrix and attending information was provided to the NM DOT Research Bureau during the ongoing quarterly reporting periods. As recognized by the research, the freight corridor concept was to provide for the factors needed to establish freight corridors for rail and truck transport. The *Analysis of Existing Freight Plans in Other States* was used to assist in identifying those freight corridor factors and criteria, and as described in the matrix are: (1) the rationale for designating a freight corridor; (2) the analysis framework employed in the development of a designated freight corridor; (3) the effects of border trade on freight corridors if appropriate; (4) how well freight

corridors are integrated into the state's or region's overall transportation plan; (5) public safety concerns related to freight corridors; (6) multimodal considerations; (7) cost analysis, economic analysis, performance measures, data collection methods; and, (8) the use, or proposed use, of ITS technologies. The studies found in the literature review were intended to provide the NM DOT Research Bureau with the background on the various factors and criteria which must be used to initiate a freight corridor policy and/or develop well established freight corridor designations in New Mexico.

A *Summary Matrix of Analysis of Existing Freight Plans in Other States* was prepared for ease of use and review and can be seen in Table 11. This Summary Matrix is broken down by state and regional government sponsored studies, US DOT FHWA studies, and professional association research. As noted, several states have taken on this process of freight corridor identification and development including years of data collection and analysis to determine if and how rail and truck freight corridors should best be developed within their states and regions. Most states started with the question of why freight corridors were important for their long term transportation planning and economic development and from there established goals and objectives prior to venturing into data collection, analysis, research and final policy direction. Once the studies were underway and data collection on freight significantly developed, these states typically were able to establish freight projections, which substantiated conclusions and recommendations.

As can be seen from the US DOT FHWA reports, the recommendations were made at collaborative meetings with various states and through surveys of state DOT's

throughout the nation to garner their interest in and indication of the rail and truck freight issues in their respective states. Many of the FHWA recommendations have been statutorily set in the SAFETEA-LU.

TABLE 11 A Summary Matrix of Analysis of Existing Freight Plans in Other States.

Organization	Title	Year	Why freight corridors?	Analysis framework for the designation of freight corridors	Effect of border trade on freight corridors	Integrated freight corridors into overall plan	Public safety concerns	Multimodal considerations	Economic analysis	Cost analysis	Performance measures	Data collection	Intelligent Transportation Systems
State DOTs and Regional Organizations													
Alabama, Arizona, California, Florida, Louisiana, Mississippi, New Mexico DOTs, FHWA	*The National I-10 Freight Corridor Study*	2003	X	X		X		X	X	X	X	X	X
Chicago Public Transit Authority	*Commuter Rail, Freight Railroads, and the Debate on Open Access, Regional Transportation Authority, Metropolitan Conference on Public Transportation Research, Chicago, 2000*	2000	X	X		X		X	X	X	X	X	
Colorado, New Mexico, Oklahoma and New Mexico DOTs	*Ports-to-Plains Corridor*	2005	X	X	X	X	X	X		X		X	X
Florida DOT	*Florida Intermodal Statewide Highway Freight Model*	2000	X	X		X	X	X		X	X	X	X
Maine DOT	*Maine Integrated Freight Plan, Final Report*	2002	X	X	X	X	X	X	X	X	X	X	X
Minnesota DOT	*Feasibility of a Shipper Panel to Measure Transportation Services*	2004		X	X	X		X	X	X	X	X	X

Organization	Title	Year	Why freight corridors?	Analysis framework for the designation of freight corridors	Effect of border trade on freight corridors	Integrated freight corridors into overall plan	Public safety concerns	Multimodal considerations	Economic analysis	Economic analysis	Performance measures	Data collection	Intelligent Transportation Systems
Minnesota DOT	*Minnesota Statewide Freight Plan*	2005		X	X	X	X	X	X	X	X	X	X
Minnesota DOT	*Statewide Multimodal Freight Flows Study: Preserving Minnesota's Economic Competitiveness*	2000	X	X	X	X	X	X	X	X	X	X	X
Minnesota DOT	*Winona Intermodal Study, Final Report*	2002	X	X	X	X	X	X	X	X	X	X	X
New Mexico DOT	*Long Range Major Transportation Investment Study, North Central Region, Final Report*	2001	X	X		X	X	X	X	X	X	X	X
Ohio DOT	*Truck Trip Data Collection Methods, Final Report (SPR 343)*	2004	X	X		X		X	X		X	X	X
Oklahoma DOT	*2005-2030 Statewide Intermodal Transportation Plan*	2005	X	X	X	X		X				X	
Oregon DOT	*Freight Rail and the Oregon Economy: A Background Paper, Final Report*	2004	X	X	X	X	X	X	X	X	X		
Oregon DOT	*Mapping Perceived Travel Problems Along Oregon's Roads: Geo-Coding Motor Carrier Survey Responses for the Oregon Department of Transportation*	2004		X		X						X	X
Oregon DOT	*Motor Carrier Concerns About Transportation Problems in Oregon*	2004		X		X	X		X			X	
Oregon DOT	*Oregon Commodity Flow Forecast Update and Lower Columbia River Cargo Forecast*	2002	X	X	X	X		X	X	X		X	
Oregon DOT	*Oregon Commodity Flow Forecast, Transportation and Land Use Model Integration Project, Phase 3I*	2005		X	X		X	X	X	X		X	X

Organization	Title	Year	Why freight corridors?	Analysis framework for the designation of freight corridors	Effect of border trade on freight corridors	Integrated are freight corridors into overall plan	What are public safety concerns	Multimodal considerations	Economic analysis	Economic analysis	Performance measures	Data collection	Intelligent Transportation Systems
Oregon DOT	*Oregon Freight and Truck Commodity Flows: Analysis and Summary*	1998	X	X	X	X	X	X	X	X		X	
Oregon DOT	*Oregon Transportation Plan Update: Freight Issues*	Not dated	X	X	X	X	X	X	X	X	X	X	X
Southern California Association of Governments & San Bernardino Associated Governments	*Subregional Freight Movement Truck Access Study, Southern California Association of Governments and San Bernardino Associated Governments*	2004	X	X			X	X				X	
Tennessee DOT	*Tennessee Long-Range Transportation Plan: Goals, Objectives, and Policies, Draft Report*	2005		X		X	X	X		X	X	X	X
Texas DOT	*Texas Department of Transportation: Effect of the North American Free Trade Agreement on the Texas Highway System*	1998	X	X	X	X	X		X		X	X	
Virginia Transportation Research Council	*Application of a Statewide Intermodal Freight Planning Methodology*	2001	X	X		X		X		X	X	X	X
Washington State DOT	*Measuring Performance in Difficult-to-Measure Areas: Freight Systems*	2004		X	X	X		X	X	X	X	X	

Organization	Title	Year	Why freight corridors?	Analysis framework for the designation of freight corridors	Effect of border trade on freight corridors	Integrated are freight corridors into overall plan	What are public safety concerns	Multimodal considerations	Economic analysis	Economic analysis	Performance measures	Data collection	Intelligent Transportation Systems
US Department of Transportation, Federal Highway Administration													
US Department of Transportation, FHWA	*FHWA Freight Transportation Planning Workshop*	2002	X	X		X		X	X		X	X	
US Department of Transportation, FHWA	*Freight Provisions in SAFETEA-LU, FHWA, U.S. Department of Transportation*	2005	X	X	X	X		X	X	X		X	X
US Department of Transportation, FHWA, Region 5	*Upper Midwest Freight Corridor Study*	2005	X	X	X	X	X	X	X	X	X	X	X
Professional Organizations													
AASHTO	*Transportation: Invest in America – Freight Rail Bottom Line Report*	Not Dated	X	X	X	X	X	X	X	X		X	X
American Transportation Research Institute	*Homeland Security and the Trucking Industry*	2005		X	X	X	X			X		X	X
American Transportation Research Institute	*Measuring Travel Time in Freight Significant Corridors*	2005	X	X	X						X	X	X
Western Trade Network	*Western Trade Network, Phase II*	1999	X	X	X	X	X	X	X	X	X	X	X

Annotated Bibliography of Existing Freight Corridor Related Studies

A brief annotated bibliography of existing freight reports for up to thirty-five states was developed cataloging and describing each of the studies used in the development of the matrix in Table 1. Sources used for the matrix and other conclusions and recommendations found later in the report are noted below in alphabetical order by title of the document.

1. *Application of a Statewide Intermodal Freight Planning Methodology.* Brich, S., et al. (2001). Virginia Transportation Research Council. www.virginiadot.org/vtrc/main/online_reports/pdf/02-r5.pdf

   The Virginia Transportation Research Council developed a statewide freight planning methodology for improving Virginia's freight transportation infrastructure. The six steps of the planning methodology are: Inventory the system; Identify the problem; Establish performance measures; Collect data and define conditions for specific problems; Develop and evaluate improvement alternatives; and select and implement improvements.

2. *Commodity Flow Forecast Update and Lower Columbia River Cargo Forecast: Commodity Flow Forecast Update Final Report (ODOT PCMS No. 21778).* Oregon Department of Transportation, et al. (2002). www.portofportland.com/PDFPOP/Trade_Trans_Studies_LCR_Cmdty_Flw_Rpt.pdf

   The report documents freight flow forecasts to 2030 for the Portland/Vancouver metropolitan area by transportation mode and commodity group. Although comprised of commodities growing at different rates, this study forecasts that the total of all commodity tonnage in the metropolitan area will double between 1997 and 2030.

3. *Commuter Rail, Freight Railroads, and the Debate on Open Access, Regional Transportation Authority.* Metropolitan Conference on Public Transportation Research, Chicago, Allen, J. et al. 2000 www.uppermidwestfreight.org/resources/Allen_CommuterRail.pdf

   A prosperous economy in the U.S. has generated increased demand for shipments of goods. Freight railroads are experiencing a capacity shortage. Commuter trains that operate on Freight lines are also experiencing the effects. This paper examines the problem in detail and proposes open access as a partial solution.

4. *Feasibility of a Shipper Panel to Measure Transportation Services, Minnesota Department of Transportation, Final Report*. (2003-04). Beier F. et al. Minnesota Department of Transportation. (2002). www.dot.state.mn.us/ofrw/PDF/ShprPanelFINALRPT200304.pdf

   This project examines the feasibility of establishing a standing panel of shippers who would contribute carrier evaluation data to a central database. The panel would contribute a broader range of experience than any individual shipper contributes and presumably improve the evaluation process.

5. *Freight Rail and the Oregon Economy, A Background Paper*. Cambridge Systematics, Inc., Cambridge MA. (2002) www.portofportland.com/PDFPOP/Trade_Trans_Studies_Freight_Rail_OR_Econ.pdf

   This workshop, held in Detroit, Michigan, was a culmination of 18 months of outreach events designed to examine freight issues and problems and to identify solutions. The range of topics covered: freight in the transportation planning process; multi-state/jurisdictional freight transportation decision making; and freight operations strategies and financing freight improvements. The workshop promoted the concept of "freight" and "passenger" transportation as opposed to "modes" of transportation, and promoted the establishment of freight specific performance measures. (Abstract)

6. Florida Department of Transportation. [on-line] *Florida Intermodal Statewide Highway Freight Model, 2000.* webservices.camsys.com/freightmodel/freightmodel.htm

   This document represents the analysis framework for the development of a statewide highway freight model. Considered in the study are: the evaluation of existing freight forecasting models; an inventory of existing freight/truck surveys and databases; model specification with respect to policy decisions; identification of data needs; a plan for data collection and assembly; model development; model validation and refinement; and model integration and implementation.

7. *Freight Provisions in SAFETEA-LU*. {on-line, 2005]. US Department of Transportation, Federal Highway Administration. 2005. www.fhwa.dot.gov/freightplanning/safetea_lu.htm

   This report represents a summary of the freight provisions outlined in the Safe, Accountable, Flexible and Efficient Transportation Equity Act: A Legacy for Users. The act outlines funding directions, projects, and commissions and studies relevant to freight movement in the US.

8. Freight Rail and the Oregon Economy: A Background Paper, Final Report, 2004. The objective of this paper is to provide a starting point for discussions about the

public sector's role in the freight-rail system and strategies for ensuring that freight rail can keep pace with economic growth and meet the needs of Oregon's business and industry. The paper reviews background information on freight demand and the state of the rail industry; Oregon's freight-rail network and railroads; and the role of rail freight in the economies of Oregon, the Portland metropolitan region, and the Port of Portland's marine terminals. The paper also outlines corridor-level rail capacity issues and explores the economic implications of these rail capacity issues for key industries. (P. 10-1)

9. *Homeland Security and the Trucking Industry.* Donath, M. et al. ITS Institute Center for Transportation Studies, University of Minnesota. (2005). www.cts.umn.edu/pdf/CTS-05-08.pdf

   This report details modern aspects of the trucking industry such as competition, low operating margins, driver shortages, and a growing gap between small and large carriers. These factors are examined in the context of security concerns in the wake of the events of 9/11/2001. The report makes recommendations as to how to provide a trucking environment that is safe and secure.

10. New Mexico Department of Transportation. *Long Range Major Transportation Investment Study, North Central Region, Final Report* . (2001).

    The NM DOT and communities in the North Central Region of New Mexico conducted a study of major transportation investment needs for the area from Belen to Española. The study synthesized previous area transportation studies, identifying needs and solutions to improve area-wide mobility (p. iv).

11. *Maine Integrated Freight Plan.* Cambridge Systematics, Cambridge MA. (2002). mainegov-images.informe.org/mdot/freight/documents/ifp2002_000.pdf

    The Maine Department of Transportation recognizes the importance of freight management and growth in its region's overall transportation infrastructure, and the relationship of effective freight management to the state's overall economic vitality. This Integrated Freight Plan works to develop an updated freight profile for the state reflecting changes to the freight transportation system and the evolution of the freight transportation industry (p. ES-8).

12. *Mapping Perceived Travel Problems Along Oregon's Roads: Geo-Coding Motor Carrier Survey Responses for the Oregon Department of Transportation.* Engelmann, M., Sproles, E. UO InfoGraphics Lab, Department of Geography, University of Oregon. (2004). www.oregon.gov/ODOT/TD/FREIGHT/docs/publications/odot/GeoCodingMCSurvey.pdf

    This report describes methodologies used by the InfoGraphics Lab at the University of Oregon for the creation and production of geo-spatial data and maps

of responses to a motor carrier survey of perceived problems on Oregon's roads (p. 1).

13. *Measuring Travel Time in Freight-Significant Corridors*. Washington, DC. US Department of Transportation, Federal Highway Administration. (2005). www.ops.fhwa.dot.gov/freight/documents/travel_time_flyer.pdf

    This Power Point presentation to the Transportation Research Board Performance Measures to Improve Transportation Systems Second National Conference details the purposes for, and benefits of, developing performance measures for freight.

14. *Measuring Travel Time in Freight Significant Corridors*. American Transportation Research Institute. (2005). ops.fhwa.dot.gov/freight/time.htm

    In response to dramatic economic growth in the trucking industry, the Federal Highway Administration (FHWA) contracted with ATRI to develop and test a national system for monitoring freight performance measures (FPM) on key interstate corridors. This report describes data collection methods and makes recommendations.

15. *Minnesota Statewide Freight Plan Executive Summary.* Minnesota Department of Transportation (2005). www.dot.state.mn.us/ofrw/PDF/MN_SFP_%20Exec_Sum.pdf

    Minnesota, a state that is facing a change from a production-based economy to service-based economy, examines its twenty-year freight plan with regard to the integration of freight planning into the Mn/DOT overall plan, multimodal planning, the North American Free Trade Agreement, and the development of performance measures.

16. *Motor Carrier Concerns About Transportation Problems in Oregon, Final Report.* Kirk, A. R. (2004). www.oregon.gov/ODOT/TD/TP_RES/docs/Reports/MotorCarrierConcerns.pdf

    In the summer of 2001 the Oregon Department of Transportation contracted with Portland State University (PSU) to gather information on problems truck freight transportation firms encounter in moving freight on Oregon's roads. This report is a product of a survey conducted by a professional firm, and summarizes responses from 1,872 out of a sample of 3,064 trucking firms (p. 1).

17. *The National I-10 Freight Corridor Study*. Alabama Department of Transportation, et.al. (2003). www.i10freightstudy.org/

    Freight transportation is central to the performance of the US economy and a key contributor to US competitiveness in the global marketplace. The continuing trend toward a service economy will increase the volume of freight traffic on

highways. Highways are essential to the efficiency of the other freight transportation system elements, including ports, inland waterways, and railroads. Increasing capacity in high volume corridors is the best method for lowering highway congestion.

18. *Nevada Statewide Intermodal Goods Movement Study Draft.* Nevada Department of Transportation, Carson City, NV. (2002). Guinn, K.C. www.nevadadot.com/reports_pubs/goods_movement/pdfs/GoodsTOC.pdf

    This report summarizes an initial attempt to examine Nevada's freight strengths in the economic development and diversification process. The needs of the non-tourism and non-gaming industries have been somewhat overlooked in the state's overall economic development process until recently. This study looks at the importance of integration of freight transportation into the state's overall economic development plan (pp. 1-1, 2).

19. New Mexico Department of Transportation. *New Mexico 2025: Statewide Multimodal Transportation Plan.* (2005). www.nmshtd.state.nm.us/upload/images/Long_Range_Planning_Section/Guiding Principles/FulfillingNM DOTs_GuidingPrinciples.pdf

    In July, 2003 New Mexico's Highway and Transportation Department became the New Mexico Department of Transportation. This change in name marks a shift toward a more multimodal perspective on transportation which is reflected in this planning document.

20. Oregon Department of Transportation (1998). *Oregon Freight Truck Commodity Flows: Analysis and Summary.* Salem, Oregon. Oregon Department of Transportation. (1998). www.oregon.gov/ODOT/TD/TP/docs/TMR/Misc/ODOTcfs2.pdf

    The report documents freight flow forecasts to 2030 for Oregon by transportation mode, area, and commodity group. Although comprised of commodities growing at different rates, this study forecasts that the total of all commodity tonnage in the state will increase 81 percent between 1997 and 2030.

21. Oregon Department of Transportation, Transportation Planning Analysis Unit. *Oregon Freight Truck Commodity Flows: Analysis and Summary*. (1998). www.oregon.gov/ODOT/TD/TP/docs/TMR/Misc/ODOTcfs2.pdf

    This study was initiated by the ODOT Transportation Planning Analysis Unit to address information gaps of commodity movements by truck within Oregon. The survey involved interviews with over 16,000 truck drivers at the State's six ports-of-entry. For the purposes of the study, three commodity flow regions are identified: Portland-Metro, Valley/SW Oregon, and Eastern Oregon.

Understanding the movements of truck freight within the state is critical to Oregon's economic competitiveness.

22. Oregon Department of Transportation. *Oregon Transportation Plan Update: Freight Issues.* (undated). www.oregon.gov/ODOT/TD/TP/docs/otpMobility/FreightIssues.pdf

    This report provides an extensive overview of the impact of freight on Oregon. Included in the report are: the impact of freight on the economy; the various modes in Oregon's freight transportation system; trends, issues, and recommendations.

23. Texas Department of Transportation, et.al. *Ports to Plains Trade Corridor.* (2004). www.portstoplains.com

    This study is a joint effort by four state DOTs including Colorado, Texas, Oklahoma, and New Mexico. The purpose of the initiative is to create a Development and Management Plan for the corridor and serve as an essential tool for securing federal funding for corridor development (p. 1, Focus).

24. *Statewide 2005-2030 Intermodal Transportation Plan*. Oklahoma City, Oklahoma. Oklahoma Department of Transportation. (2005). www.okladot.state.ok.us/hqdiv/p-r-div/25yearplan/

    The OKDOT endeavors through this plan to examine the link between transportation and economic development, in cooperation with the Oklahoma Department of Commerce, as to how existing and future transportation infrastructure could aid Oklahoma's economic development (Ch. 1, p. 1).

25. *Statewide Multimodal Freight Flows Study, Executive Summary: Preserving Minnesota Economic Competitiveness.* Cambridge Systematics, Cambridge, MA. (2000). www.dot.state.mn.us/ofrw/PDF/2000_MN_Statewide_Freightflows_Study.pdf

    Freight movement plays a major role in the economic prosperity of Minnesota. Through a number of efforts the Minnesota Department of Transportation (Mn/DOT) is working on the interests of businesses throughout the state to identify potential improvements to the statewide transportation system. The goal of this study was to provide data, recommendations, and direction regarding Minnesota freight flows to Mn/DOT and the Minnesota Freight Advisory Committee.

26. *Statewide Transportation Planning Model and Methodology Development Program*. Iowa State University, Center for Transportation Research and Education. (1996). www.ctre.iastate.edu/research/detail.cfm?projectID=124

The Iowa Department of Transportation and Iowa State University introduce a model for freight planning that examines multimodal tactical models to simulate the impacts of changes in transportation variables on freight movement. The model is designed to respond to forecasts of economic activity by forecasting amounts of freight expected to be hauled, thus making informed decisions about allocation of construction and maintenance dollars, therefore supporting state economic development objectives.

27. *Subregional Freight Movement Truck Access Study.* Myer, Mohaddes Associates. (2004). www.scag.ca.gov/goodsmove/pdf/SFM_Truck_Access_Study_0704.pdf

    The goal of the subregional freight movement truck access study is to develop strategies and planning tools to improve the forecasting of goods movement and trucking trends and to better characterize truck access to intermodal facilities and truck activity centers in the western San Bernardino and Riverside County area (p. 4).

28. *Tennessee Long Range Transportation Plan, Goals, Objectives and Policies Final Report.* (2005) PBS&J Consultant Team for the Tennessee Department of Transportation. (2005). www.tdot.state.tn.us/plango/pdfs/plan/GoalsOb.pdf

    This LRTP outlines a 25-year transportation vision for the state that will be linked to a 10-year plan for strategic transportation programs and investments, as well as an annually updated 3-year program of specific transportation projects. The plan analyzes the state's existing and future transportation needs at a statewide multimodal level, and includes all modes of transportation: highway, rail public transportation, ports and waterways, aviation, bicycle, and pedestrian.

29. *Texas Department of Transportation: Effect of the North American Free Trade Agreement on the Texas Highway System*. Texas Department of Transportation. (1998). www.window.state.tx.us/txdot/txdot100.html

    Since the 1994 passage of the North American Free Trade Agreement (NAFTA), trade between the US and Mexico has increased dramatically. This trend spurred a study to evaluate the impact of NAFTA truck traffic on the Texas highway system. This report identifies highway corridors that carry the most NAFTA truck traffic and estimates the impact of that traffic on Texas citizens.

30. *Transportation: Invest in America—Freight Rail Bottom Line Report*. [on-line] American Association of State Highway and Transportation Officials. freight.transportation.org/doc/FreightRailReport.pdf

    This document presents AASHTO's views concerning the capacity of the nation's freight transportation system, especially the freight-rail system, in keeping pace with the expected growth of the US economy over the next 20 years. The report describes the freight-rail industry, analyzes its benefits to the nation, estimates

investment needs and the capacity of the industry to meet those needs, and quantifies the consequences of not investing in freight rail, particularly with its impact on highway congestion and conditions (foreword).

31. *Truck Trip Data Collection Methods Final Report.* Casavant, K., et al. (2004). www.oregon.gov/ODOT/TD/TP_RES/docs/Reports/TruckTripData.pdf

    This study identifies the lack of comprehensive methodologies for the collection of freight movement data. There is a literature review, discussion about past and current methodologies, and their strengths and shortcomings, as well as two pilot studies devised for the collection of freight movement data in Oregon. The pilot study data is analyzed for completeness and cost, and recommendations are made for future data collection studies.

32. *Upper Midwest Freight Corridor Study.* US Department of Transportation Region 5 and the Ohio Department of Transportation (2005). www.uppermidwestfreight.org/files/execsummary.pdf

    This study was undertaken in order to establish a regional approach to improving freight transportation through the Upper Midwest corridor. The study examines several aspects of regional freight transportation including capacity, intermodal issues, border issues, performance measures, administrative issues, demand/usage, and best practices.

33. *User's Guide for the Multimodal Statewide Freight Transportation Model.* Iowa State University Center for Transportation Research and Education. (Unknown). www.ctre.iastate.edu/Research/statmod/usr_guid.pdf

    This guide describes the procedures to operate the statewide multimodal freight transportation model developed for the IDOT by the Iowa State University Center for Transportation Research and Education. Several classifications of probable freight planning issues and the necessary model alterations are described.

34. *Western Transportation Trade Network, Final Report Phase II.* Western Transportation Trade Network. (1999). www.dot.state.co.us/Publications/wttn/WTTN-Ch%201.pdf

    The WTTN is a surface transportation concept which seeks to enhance the economic prosperity of the 17 western US states. The concept was developed by the Western Association of State Highway and Transportation Officials (WASHTO). WTTN has developed this report based on the following objectives: to develop a coalition of state DOTs and utilize the input of other interested parties to develop a multimodal network in the western US; to collect an adequate level of information on trade and its impact on the transportation system to make forecasts and address deficiencies and needs; to develop a standardized database;

and to define performance objectives of the multimodal transportation and trade network (Ch. 1, pp. 1, 2).

35. Minnesota Department of Transportation. *Winona Intermodal Study Final Report.* (2002). www.dot.state.mn.us/ofrw/PDF/Winona_IntermodalStudy_Final.pdf

    Due to the City of Winoan's location and access to the Mississippi River navigations system, I-90, US 61, the national rail system, the presence of over 100 diverse manufacturers, and two universities, it is one of the Midwest region's principle transportation centers. To help understand and address future transportation issues facing the city, a project team initiated the Winona Intermodal Study. The project team identified the following goals to improve Winona's transportation system: to relieve congestion and improve traffic flow; improve the quality of life for citizens; and improve safety for the traveling public (pp. 1-5).

FIVE STATE'S CASE STUDIES OF FREIGHT CORRIDOR DEVELOPMENT

From the Literature Review and the matrix developed titled, Establishing Freight Corridors in New Mexico: Analysis of Existing Freight Plans in Other States, five states were selected for more in-depth analysis. The states chosen for this analysis and *Five* State Case Studies - Oregon, Texas, Minnesota, Nevada, and Florida - were selected for innovative processes and analysis that prove relevant to freight corridor planning in New Mexico. The rationale for the states selected for the case studies includes the following:

- **Oregon** has plans to more fully develop its rail capacity, and the state will be funding the necessary infrastructure improvements in part through lottery revenues. Oregon has also completed extensive multimodal studies and developed projections for rail and commercial vehicle freight.
- **Texas** has several initiatives in place including the Ports-to-Plains Corridor, a multi-state corridor that directly involves New Mexico. The Texas studies also introduce different data collection methods, including a qualitative "town hall" approach in the Ports-to-Plains initiative, as well as some of the political debate surrounding planning for the Trans-Texas Corridor and the potential economic and environmental impact such a large project could have on the state.
- **Minnesota**, like New Mexico, has an international border and is largely rural with few metropolitan areas. There are some lessons learned in Minnesota studies.
- **Nevada,** similar to Minnesota and New Mexico in its split of urban/rural features, is also a southwestern state which is investigating ways to originate freight within the state through developing strategies to attract industry, which could alleviate

the freight issues associated with being a "pass-through" state. Nevada and New Mexico share this "pass-through" theme in their freight systems.

- **Florida** has an interesting broad-scale innovative approach that, rather than dividing freight into the traditional *modal* categories, has developed a Strategic Intermodal Plan that uses the categories *hubs, interregional corridor,* and *intermodal connectors.* Additionally, Florida has large pockets of poverty, particularly in rural areas, and part of the planning process includes creating better access to markets.

These five states were selected for more in-depth analysis with a view toward refining the factors that NM DOT would need to take into consideration when making decisions on how or if to develop a state corridor concept and incorporate freight data into design and utilization plans with existing freight infrastructure. These factors include the following areas:

- Development & Implementation of Current State Freight Policies
- Data Collection & Analysis Needs
- Multimodal Costs and Benefits including Funding Initiatives
- Multimodal and Multi-State Efforts

A matrix was developed to present the information of the *Five State Case Studies* both for ease of reading and so that the reader can quickly discern the similarities, differences, and perhaps larger trends in these states' freight corridor development process. As can be noted from these studies, freight corridor planning ***is*** a process. The headings in the matrix: overview, policies, data collection methods, multimodal costs and benefits, and recommendations, were structured in a fashion that is intended to be

linear, with each heading building upon the last. These areas address the questions that are likely to be asked by legislators, constituents, and funding entities as New Mexico continues to develop its freight corridor planning initiative. The *Five State Case Studies* matrix is outlined below for Oregon, Texas, Minnesota, Nevada and Florida.

Oregon State Case Study of Freight Corridor Development

Overview

The state of Oregon has perhaps the most well-developed freight transportation plan encountered in this in-depth look at freight corridor development. Included in the state's analysis of freight transportation issues are: commodity flow forecasts, a truck trip data collection methods study, the *Connect*Oregon program (a lottery-bond-based initiative), state legislation establishing the Multimodal Transportation Fund, the Oregon Transportation Plan Update, and a study of Freight Rail and the Oregon Economy. The state looks at comparative advantages of developing multi-state corridors, developing public-private partnerships, gaining the most advantage from multimodal arrangements, and providing efficient freight transportation services in a service-based economy.

Policies

The 2005 Oregon Transportation Plan states a policy on freight that achieves *balance* between transportation systems. In doing so, the plan aims to design systems and facilities that accommodate multiple modes within corridors, and encourages integrated use, thus providing users with cost-effective choices of travel and shipping within corridors.

The policy also calls for *accessibility* through an availability of modal choices, ease of use, relative cost, and proximity to service; and *connectivity* among places (including within the state, the nation, and the world). Connectivity among places can be achieved through: identifying a multimodal network of facilities to meet the requirements for movement of people, goods, and services throughout the state; and identifying significant out-of-state corridors. *Source: Oregon Transportation Plan Update: Freight Issues, 2004.*

Data Collection

A variety of data sources were used in Oregon's freight study, including the *Commodity Flow Forecast (CFF) Update and Lower Columbia River Cargo Forecast*, generated by DRI-WEFA, June 30, 2002; *Truck Trip Data Collection Methods, Final Report*, a collaborative effort among Washington State University Department of Agriculture, the University at Albany—State University at New York Department of Geography and Planning, the Oregon Department of Transportation Research Unit, and the Federal Highway Administration, February 2004; and, *Mapping Perceived Travel Problems Along Oregon's Roads (MPTP): Geo-Coding Motor Carrier Survey Responses for the*

Oregon Department of Transportation, December, 2004.

Commodity Flow Forecast (CFF)

The CFF documents freight flow forecasts to 2030 for the Portland/Vancouver metropolitan area by transportation mode and commodity group. Included in these projections is the forecast that commodity tonnage will double between 1997 and 2030; freight transportation demand is influenced by economic conditions outside the Portland/Vancouver area; globalization will continue to grow via trade links; economic growth will be more rapid in developing countries than in the advanced countries of Europe and Asia; US population growth will slow; and manufacturing employment will continue to decline, while service sectors will generate an increasing share of job growth.

Involved in the development of the CFF was the establishment of base year (1997) commodity flows for Portland. Several steps were involved in establishing 1997 as the base year for commodity flows including the selection of the 1997 US Bureau of Transportation Statistics Commodity Flow Survey and following the next five steps: (1) first approximation base year commodity flows; (2) validation of first approximation flows with mode/commodity specific data sets; (3) validation of revised commodity flow database with establishment data and reload facility data; (4) development of vehicle load factors and validation with truck traffic counts; and, (5) development of directional flows.

Several regional commodity flow and economic data sets were used to construct control totals for inbound, outbound, and through commodity flows. Construction of the first approximation base year commodity flows used the following data sources: the 1994 DRI 2040 regional commodity flow forecast; the 1997 Kaiser commodity forecast; the 1997 US Economic Census; the 1997 Commodity Flow Survey; and the Reebie Associates 1997 TRANSEARCH commodity flow data.

Truck Trip Data Collection Methods

The overall goal of this study was to identify a reliable data collection method capable of generating the information at a level of detail useful to ODOT's modeling and freight planning needs for data on truck movements at the metropolitan level. Objectives of the effort were to: identify and evaluate alternative methods of collecting truck travel data; recommend a data collection method that can provide the necessary data to ODOT, at sufficient detail, on truck movements for transportation modeling and freight planning needs; select one or more data collection methods for field testing; and to analyze field test results, identifying constraint, data detail, and statistical reliability achieved using the recommended methodology(ies). The study features a list of past and recent data collection efforts for the freight industry, as well as analytical review of those efforts. Under review for this study were the following data collection methods: mail survey, telephone survey, roadside interview survey, combined telephone and mail survey, video surveillance, and GPS receiver attached to sample of trucks.

Pilot Studies: Involved in the study were two data collection approaches, which seemed the most promising in providing needed information regarding *inter*-regional and *intra*-regional freight movements. Those methods selected for the study were: the

roadside interview approach selected for collecting data on inter-regional freight movements, and the mail/fax survey approach selected for collecting data on intra-regional freight movements.

Pilot Study I, the roadside interview method, used surveys that were designed to take approximately two minutes to complete and collected the following information: carrier name, carrier address, vehicle and trailer configuration, number of axles, origin address of shipment, destination address of shipment, commodity, detailed trip route, address of pickups and deliveries, time of day, and hazardous material placard code. Additionally, roadside surveys were conducted at port facilities and at a trucking company, which had voluntarily agreed to participate in the pilot study. The interviews were conducted by a local service club and, therefore, reduced the potential cost of the project.

Pilot Study II was comprised of two components—a mail survey method and a fax survey method. The fax survey component was included because many freight firms rely on fax for important communications, and a fax survey might be more likely than mail to yield a response. This questionnaire was designed to be completed in about twenty minutes. The types of information collected were warehouse/distribution center information related to size of operation; daily time distribution of inbound and outbound shipments; seasonal time distribution (6 time periods) of inbound and outbound shipments for the year; vehicle and trailer configuration; commodity description for inbound and outbound shipments; inbound and outbound shipment information such as number of truckloads, average payload weight, number of stops per trip and average length of route; addresses of shipment origins and destinations; and routes utilized for inbound and outbound shipments. This approach used a modified Total Design Methodology (TDM) developed by Dr. Don Dillman of Washington State University (1978).

Mail Survey: Three different mail survey methods were used: (1) straight mail—a single contact via mailed questionnaires; (2) phone/mail—a telephone contact soliciting an agreement to participate, followed by a mailed questionnaire; and (3) phone/mail/phone—a telephone contact soliciting an agreement to participate, followed by a mailed questionnaire and a follow-up reminder by phone to return the questionnaire.

Fax Survey: The second method in Pilot Study II was a fax survey method, which similar to the mail survey approach, used a format of: (1) straight fax—a single contact via faxed questionnaire; (2) phone/fax—a telephone contact soliciting an agreement to participate, followed by a faxed questionnaire; and (3) a phone/fax/phone format—a telephone contact soliciting an agreement to participate, followed by a faxed questionnaire and a follow-up reminder to return the questionnaire.

Results: Overall, the roadside surveys were successful in all facets of implementation and collecting freight data. Primary findings were that:

- The capture rate is dependent upon available parking and survey personnel relative to truck volume.
- The roadside interview method resulted in high response rates relative to vehicle

and trailer information, carrier information, trip route information, and facility type.

- Roadside interviews at the warehouse/distribution center and interstate highway weight station provided high response rates related to commodity type, while port facilities yielded higher response rates for container traffic.
- Obtaining specific street addresses and zip codes for trip origin and destination is difficult for all types of roadside interviews.
- Finding a large number of private transportation firms to participate in warehouse/distribution center surveys may prove challenging.

For the mail/fax pilot study, response rates were generally low, but did improve with increased contact. Generally, most answers were completed by respondents who agreed to complete the survey, but a high percentage of respondents indicated they did not have time to complete the survey, which could indicate that too much information was sought.

Mapping Perceived Travel Problems (MPTP)

In fall 2003, the Oregon Department of Transportation contracted with the InfoGraphics Lab at the University of Oregon to create and produce geo-spatial data and maps of responses to the motor carrier survey (cited in previously) of perceived problems on Oregon's roads. This study facilitates a spatial analysis of the perceptions of motor carriers on issues such as problems with roadway infrastructure, difficulties in permit processes or other administrative concerns, and the location of reported and previously unreported problems such as those related to congestion. The study contains geo-spatial data and maps, graphs, and tables. Items coded in the study are: "infrastructure," "congestion," "restriction," "other drivers," "construction," and "other." Additionally, the project has the ability to join geo-spatial data to the original survey response, thus providing a method for extending the information about geographic features in a shapefile.

Multimodalism Costs and Benefits

Commodity Flow Forecast

A major trend in freight transportation nationwide is a shift toward a service-oriented economy rather than manufacturing-oriented. Involved in this shift is the need for the transportation industry to be responsive by becoming more flexible, reliable, and providing just-in-time (JIT) service. Traffic growth for the consequent smaller shipments of the JIT model is a major consideration in transportation planning, as is the impact on the environment and public safety relevant to the growth in traffic. Another aspect of transportation planning in the service-oriented arena is a shift from inventory-based (push) to replenishment-based (pull) logistics, and these changes have created the need for real-time information about stocks and customer demand, thus creating a need for advanced information technologies with the capacity for generating real-time information. Implied in the demand for state-of-the-art information technology is the cost of creating the infrastructure to support IT; both shippers and carriers face high investment costs. Benefits of IT include improving: shipment and asset tracking; routing and dispatch optimization models; and commercial transaction management software.

In terms of delivery costs, the "last mile" is the most expensive. Outsourcing of logistics services has become a common practice, where logistics specialists are able to bundle services across modes to meet high performance demands of customers. All aspects of the freight industries are feeling pressured to provide a low-cost transportation product, but are having difficulties in finding the capacity to make the necessary infrastructure investments. Additionally, financial institutions and investors are not interested in dealing with small carriers with whom the return on investment will be relatively small.

Furthermore, the question of whether shippers or carriers will pay the price for investing in information technologies has not been resolved. Each side believes the other has more to gain from the investments, and neither wants to bear the lion's share of the costs.

Additional problems in the freight investment industry are that: portions of the freight system require substantial rehabilitation; the costs of congestion associated with bottlenecks are growing and threatening industrial productivity; rising costs for land, fuel, and labor are beginning to reverse trends in transportation productivity growth; and increasing difficulties in obtaining land and investment capital are making it difficult to expand facilities and add necessary new capacity to meet growing freight demand. These mounting problems occur in an investment environment in which there will be few new federal funding sources for freight. Some thoughts to the resolution of these problems have to do with the implementation of user fees and more attention to multi-state planning for freight transportation, particularly in freight corridors.

There also is acknowledgement that there is a mismatch in the planning timeframes of the public and private sectors that impedes cooperation on freight planning. Public sector planning tends to look at long time horizons; private sector has a more near-term focus. Yet another issue is that Metropolitan Planning Organizations lack basic freight data and analysis tools for evaluating project alternatives or understanding the implications of future freight industry trends. *Source: Commodity Flow Forecast Update and Lower Columbia River Cargo Forecast, ODOT PCMS No. 21778, DRI-WEFA, June 30, 2002.*

Freight Rail and the Oregon Economy

Rail transportation is vital to the nation's economy, carrying long-distance shipments cost-effectively, including: heavy, bulky commodities; high-value time-sensitive merchandise; industrial parts, mail and parcels moving in intermodal containers and truck trailers; but also freight railroads maintain the track for many commuter railroads, provide rail lines and dispatching for intercity passenger-rail services, and serve as the backbone for the strategic defense network (STRACNET), providing mobility and access to ports for military goods and equipment.

Railroads have increased productivity and decreased rates significantly since the economic deregulation of the industry in 1980; however, the benefits have gone to shippers and the economy in the form of rate cuts rather than to railroads and their investors. Railroads today are not earning their cost of capital and may not be able to keep pace with economic growth at the current level of investment. If railroads cannot maintain their current share of National freight, then rail freight will be shed to trucks on

an already congested highway system, thus imposing greater costs on state and local highway agencies, on highway users, and on shippers, resulting in less competitive industries, slower economic growth, and fewer jobs if industries choose to cut back or relocate instead of absorbing higher transportation costs.

Public investment in the rail system has historically treated the bottom of the system: grade crossings; branch lines, and commuter rail services. The present need is to treat the top: major corridors, intermodal terminals and connectors, and urban rail exchanges. The public sector has two broad choices in dealing with these new needs: (1) to opt for market-driven evolution of the freight rail system *or* (2) push for policy-driven expansion of capacity.

Opting for a market-driven evolution would entail minimizing state involvement and betting that the rail industry will continue to be stable, productive, and competitive with enough business to operate. Railroads would not replenish their infrastructure as quickly or grow as rapidly as the demand for freight, thus risking that the freight-rail system may not support state economic development goals.

On the other hand, opting for policy-driven expansion means building a new public-private partnership with the railroads. Increasing state involvement and investment to achieve a freight-rail system that provides the cost-effective transport needed to serve national and global markets helps relieve truck pressure on highways and supports Oregon's economic development. Risks involved in this approach included:

- The public sector can facilitate or invest in rail improvements, but it cannot provide effective and cost-competitive services that will attract and retain shippers.
- The railroads must deliver those services.
- There is the possibility that the market will not respond to the public sector's or the railroad's vision of the state's freight transportation needs.

Four major corridors and the Portland Triangle are experiencing significant rail capacity and service problems that will affect business and industry in Oregon and the Portland Metropolitan region as freight demand and rail congestion increase: (1) the Portland-Seattle Corridor, (2) the Portland Triangle, (3) the Columbia Gorge Corridor, (4) the Willamette Valley Corridor, and (5) the Klamath Corridor. By 2020, freight flows in the West Coast corridor are forecast to reach 57 million tons and 52 billion ton-miles, 69 percent of which will be carried by truck and 31 percent by rail. The West Coast rail corridor extends 1,200 miles north-south, paralleling I-5 and linking Seattle, Portland, and Southern Oregon to the Bay Area, Los Angeles, and San Diego. The corridor serves freight flows between the Pacific Northwest, the Pacific Southwest, as well as Canadian and Mexican cross-border traffic. Rail is not competitive with trucking along the West Coast corridor in respect to transit time and service reliability. Rail captures a modest share of southbound carload traffic, but captures only a small share of northbound intermodal traffic; rail capacity is constrained because of the mountainous terrain. Additionally, there are numerous choke points along the West Coast rail corridor; however, highway capacity along the I-5 Corridor is even more constrained than rail capacity. The Federal Highway Administration estimates that without improvements, by 2020 traffic on I-5 could operate at level of service E and F (stop and go) for many hours a day for virtually the entire distance between San Diego

and the Bay Area, as well as through the Portland and Seattle-Tacoma metropolitan regions.

Severe highway congestion and the fact that the average length of a truck haul in the corridor is 936 miles (a distance at which rail intermodal is highly competitive with truck) suggests there is room to improve rail service along the corridor. Oregon needs improved West Coast rail corridor service to reach the large and lucrative Southern California markets and to keep down the cost of food and goods brought north to supply the growing population and industry of the Pacific Northwest, thus requiring coordinated improvements in rail capacity in the Portland Triangle, the Willamette Valley corridor, and Klamath gateway in Southern Oregon.

ConnectOregon

ConnectOregon (Senate Bill 71, approved in August 2005 by the Oregon Legislative Assembly) is a lottery-bond-based initiative ($100 million) to invest in air, rail, marine, and transit infrastructure to ensure Oregon's transportation system is strong, diverse, and efficient. It is focused on improving the connections between the highway system and other modes of transportation to better integrate the components of the system, improve the flow of commerce, and remove delays.

Projects will be evaluated on the following criteria to determine whether they are qualified to receive *ConnectOregon* funds: whether the project reduces transportation costs for Oregon businesses; whether it benefits or connects two or more modes; whether it is a critical link in a statewide or regional transportation system; how much of the cost can be borne by applicants; whether the project creates construction and permanent jobs in the state; and whether the project is ready for construction.

Oregon Studies' Recommendations

Freight Policy Recommendations

The Oregon Transportation Plan Update, 2004 makes the following policy recommendations.

1. Enhance Oregon's competitive strength as a distribution point within the global trade network through efficient trade-related infrastructure improvements.
   - Support improvements to National Highway Service intermodal connectors.
   - Maintain the Columbia River navigation channel.
   - Support highway and rail improvements in the I-5 Corridor.
2. Create a comprehensive freight agenda for the state and metropolitan areas.
   - Expand freight planning at the state and local levels.
   - Establish criteria and a process to prioritize the funding of transportation projects that demonstrably contribute to economic vitality.
3. Advance the public's role in a statewide passenger and freight rail agenda.
   - Provide stable funding for shortline and mainline rail improvements, including continued public/private partnerships.
4. Increase the reliability of freight movements.
   - On the highway, decrease congestion where possible, and increase incident management and efficient operation of the system through such means as advanced traveler information, coordinated traffic signalization, and access

management.
5. Streamline the environmental approval process.
6. Promote the security of freight cargo and infrastructure.
7. Support the use of E-commerce and other cost-effective technology to enhance productivity and freight movements.

Freight Rail

The Freight Rail and the Oregon Economy document recommends that the public sector to build a new partnership with railroads and expand capacity of the freight-rail system. The Oregon Department of Transportation, the Portland Metropolitan Community, and the Port of Portland may wish to consider:

- Defining state and local freight and economic development policies to address freight-rail needs and link public initiatives to the Oregon and Pacific Northwest economic development goals.
- Clarify public roles and responsibilities by convening a Pacific Northwest Freight Advisory Committee.
- Strengthen decision-making procedures by improving state, metropolitan, and Port freight-rail planning and analytical capabilities to better understand business logistics and freight-rail services, and work with railroads to develop a regional rail network model sufficient to identify major capacity constraints.

Leverage resources such as proposed intermodal connector grants, intermodal transfer facility development grants, the anticipated 'freight gateways' or 'projects of national significance' program, funding for multi-state corridor planning and project development, as well as state and local tax incentives for investment in freight rail improvements.

Texas State Case Study of Freight Corridor Development

Overview

Texas is participating in and/or leading a number of multi-state multi-jurisdictional efforts in transportation planning. Among several large-scale efforts are the Trans-Texas Corridor, featuring a 6400-kilometer (4000-mile) multi-use transportation system that will take a projected 50 years to develop (study report July/August 2005); the Ports-to-Plains Trade Corridor, a joint effort by four state Departments of Transportation (Colorado, Texas, Oklahoma, and New Mexico) (study report 2004, Ports-to-Plains Trade Corridor Coalition); the National I-10 Freight Corridor Study (May 2003); and the Texas Department of Transportation's *Effect of the North American Free Trade Agreement on the Texas Highway System* (1998).

Policies

***The Trans-Texas Corridor* (2005)**

This initiative features policies relevant to various entities including a Memorandum of Understanding with the Burlington Northern Santa Fe (BNSF) Railway Company which:

- Outlines the policy document entitled "Public Private Partnerships." In their agreement, the BNSF and the state of Texas have agreed that improvements to the Texas freight rail system will benefit the state by enabling increased freight rail efficiencies and improving services to freight customers, and encourage economic development within the state. The state also acknowledges that BNSF operates in a competitive business environment and BNSF understands that the state intends to enter into similar agreements with other transportation providers, including BNSF's competitors.
- States that BNSF will consider public-private partnerships in cases that benefit the public and ensure that the interests of BNSF are protected. It is also recognized that public-private partnerships must be voluntary on both sides; decisions on behalf of the public must protect the public interest and investment.
- Requires a fact-based planning approach that: describes the project scope; assesses impact on current freight traffic levels and future traffic growth; provides a cost-benefit analysis on an after-tax risk-adjusted basis; and identifies public funding sources, timing, processes, and probability of obtaining funding to meet the public's objectives in terms of time and toward meeting the goals of the public.

Similarly, the Capital Area Metropolitan Planning Organization (CAMPO), based in Austin, has developed a document commenting on Phase I of the Environmental Impact

Study of Trans-Texas Corridor 35 and how the Trans-Texas initiative integrates with CAMPO's Mobility 2030 Plan. The integration of the two plans follows a line of reasoning in which:

- CAMPO Mobility 2030 Plan calls for: implementing commuter rail; completing roadway improvements; the integration of transportation and land use planning; providing a connected system of regional arterials; developing a transportation system that distributes the impacts and benefits of transportation projects fairly across income and ethnic divisions; and developing a transportation system that helps reduce transportation related air pollution and emissions
- Trans-Texas Corridor-35 (TTC-35) provides an opportunity to meet both urban and inter-city transportation needs and through planning together, the CAMPO Transportation Policy Board can: select a rail corridor for TTC-35 that can use existing resources, allow for some relocation of freight lines, allow coordination of passenger and freight rail service, minimize environmental impacts, and allow access of freight rail from the Austin region to TTC-35;
- CAMPO believes that the impact of TTC-35 on low income and minority communities should be considered, as well as the impact of TTC-35 on environmentally sensitive lands and regional air quality;
- Any potential high-speed passenger rail being developed as part of TTC-35 should be coordinated with planned regional rail investments in the CAMPO area and should serve that population region;
- Overpasses and/or underpasses that accommodate multiple modes should be provided as part of TTC-35 implementation.

Additionally, the North Central Texas Council of Governments (NCTCOG) has been designated as the Metropolitan Planning Organization for the Dallas-Fort Worth area by the Governor of Texas and is authorized to conduct coordinating and technical studies as required to guide development of the area. The Regional Transportation Council (RTC) is the regional transportation policy body associated with NCTCOG, and has adopted a Goods Movement Corridors Technology Deployment Program aimed at expanding and enhancing the Intelligent Transportation System infrastructure in the region. TTC-35 provides important new corridors for energy, water, information, and other utility needs necessary for continued urban growth. The RTC supports expanded investments to meet long-standing urban mobility, reliability, safety, and air quality needs, including:

- Utilizing the TTC-35 main alignment and urban connectors;
- Regionally supporting phased modal investments;
- ITS and geometric improvements;
- Capacity improvements; and,
- Access to the Dallas/Fort Worth International Airport.

***Ports-to-Plains Trade Corridor (*2004)**

Ports-to-Plains was spurred by the House of Representatives reauthorization of the Transportation Equity Act, a Legacy for Users (TEALU) 2004, and within that bill, the National Corridor Infrastructure Improvement Program (NCCIP), and the Coordinated Border Infrastructure Program (CBIP). Also, the Senate Environmental and Public Works Committee, as part of SAFETEA-LU played a part in the development of the

program. Combined funding sources intended for the development of interstate trade corridors resulted in the initiative, which will benefit an interstate corridor system in Colorado, New Mexico, Oklahoma, and Texas through over $62,000,000 in funding.

Corridor Legislation
In terms of preparing the NAFTA study, several pieces of federal transportation legislation in the 1990s addressed the issue of trade corridors and contained opportunities for Texas and other states along these corridors to obtain funding. Funding was available to evaluate needs, plan, and conduct feasibility studies evaluating improvement opportunities on highway travel corridors in Texas, and evaluations of freight corridors by the Western Transportation Trade Network and the Latin American Trade and Transportation Study.

Data Collection

***The National I-10 Freight Corridor Study* (2003)**
This study makes numerous projections based on base conditions along the corridor. One of the key measures used for the study is the Level of Service (LOS), which uses a scale of A (best) through F (worst). Using the LOS measure, approximately 400 of the 1,900 miles of the corridor are currently operating at an unacceptable LOS, and it is projected that by 2025, 1,500 miles of the corridor will have an unacceptable LOS. Using the LOS measure, the study goes on to project: estimated impacts on speed and delay; the impact of freight flows on congestion; and an analysis of freight oriented alternatives. Freight alternatives examined under the study include: widening I-10 to provide additional capacity; deploying ITS technologies along the corridor; separating truck traffic from automotive traffic; rail intermodal; waterway intermodal; urban truck bypass; increasing truck productivity; creating freight villages, and altering time of facility operations.

The Effects of NAFTA on the Texas Highway System (1998)
The study used a number of data collection methods, but cautions that this report should be viewed as an initial assessment of NAFTA truck impacts. Among the data collection efforts were: an origin-destination survey of truck traffic crossing the border between Texas and Mexico; a statewide analysis model, presenting a "snapshot-in-time" view of NAFTA impacts; and programming of specific projects.

Ports-to-Plains Trade Corridor
By 2005, accomplishments of the initiative included:

- Completion of a feasibility study that determined the best route from Canada via Denver, utilizing I-27 to the Mexican border;
- Completion of a Ports-to-Plains strategy session and formulation of a strategic plan;
- Development of a Ports-to-Plains Coalition with over 75 members representing various cities, county organizations, and businesses along the route;
- Obtainment of "High Priority Corridor" designation from the Federal government;
- Convening of five Ports-to-Plains Summits in Amarillo, Lubbock, Acuna,

Denver, and Laredo;
- Receipt of funding from Texas Department of Transportation ($1.5 million) for the Ports-to-Plains Route Identification Study; and inclusion of the Ports-to-Plains route in the Unified Transportation Plans of Oklahoma, Colorado, New Mexico, and Texas.

Multimodalism Costs and Benefits

The National I-10 Freight Corridor Study

The National I-10 Freight Corridor study goes into great detail to describe the costs and benefits of taking a multimodal approach to freight management. Particularly, base lines are established using a variable of the absence of freight on roadways. The study report figures estimated costs of: the impact of speed and delay; the capacity to recoup costs of capital outlay for deployment of ITS models; the effect of separating trucks from automobiles on deficient mileage; the economic benefits of inter-regional trade; and the social and economic cost of maintaining the status quo.

The Effect of NAFTA on the Texas Highway System (1998)

Trade between the US and Mexico has increased dramatically since the passage of the North American Free Trade Agreement. This report identifies those highway corridors that carry the most NAFTA truck traffic and estimates the impact of that traffic on Texas citizens. There are two major categories of impacts of NAFTA: those experienced statewide, and those affecting the immediate border vicinity:

Those impacts facing border vicinities include:

- Choke points at the border that are caused by such factors as: insufficient infrastructure; border clearance through numerous state and federal agencies; and paperwork, staffing issues, and institutional and cultural issues.
- Existing infrastructure at the border is often located in congested downtown areas, causing traffic congestion and limits to the possibilities for expansion.
- Planned improvements to border infrastructure include: connecting roads, expanded inspection facilities; x-ray machinery for inspecting trailers, traffic re-routing, facilities for separating freight traffic from general traffic; and proposed bridges. Total costs for all the improvements listed in the report are $398,700,000.
- Mexican infrastructure is another issue for all freight modes, including difficulties in connections for modal changes.

Effects of NAFTA on statewide travel include:

- Most NAFTA trucks use Texas ports of entry.
- A significant portion of NAFTA trucks pass through Texas to other destinations.
- NAFTA trucks comprise a significant portion of truck traffic in Texas.
- NAFTA trucks are focused on a small number of highways.

Costs to Texas of NAFTA traffic fall into two general categories including social costs and capital costs. Among the social costs of NAFTA traffic to the citizens of Texas are:

- Congestion, which can cause time loss and increases in wear and tear on cars and trucks.

- Accidents, resulting in personal injury, and losses, and damage to property.
- Air pollution, making people sick and keeping them from being productive.
- Noise pollution, which cause reduction in the values of adjacent real estate.
- These social costs translated to approximately $510.8 million in 1996. Capital costs of addressing NAFTA needs are related to:
- Large numbers of heavy trucks, which cause pavement to deteriorate at a faster rate.
- Preservation projects, such as resurfacing and repairs, which are thus required to extend pavement life to its originally scheduled lifetime.
- Mobility projects designed to reduce congestion or shorten trips by increasing the number of lanes or providing more direct routes.
- Safety improvement projects designed to mitigate the potential hazards associated with each of the above categories.

Ports-to-Plains Trade Corridor

It is estimated that the Ports-to-Plains project will:

- Create 44,480 jobs (including 39,700 in distribution and manufacturing).
- Increase income along the corridor by over $4.5 billion.
- Realize an economic cost benefit ratio of 3:1.
- These economic benefits are contingent upon the corridor being four-laned and are in addition to the projected increases associated with natural growth on the existing roadways.

Rationale for defining these benefits was derived from the following demographic information:

- Communities along the corridor (including metropolitan areas) are relatively small, and economic development activities need to be scaled accordingly.
- Income and wages are well below the US average in most communities along the corridor.
- Employment in the corridor is oriented toward farming and transportation rather than manufacturing and service-oriented industries.
- Most communities are perceived to have limited labor pools, and unemployment within these communities is often low because of declining populations.
- Most locations along the corridor would like to increase jobs in order to keep people in their communities.

Texas Freight Study Recommendations

There is currently a study in progress sponsored by the Transportation Research Bureau to develop freight highway corridor performance measurement strategies. The state agencies responsible for constructing, maintaining, and rehabilitating highway networks have little performance data available to use in decision-making. This scoping study, in effect from 9/1/2005 to 8/31/2006 will consider a range of performance measures being considered for both urban and inter-city corridors and recommend performance measure strategies that could be implemented at both the Texas Department of Transportation district level and at division levels. Also under examination in the study is the impact of

intensive traffic generators like retail "big box" distribution centers on corridor performance.

Ports-to-Plains Trade Corridor

The report concludes with the following action items:

- To organize economic development strategies by segments along the corridor, focusing on rural and mid-size communities that want and need assistance.
- To establish a focused set of corridor-wide priority highway projects.
- To define a corridor strategy. If the corridor chooses to pursue Intelligent Transportation Systems projects, focus first on safety issues under the Emergency Medical Services development track in the Rural ITS program.
- To pursue with congressional representatives and USDA officials the concept of establishing a REAP (Rural Economic Area Partnership) Zone that would provide: assistance in corridor-wide strategic planning; opportunities to obtain significant public and private sector funds to support development; and enhanced ability for individual communities to access funds through the Ports-to-Plains Corridor Coalition.
- To create a corridor-wide strategic plan for economic development.
- To endeavor to match the varied location and character of the towns and cities along the corridor with potential benefits in most sectors, including manufacturing, transportation and warehousing, retail, services, and agriculture.

Minnesota State Case Study of Freight Corridor Development

Overview

For the purposes of this report, four freight studies in the state of Minnesota were used: the *Statewide Multimodal Freight Flows Study*, 2000; the *Minnesota Statewide Freight Plan*, 2005; *Feasibility of a Shipper Panel to Measure Transportation Services* (2003-2004); and *Winona Intermodal Study, Final Report* (2002).

Policies

***Minnesota Statewide Freight Plan* (2005)**

The Minnesota Department of Transportation's (Mn/DOT) Statewide Transportation Plan has adopted the following policy on freight: *Provide an integrated system of freight transportation in Minnesota—highway, rail, water, air cargo, and intermodal terminals—that offers safe, reliable, and competitive access to statewide, national, and international markets.*

Though the policy statement is brief, it entails a number of policy directions and strategies to support the policy. Key directions in Mn/DOT's policy on freight are to:

- Improve the condition, connectivity, and capacity of statewide freight infrastructure.
- Improve the condition, connectivity, and capacity of national and international freight infrastructure serving Minnesota.
- Enhance the operational performance and safety of statewide freight systems.
- Enhance integration of freight into regional and state transportation planning and investment decisions.
- Strengthen partnerships to address significant freight issues.
- Streamline and improve the effectiveness of motor carrier regulatory activities.

Data Collection

***Statewide Multimodal Freight Flows Study* (2000)**

The study, conducted by Cambridge Systematics, was designed to provide data, recommendations, and direction regarding Minnesota freight flows to the Mn/DOT and the Minnesota Freight Advisory Committee (MFAC). Factors measured under the study include:

- The volume, density, and character of major freight flows in the state by mode and corridor.
- The origins and destinations of freight flows by mode to and from major regional centers in the state.

- Critical freight transportation planning, infrastructure, and policy issues.
- Data, freight system performance measures, and recommendations to support and compliment the Interregional Corridors Study, which identified priority and at-risk interregional highway corridors connecting the State's regional trade centers.

***Minnesota Statewide Freight Plan* (2005)**

As part of an ongoing effort to effectively collect data on freight movement, Minnesota has developed a Statewide Transportation Plan Performance Framework which provides a comprehensive set of multimodal performance measures, addressing all modes, system infrastructure, services, and geographic areas. Contained in the performance framework are three strategic directions: to safeguard what exists; to make the network operate better; and to make Mn/DOT work better. In alignment with these strategic directions, there are freight measurement by mode. For example, in trucking the framework measures includes: the percentage of miles of highway that meet "good" and "poor" ride quality targets; peak-period travel time reliability; and miles of peak-period congestion per day.

An important consideration in measuring performance in counting vehicles is the large volume of trucks moving along Minnesota's roadways. Trucks represent the length of three to four automobiles, and Minnesota has adopted the practice of using the term Passenger Vehicle Equivalency (PVE), allowing for more accurate quantification of the actual impact trucks have on overall congestion, air quality, and wear on roads.

***Feasibility of a Shipper Panel to Measure Transportation Services* (2004)**

This study (conducted by Mn/DOT and the University of Minnesota) examines the feasibility of establishing a standing panel of shippers who would contribute carrier evaluation data to a central database. The panel would contribute a broader range of experience than any individual shipper and presumably improve the evaluation process. Shippers could use the data as a quality control metric on existing carriers or as a basis of carrier selection; policy groups could use the aggregated data to measure service or capacity levels in specific areas or lanes.

The methodology used to collect data was a series of focus groups throughout the state followed by a survey addressed to regional firms; a national survey was used as a control group. Findings of the study include:

- A shipper panel appears to add value to the evaluation process and a majority of respondents were willing to share information.
- Technological barriers to implementation of such a panel appear to be low. The context of the panel would be a web-based system that could be downloaded into a commercially available spreadsheet or database.
- There is evidence of a trend toward centralizing the carrier evaluation process, in which a single office may be responsible for evaluating carrier performance at many facilities.
- Larger firms are more likely to perceive value in using such a reporting system, as are firms that enjoy a variety of modal choices.
- There remain substantial implementation issues to a shipper panel including design of a format to gather evaluation data as well as the format for distributing such information.

***Winona Intermodal Study* (2002)**

This study, a joint effort on the part of the Mn/DOT's Office of Freight, Railroads and Waterways, the City of Winona (Port of Winona), and the Mn/DOT District 6, took into consideration a number of previous studies commissioned by a broad range of stakeholders. Those previous studies included:

- The Railroad Relocation Study (1976) to explore the feasibility of relocation of mainline tracks to the Winona Waterfront.
- The city of Winona Comprehensive Plan (1995) to identify long-range goal and serve as a guide for the physical, social, and economic development of the city.
- The Midwest Regional Rail Initiative (1996), which involved multi-state efforts to inventory, assess, and recommend improvements for High-Speed Rail (HSR) expansion in the Midwest.
- A comprehensive Study of Housing and Industrial Development in Winona County, Minnesota (1999), which studied county and regional employment, economic and industrial trends and forecasts through 2010.
- The Southern Minnesota Rail Corridor Safety Plan (2000), a comprehensive corridor inventory and assessment of grade crossing characteristics and data.
- The Statewide Multimodal Freight Flows Study (2000), which identified how goods move through Minnesota and identified key corridors for improvements.

Multimodalism Costs and Benefits

Statewide Multimodal Freight Flows Study

Minnesota's economy requires a multimodal approach to freight transportation, focusing on:

- Highways, because trucks move most consumer products and account for the majority of freight movements by value.
- Rail, because the largest share of freight movements by weight, representing the state's major export commodities, are carried by the extensive rail network.
- Waterborne freight, because important bulk shipments of coal, iron ore, and grain move through the state's ports and waterways.
- Air freight, because the highest-value shipments move on airplanes.

Factors facing the successful integration of multimodal freight transportation include:

- The number of trucks on the state's roadways due to the dynamic growth of sectors of the economy, such as high technology, that produce or consume high-value products for which rapid and reliable delivery is a priority.
- Changes in business practices for shippers, manufacturers, and motor carriers are creating a greater reliance on trucking.
- Just-in-time manufacturing and distribution systems and increased emphasis on customer service and e-commerce are having major impacts on carrier operations.
- Competitive pressures facing the rail, water, and air freight modes in the state are shifting some trips, in both the rural areas and the Metro region, to trucks.
- Planning for traffic delays and lower speed is part of a carrier's business practices, but it increases operating costs and lowers profit margins-missing a delivery window outright frequently results in shipper-imposed penalties on the carrier.

Minnesota Statewide Freight Plan

The state of Minnesota currently has too few intermodal terminals. A number of impediments to freight movement in and around the existing terminals have been identified, such as: landside access at ports; lack of international air cargo service; and infringement of residential development near rail terminals. To help improve access to intermodal terminals and reduce demands on roadways to these facilities, the FHWA provides a special status of "intermodal connectors" for primary access roads between large intermodal terminals. Roadways designated as intermodal connectors are eligible for certain highway improvement funding programs.

Winona Intermodal Study

The City of Winona serves as a regional principal transportation center. The importance of the city in relation to transportation is due to: the city's location and access to the Mississippi River, being at the intersection of two major roadways (I-90 and US 61), having access to the national rail system, being home to over 100 diverse manufacturing firms and two nationally recognized universities.

The Mn/DOT, the City of Winona, and the consulting firm of Edwards and Kelcey initiated the Winona Intermodal Study in spring, 2001. The study developed a multimodal planning process designed to analyze the efficiency of intermodal rail, truck, and barge activity into the Port and through the city while identifying strategic transportation improvements that can work in concert with one another.

The study cites Minnesota's Transportation Plan, *Moving Minnesota,* as identifying the following initiatives for implementing its Interregional Corridor Program, to:

- Prioritize and invest in improvements that preserve safety and mobility on these key statewide economic links.
- Integrate state and local transportation investment decisions.
- Integrate state land-use and transportation policy direction; develop land-use controls and ordinances that will guide how traffic will access these key routes.
- Identify and fund access management projects to manage congestion and requests for new traffic signals.

Minnesota Freight Study Recommendations

Statewide Multimodal Freight Flows Study

The results of this study underscore the need to reconcile the public and private infrastructure versus supply chain management, as well as 15-year planning horizons versus 15-minute just-in-time delivery windows.

Recommendations for highway freight:

- Develop major investment strategies and performance standards to facilitate freight movement on the key truck highway corridors.
- Examine the designation of the I-94 corridor as a Corridor of National Significance for funding under the USDOT's Borders and Corridors Program.
- Ensure that the local roadway system can meet the requirements of truck transport, including solving "hot spots" with high levels of congestion or accidents; developing new truck lanes, bypass ramps, staging areas and haul roads; and reassessing the statewide 80,000 pound weight limit.
- Undertake efforts that result in closer coordination between the freight and

highway planning functions of Mn/DOT and the motor carrier regulatory activities of the Office of Motor Carrier Services and the Commercial Vehicle Section of the State Patrol.
- Leverage opportunities for coordination and data exchange in the application of ITS for regulatory and information purposes.
- Pursue the development of more public and private truck rest stops and parking areas on key corridor routes and in congested metropolitan areas.

Recommendations for railroads:
- Continue to intervene in railroad merger cases to ensure that rail service remains and continues to be competitive with other modal options.
- Take steps to maintain a healthy short-line industry including reducing capital costs through loan assistance and encouraging public/private partnerships.
- Identify a strategic rail network and conduct major investment studies on key freight corridors.
- Facilitating or partnering in intermodal terminal development.

Recommendations for air freight:
- Proactively investigate the development of air cargo facilities at second-tier airports around the state, helping to reduce long-haul truck traffic.
- Identify opportunities for large hubbing or consolidation activities that would benefit from avoiding congestion and operating costs.

Recommendations for key corridors:
- Infrastructure investment should focus on the major freight corridors that link the state's economy to other states and nations.
- Increasing safety and efficiency is required to ensure future growth of the state's economy.
- It is critical that the state maintain a dedicated freight planning office, which would facilitate the development of multimodal freight options, focus investment on key corridors, develop public/private partnerships, and strengthen freight planning activities in the Mn/DOT.

Minnesota Statewide Freight Plan

In an effort to integrate freight programs with other transportation planning and investment activities, the Minnesota Statewide Freight Plan recommends the following actions:
- Mn/DOT should coordinate with other agencies to reveal areas where investment programs intersect, yielding complementary funding for specific improvements.
- Look to the private sector freight industry to leverage funds for project-specific improvements.
- To ensure that freight factors are considered in a more consistent and timely manner, a process should be established to allow input on major investment studies, on system plans, and on corridor studies, thus assuring that freight issues are more adequately and systematically addressed.
- Examine whether a freight interest is represented on major guidance and

decision-making committees.

Feasibility of a Shipper Panel to Measure Transportation Services

The study recommends that a pilot project be established in which a privately-run shippers' panel be established to provide a longitudinal perspective on the quality of transportation services experienced by shippers in a particular region of the country. Such a study could:

- Develop benchmark information in terms of how firms currently evaluate transportation carriers.
- Develop conclusions relative to the perceived value (on the part of shippers) of evaluation data from a pooled resource.
- Develop conclusions relative to the ability and willingness of firms to share information as well as participate in such a panel; and develop conclusions relative to how shipper panels should be organized in terms of geographic scope and definition of affinity groups.

Winona Intermodal Study

This study finds that Winona is experiencing traffic congestion and delays within its transportation system, and that the congestion and delays are most severe where transportation modes intersect. If nothing is done to improve the system, congestion in all modes will continue to increase. During the study process, the project team identified the following goals that represent broad ambitions, which will improve Winona's transportation system:

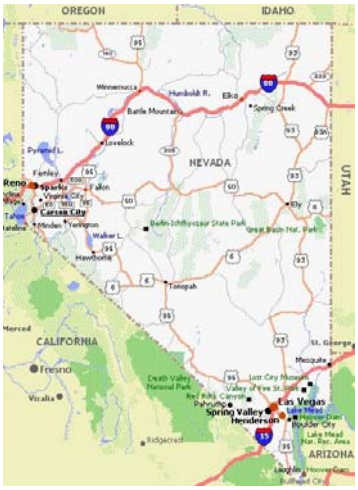
- Relieve congestion and improve traffic flow into and through the city.
- Improve the quality of life for the citizens of Winona.
- Improve safety for the traveling public.

The goals determined a number of measurable objectives which include the following:

- Identify and understand rail, truck, vehicle, and barge transportation issues impacting the Port and City of Winona.
- Understand how the transportation system works in the City of Winona.
- Develop a coordinated multimodal planning process that analyzes the efficiency of intermodal rail, truck and barge activity into the Port of Winona and through the City of Winona.
- Understand existing and future issues seen as most imperative to develop the appropriate infrastructure for the Port and the City of Winona.
- Develop a comprehensive, coordinated plan to guide specific investments in transportation infrastructure.
- Develop a prioritized list of projects designed to improve traffic flow in and through the City of Winona.

Nevada State Case Study of Freight Corridor Development

Overview



This report examines Nevada's freight transportation system and how to best utilize Nevada's freight strengths in the economic development and economic diversification process. The objective of this study is to determine specific transportation actions and performance on the state transportation system and users of the system; to make specific recommendations regarding freight transportation strategies; and to develop a statewide intermodal transportation improvement program tied to national and state legislations, as well as local planning initiatives, and to prepare the goods movement component of the *Statewide Long Range Intermodal Transportation Plan (NEVPLAN).*

Policies

Nevada Statewide Intermodal Goods Movement Study

The Nevada Department of Transportation (NDOT) maintains a transportation planning process, which culminates in its long range plan, *NEVPLAN* and the *State Transportation Improvement Plan (STIP).* An important goal of the study is to better incorporate freight transportation into the statewide transportation planning process.

NEVPLAN

The mission statement of the Nevada Department of Transportation is to:
"Efficiently plan, design, construct, and maintain a safe and effective transportation system for Nevada's economic, environmental, social, and intermodal needs." The state strives to implement this mission through:

- Establishing a comprehensive multimodal transportation planning process that involves all necessary levels of government, the private sector, and the public to develop coordinated transportation plans and implementation strategies to respond to transportation needs, and to develop the state's economy to its full potential.
- Creating a variety of transportation solutions to address the state's rural and urban diversity.
- Economical and efficient use of resources by providing for a variety of ways to travel within existing transportation corridors.
- Reducing air pollution, noise, and hazards to people, disruption to communities, and adverse environmental impacts.
- Determining needs and providing service to those currently underserved by transportation.

Statewide Transportation Improvement Program, 2006-2008

Annually, NDOT develops a STIP. The STIP includes a three-year list of federally funded and regionally significant non-federally funded transportation projects and

programs consistent with the goals and strategies of the statewide transportation plan. Before a project in a non-attainment area can be included in the STIP, it must be found to be in conformance with the State Implementation Plan (SIP). A SIP is an enforceable plan developed at the state level that explains how the state will comply with air quality standards according to the federal Clean Air Act.

The STIP is completed in cooperation with the state's MPOs and local governmental agencies; MPOs are required to develop a Regional Transportation Improvement Program (RTIP) that is consistent with the Regional Transportation Plan. These plans must be multimodal and fiscally constrained.

Data Collection

Nevada Statewide Intermodal Goods Movement Study

Objectives of the study were to:

- Identify the economic impact of the state's freight transportation industry.
- Identify opportunities and strategies for promoting efficient transportation of goods statewide and in metropolitan areas and to evaluate the position of Nevada and its intermodal freight operations at a level consistent with transportation operations nationally and internationally.
- Identify detailed facility/access needs and strategies to ensure the orderly development of a transportation system that provides for efficient movement of goods and information.
- Provide the necessary system detail for the intermodal components of regional corridor and statewide transportation plans, programs, and congestion management systems.
- Prepare the Goods Movement element of the NEVPLAN.

The study conducted an outreach with thirteen regional Economic Development Agencies in the state, recognizing that economic development is intrinsically tied to efficient transportation systems. Efficient transportation systems result in lower transportation costs for shippers. Lower transportation costs result in lower total costs for goods manufactured in the state.

Data collected for this study came from Reebie Associates' TRANSEARCH database. Through data collection efforts, it was determined that 80 percent of *internal* statewide Nevada commodity freight flows were either from Las Vegas or to Las Vegas. External freight flows were also studied and it was determined that Nevada is largely a pass-through state.

The study went on to describe commodity flows passing through the state, for the following three purposes:

- Identify the types of commodities which are currently passing through Nevada and being traded by other US regions, thus identifying the industries for which Nevada may not currently have a comparative advantage, as well as to identify opportunities for potential future development.
- Establish the nature of commodity flows, as in type of commodity and direction of the flow, in order to establish which markets trading through Nevada are producing markets and which are consuming markets.

- Understanding how a commodity is shipped can facilitate better decision making about the transportation system in order to facilitate an efficient logistics network for moving goods through Nevada, in addition to the goods either originating or terminating in the state economy, thus preparing the transportation network.

NEVPLAN

The mission and goals are made in concert with the following related transportation plans and programs: metropolitan area plans; the Regional Transportation Commission of Southern Nevada (RTC); the STIP; the State of Nevada Statewide Rail Plan; Nevada Statewide Intermodal Goods Movement Study; Route Concept Reports; Nevada Aviation System Plan; State Bikeway and Pedestrian Plan; the Nevada State Transit Plan; Conformit-State Implementation Plans; the Statewide Planning Public Participation Plan; Small Urban Transportation Planning Efforts; the State Transportation Board; the Advisory Committee for Transit; the Statewide Transportation Technical Advisory Committee (STTAC); and the Nevada Aviation Technical Advisory Committee.

Statewide Transportation Improvement Program, 2006-2008

Transportation improvement project selection is based on a project evaluation process for selecting projects to be included in the STIP and Annual Work Program, and is delineated through the project submittal application and considerations for Congressionally-earmarked projects.

Other programs considered under the process are: Federal Highway Lands, Congestion Mitigation and Air Quality Program (CMAQ), Interstate Discretionary Programs, Set-Asides for Sound wall and Landscaping Programs, Safety Improvement/Hazard Elimination Programs, State Highway Preservation, Interstate Maintenance Program, Highway Bridge Replacement and Rehabilitation Program, Enhancement Program, Scenic Byways Program, and the Recreational Trails Program.

Multimodalism Costs and Benefits

Nevada Statewide Intermodal Goods Movement Study

According to this study, a multimodal corridor should connect significant endpoints, offer transportation opportunities consisting of more than one mode (i.e., highway, air, and railroad) and carry significant freight volumes. The US Congress designation of High Priority Corridors is relevant to the following corridors in Nevada: the Economic Lifeline Corridor, running through California, Arizona, and Nevada; US 395, Funning north-south through Washington, Oregon, Nevada, and California; and the CANMEX Corridor, running north-south through Montana, Idaho, Utah, Nevada, and Arizona.

There are three types of corridors identified in the plan: major regional corridors, major statewide corridors, and special, mostly local corridors. While corridor designations and studies are substantial and ongoing, the FHWA has begun a major effort to characterize the nature and extent of physical and operational problems of freight connectors and investments made on them. To inform this study, FHWA requested Highway Performance Monitoring System (HPMS) data, including:

descriptions of connectors in terms of urban and rural segments; Average Annual Daily Traffic (AADT) counts; through lanes; ownership; and pavement condition ratings.

Issues identified by truckers were: highway congestion, highway surface conditions, lower than warranted speeds, access problems to truck-rail intermodal facilities, poor access to highways, and truck weight or size restrictions.

Economic Impacts of freight on Nevada economy: The types of economic impact of freight on the Nevada economy have been classified as: direct, indirect, and induced. The study includes an economic analysis of:

- The total economic impact of all trade flows in the state in terms of dollars as well as jobs.
- A breakout of the economic impact of export activity.
- A breakout of the economic impact of import activity, particularly its effect upon the transportation sector.
- An overall analysis of goods movement effects on the transportation sector.

NEVPLAN

A major focus of the NEVPLAN is to establish goals, performance measures, and strategies to guide the planning, development, and preservation of the multimodal transportation system in Nevada. NEVPLAN's six major policy goals are:

- Mobility and accessibility
- Safety
- Environmental
- Efficiency and effectiveness
- Technology
- Economic development-diversification

Mobility and accessibility: In parts of Nevada, transportation mobility and accessibility are becoming constrained. Traffic congestion has emerged as a problem in Nevada's three metropolitan areas. Congestion has caused delay, limited access to key locations, and impeded the ability of travelers to undertake personal travel and to move freight in a timely manner, raising the cost of commuter, passenger, and freight transportation. In rural Nevada, special mobility and accessibility challenges exist. The need to maintain transportation linkages between rural and urban areas is important to the economy, public health and safety, and the social structure of the state.

Safety: The overall operating safety of the transportation system is a major issue and has been heightened with speed limit increases allowed in the NHS legislation. Overall concern for basic public health and safety requires Nevada to continue to monitor and improve transportation safety through all opportunities for residents and visitors.

Environment: Environmental quality can be improved by incorporating appropriate and effective environmental designs and alternative technologies into the transportation system development process. Minimizing environmental impacts and improving air quality in non-attainment areas are aimed at reducing pollution emissions by

encouraging more efficient travel behavior. Environmental health and quality are also affected by the transportation activities required for hazardous materials, including interstate shipment of materials through Nevada. Also, two pollutants of major concern in Nevada for air quality are: carbon monoxide and particulate material.

Efficiency and effectiveness: Economic changes and changes in work and personal travel behavior have led to the recognition that efficient and effective transportation requires greater connectivity between transportation modes. Expanding trade requires the transport of goods by any combination of truck, air, and rail in a short period of time, placing a premium on a transportation system with a high level of intermodal connectivity. Intermodalism is essential to meeting the economic, health, and safety needs of rural Nevada.

Technology: ITS technologies could be used for all types of vehicles and for all parts of the transportation system. NDOT and the state's three MPOs have been aggressive in piloting and implementing ITS applications as part of their management programs. An ongoing effort is to include a Strategic Deployment Plan for I-80 and US Route 395.

Tourism, Economic Development, and Diversification: Tourism is the largest contributor to Nevada's economy with Las Vegas, Reno-Sparks and the Lake Tahoe region. Due to the importance of this economy, it is vital to maintain those transportation systems that bring visitors to the state, and to encourage their return. Rural transportation also plays a central role in the state's tourism industry, connecting visitors to urban areas and key attractions, including state and national parks.

Maintaining the capacity of the entire multimodal infrastructure will require investment. The challenge is to provide the state with maximum flexibility to meet the transportation funding needs for the next 20 years.

Nevada Freight Studies' Recommendations

Nevada Statewide Intermodal Goods Movement Study

The study states that a community which desires to diversify must have certain infrastructure items and certain characteristics, one of which is an efficient transportation system; in fact, without transportation, Nevada would not have an economy.

Nevada's single largest commodity flow weakness is that the state imports more than it exports—on the order of almost two to one, in terms of tons, and the deficit is forecast to continue. The extent to which this deficit represents a weakness rests upon the ability of other sectors of the state's economy to offset it.

Goals and strategies for improving Nevada's goods movement are listed below:

- Maintain state highways on a daily basis to ensure safe, reliable, and pleasant movement of people and goods.
- Support efficient and reliable freight movement on state highways.
- Preserve the highway infrastructure cost effectively to protect the public investment and improve mobility within congested corridors.
- Provide the safest possible highways within available resources.
- Support automation of credentialing and safety enforcement functions.
- Construct new rest areas.

- Implement Intelligent Transportation Systems Commercial Vehicle Operations strategies.
- Apply performance standards appropriate to the movement of freight-on-freight routes.
- Maintain and improve aviation facilities for safe and efficient conditions and refurbish airport facilities when cost effective.
- Provide technical assistance to local agencies for protecting airports threatened by incompatible land uses. Acquire or assist with relocation of essential airports threatened with closure.
- Partner with government agencies for improved access, connectivity, and infrastructure at aviation facilities.
- Ensure adequate mainline freight capacity and safety, and enhance access and capacity to intermodal terminals.
- Preserve and enhance service on branch lines, promote continued service on light density lines, and preserve essential lines threatened by abandonment.
- Preserve rail corridors with statewide significance for future rail proposed by purchase of rights-of-way or provision of loan funds to local jurisdictions to preserve corridors with local significance.
- Continue research and development of technology, facilitating goods movement.
- Implement state and regional transportation information systems.
- Enhance the state's comparative economic advantage with an efficient multimodal system.
- Use a cooperative planning process to develop an effective and efficient transportation system.

NEVPLAN

Mobility and Accessibility Strategies

- Continue to implement the Silver State Mobility Management Programs.
- Complete and implement the Nevada State Transit Plan.
- Complete and implement the Statewide Bicycle Plan and Pedestrian Plan.
- Initiate and update the Nevada State Rail Plan.
- Initiate and update Statewide Aviation Plan.
- Encourage closer integration of transportation and the land-use approval process.
- Follow NDOT's Public Participation Plan.

Safety Strategies

- Improve planning, development, and engineering processes for safe transportation facilities.
- Support the enforcement of transportation-related safety laws and policies; and support transportation public safety education programs.

Environment Strategies

- Support the continued development and application of alternative fuels.
- Avoid and mitigate (as appropriate) the environmental impacts of transportation facilities.
- Designate routes for hazardous materials transportation.

Efficiency and effectiveness strategies:

- Implement and construct the programs and projects contained in the STIP.
- Implement investments needed to maximize linkages between transportation modes.
- Improve the quality and reliability of the state's transportation freight system.
- Work with RTCs to implement transportation demand management strategies to promote ridesharing and carpooling.

Technology strategies:

- Develop and encourage widespread and cost-effective applications of ITS technology.
- Implement and update management systems by incorporating real-time monitoring capabilities as appropriate.

Tourism, Economic Development, and Diversification strategies:

- Ensure appropriate tourist-based transportation systems.
- Focus on projects with greatest return on investment.
- Identify and implement new and innovative funding sources.
- Encourage the design and construction of appropriate visual and natural screening techniques along the state's transportation systems.

The plan calls for investigation of financing through a number of possible funding streams from federal and state sources including programs often overlooked such as the Federal Aviation Administration.

Florida State Case Study of Freight Corridor Development

Overview

A great strength of Florida's Strategic Intermodal System (SIS) Plan is that it seems to be fully integrated into the state's transportation planning strategy. SIS was established in 2003 to enhance Florida's economic competitiveness by focusing limited resources on transportation facilities that are critical to Florida's economy and way of life. SIS represents a network of high-priority transportation facilities, including commercial service airports, spaceport, deepwater seaports, freight rail terminals, passenger rail and intercity bus terminals, rail corridors, waterways and highways.

Policies

The SIS Strategic Plan provides policy direction for implementing SIS and serves as the foundation for a new way of planning and managing Florida's transportation system. Developed by the FDOT in cooperation with 40 statewide transportation partners, regional partners, and local partners the plan:

- Redefines the state's primary role in transportation as focusing on international, interstate, and interregional travel of passengers and goods.
- Advances a multimodal approach to planning to increase mobility for people and freight on complete end-to-end trips. Rather than focusing on individual modes and facilities, state funding will be used to improve connectivity among individual modes, eliminate bottlenecks and delays, improve travel time reliability, and expand the options available for interregional travel.
- Shifts from reactive to proactive planning of future transportation investments.

Key elements of the SIS Strategic Plan, as mandated by law:

- System designation—The Strategic Plan documents objective criteria and thresholds for designating three types of facilities that make up the SIS: (1) hubs, such as airports, seaports and rail terminals that serve as gateways for people and freight; (2) interregional corridors, such as highways, rail lines and waterways that link Florida's economic regions to other regions, states and nations; and (3) intermodal connectors between hubs and corridors. Both SIS and Emerging SIS facilities are of statewide and interregional significance, and Planned Facilities have been designated as well.
- Needs assessment—The SIS Plan identifies a preliminary list of 1,500 potential investment needs, as well as 400 other proposed needs that have been identified by partners. The list of needs will be compiled into a long-term SIS Needs Plan, with FDOT and partners working toward a common economic and transportation demand forecast, consistent performance measures, and refined design and

service standards.

- Prioritization process—The SIS Plan identifies goals, factors and guidelines to assist decision-makers in setting priorities and selecting projects for funding, with emphasis on mobility and economic competitiveness.

Finance strategy—Legislation enacted in 2003 and 2004 identified SIS as the state's top transportation priority and made all SIS and Emerging SIS facilities (including those owned by local governments, independent authorities, and private sector partners) eligible for state funding. FDOT's state investment policy will allocate 75 percent of state discretionary transportation capacity to SIS by 2015.

Data Collection

Needs identification and funding strategies are addressed by a participatory model encompassing multiple transportation modes, MPOs, and private industry. The preliminary list of SIS needs includes information from:

- 2030 Unfunded Needs Plan, including input from the Florida Intrastate Highway System (FIHS) and SIS Highway Components; the second five years of the FIHS Ten-Year plan; and the remaining 15 years of the FIHS Cost Feasibility Plan.
- The Florida Aviation System Plan, which is updated on a continuous basis.
- Needs identified in the 2004/2005 update of the Florida Rail System Plan.
- Seaport Master Plans and information from specific requests on seaport needs provided by the Florida Seaport Trade and Economic Development (FSTED) Council.
- Other identified needs on SIS connectors drawn from MPO plans and other partner plans.
- Other needs on SIS hubs and corridors identified by FDOT's partners.

FDOT and its partners will use the preliminary SIS needs list and the list of other proposed needs as a starting point for the development of a comprehensive SIS Needs Plan. The SIS Needs Plan will encompass:

- Improvements that benefit both passenger and freight movement in all modes.
- Improvements on all types of facilities, including added capacity, safety and security enhancements, major preservation activities, and operational improvements that incorporate new and existing technologies and management strategies.
- Investments that are driven primarily by economic competitiveness and economic development needs.
- Investment needs on all SIS and Emerging SIS facilities.
- Recommendations for investments in new transportation facilities, or for new uses of existing facilities.

Multimodalism Costs and Benefits

Why does Florida need a strategic intermodal system? The SIS will help Florida respond to several key trends that are shaping the state's economy and use of the transportation system. Among those trends are:

- **Strong population and economic growth.** Florida's population and economy is one of the fastest- growing in the US. Between 2000 and 2020, Florida is expected to add an additional 5.8 million residents.
- **Shift toward regional economic centers.** The focal point of economic activity is shifting from individual cities and towns to economic regions. More than 84 percent of Florida's total state population was located within urbanized areas in 2000, compared with 79 percent in 1990.
- **Lagging economic performance of rural areas.** Large portions of Florida are rural in nature and have trailed the rest of the state in economic performance. 28 counties and five communities in Northwest Florida, North Central Florida, and the Heartland have chronically high unemployment and poverty rates. Better access to markets is a critical element of economic development opportunities in these rural areas.
- **Shift toward service and information industries**. Florida's economy is rapidly evolving: traditional industries such as real estate, tourism, services to retirees, and resource-oriented businesses such as citrus and phosphates remain strong; however, there is also rapid growth in microelectronics, biosciences, and professional services.
- **Continued concerns about growth management and environmental quality**. Rapid expansion in Florida's urbanized areas has consumed farmland and open space and has depleted supplies of fresh water and other natural resources. Development and the associated congestion, if left unchecked, threaten Florida's biodiversity, community fabric, and economic competitiveness.

In sum, Florida's transportation partners must adopt new solutions to address these trends or risk deterioration of the state's economy and way of life. Traditional approaches focusing on single modes will not be able to keep up with the state's transportation demands. Traffic delay currently costs the average motorist in Florida's eight largest cities about $500 per year in lost time and fuel. For trucking companies, the cost of delay exceeds $1 per minute.

Florida Freight Studies' Recommendations

Implementation of SIS began in 2004 with the identification and funding of 36 projects on SIS connectors totaling $100 million. Over the next few years, FDOT will work with all of its partners to fully implement the SIS Strategic Plan by:

- Developing the SIS Needs Plan and the SIS Cost-Feasibility Plan.
- Developing a detailed finance strategy that focuses on a better definition of opportunities for joint public/private projects.
- Strengthening the linkages between the SIS Strategic Plan and Florida's Strategic Plan for Economic Development.
- Supporting changes to the state's growth management framework such as those that reflect the state's primary transportation interest in the SIS.
- Strengthening coordination with all partners, particularly those in the private sector.

Projected transportation funding from all sources—federal, state, local and private—will not be sufficient to pay for needed improvements; the funding deficit is estimated to be more than $50 billion through the year 2020. Because resources are limited, all transportation partners must work together to make strategic choices and explore new ways of funding major transportation improvements.

Five State Case Studies and Application to New Mexico

The *Five State Case Studies* illustrate several factors to consider for establishing freight corridors for rail and truck across New Mexico and assist in gaining an understanding of multimodal planning for the freight industry. ATRI also developed a set of summary comments for each state case study, which serves to bring other states' freight corridor planning development into New Mexico applications. These comments have served as a foundation for ATRI's recommendations for the Research Bureau.

All-in-all, freight studies are beneficial and contribute vastly to the overall multimodal planning aspects of a state, but as demonstrated by the cases, these freight corridor studies can require extensive data collection and specialized economic and cost analysis. However, there are certain **factors** that are uniform throughout the case studies and which NM DOT would want to consider in implementing truck or rail freight corridors. Those factors are discussed below along with ATRI's comments. Utilizing these factors will provide a backdrop and guidance tools for NM DOT to begin to incorporate a freight corridor strategy into the *2025 Multimodal Plan* and the *State Transportation Improvement Program (STIP*). As other states have shown, it is best to utilize existing freight infrastructure and to integrate a coherent policy, planning strategy, data collection, multimodal modeling, and forecast information to meet freight projections and future freight operations.

In the five state matrixes, there are several uniform **factors** along with a quality of congruence in the process of freight corridor planning that begins with *policy development.* In developing policy, states sought to create policies at state, regional, and local levels that were interlinked for support and balance between transportation systems,

users, and government entities. Once effective policies were in place, states employed *data collection* methods to determine needs and how to proceed in developing their freight plans. Data collection typically employed a variety of methods including: commercially available *Transearch* data, state-collected freight flow data, trucker surveys, and local-level town hall meetings to obtain a more in-depth and democratic look at what stakeholders of various economic and educational strata were thinking.

The next aspect in effective freight corridor planning is a *cost/benefit analysis*. Costs and benefits were measured in terms of wear and tear on roadways, services available to truckers, and the social costs of congestion such as lost time, increased pollution, motorist satisfaction, social impact on populations residing near transportation facilities, and environmental impact on wildlife. These costs, which were calculated in actual dollars of economic impact on affected areas, were measured against the material costs in infrastructure that would be required to develop true multimodal systems that would include interregional corridors, connectors, and hubs.

Additionally, states developed *recommendations,* including innovative funding proposals they would follow as effects of their plans became apparent. In each of the plans, there is an element of continuous feedback and refinement. Many states have a long-range plan and a yearly plan. As results of actions become apparent, states modify their short-range plan and periodically adjust their long-range plan. Long-range plans range from twenty years, which is typical, to fifty years in the Trans-Texas plan, which holds the record for longest-range plan in history.

New Mexico should take note that all state cases make the initial policy determination that both rail and truck freight will take on the multimodal aspects of their

state infrastructure including transit, air and personal auto. The summaries that follow provide ATRI's comments for each of the Five State Case Studies which may be applicable to NM DOT's freight corridor planning and development activities.

Oregon Study Factors

Policy Considerations

Rail: Investigating the further development of freight rail seems to be the most forward-thinking aspect of the Oregon plan.

Congestion: Congestion along the I-5 Corridor translates to a great deal of loss in terms of time, safety, and the environment. Enhancing the freight system seems to be the only viable option for reducing highway congestion.

Data Collection

Data collection techniques include a great deal of time developing and implementing **trucker surveys** where the highest level of response comes from direct face-to-face surveys. Using a service organization, such as a commercial vehicle association, to conduct the surveys seems to be a good way of keeping costs down and getting information more efficiently.

Recommendations on Funding

Funding for Freight Improvement Infrastructure: Oregon has funded infrastructure improvement projects through lottery revenues—an innovative way to provide more money. The state, rather than just trying to build to meet current demands, seems to be taking a longer view by building ahead and increasing opportunities for increasing revenues.

Texas Study Factors

Policy Considerations

The Trans-Texas Corridor Study is an extraordinary endeavor that may prove to be the most safe, efficient and reliable transportation to those who use it. However, there are policy lessons learned which encompass (1) environmental impacts to natural resources and wildlife and the wisdom of creating such a massive transportation corridor, (2) the width of the corridor and its economic impact to communities bordering it, (3) and broad-scale privatization issues, such as who will have access to roads controlled by private industry.

The study on *The Effect of NAFTA on the Texas Highway System* is a comprehensive study to determine the social and economic costs related to the North American Free Trade Agreement, both positive and negative. It is a very good planning tool and helped to shape the overall policies for Texas freight planning scenarios. As a border state, New Mexico can take note of findings and recommendations particularly since NAFTA has deregulated many freight movements and not unlike Texas, New Mexico should find which freight movements could prove beneficial or detrimental in the long term.

Data Collection

The *Ports-to-Plains Trade Corridor* initiative employs a data collection method that carries with it an appropriate transportation planning for communities within a corridor that represents a broad range of educational and expertise levels. By conducting focus groups and similar data collection activities, diverse transportation stakeholders can give voice to their ideas and concerns. Principles of context sensitive solutions (CSS) were

used to understand the economic and social conditions of the communities involved and build-to-scale philosophy in promoting economic development along the corridor.

Innovative Design Recommendations

An equally interesting concept from Texas is the proposed *Interport* to be built in the Lubbock area. Although the word probably actually defines an intermodal hub, *Interport* implies a forward-thinking view toward freight movement between air and surface freight.

Minnesota Study Factors

Policy Considerations

Minnesota freight experience provides some leads on how to approach freight needs in New Mexico. Such an example is the use of focus groups to explore the feasibility of developing a shippers' panel to continually evaluate the quality and efficiency of freight transportation which was quite informative to Minnesota. New Mexico may also want to consider methods used in the Winona Intermodal Study for developing broad-scale integration of existing systems, policies, land-use, investment, and economic decision-making.

Data Collection

New Mexico could explore the usefulness of adopting the practice of using Passenger Vehicle Equivalency (PVE) to measure the impact of long-haul trucking on the state's highway system.

Funding Recommendations

Should New Mexico choose to have its highways obtain a designation as a Corridor of National Significance, this may open possibilities for funding under the US DOT's Borders and Corridors Program. Minnesota studies illustrate how NM DOT could explore how its roadways would qualify under FHWA guidelines as "intermodal connectors."

Nevada Study Factors

Policy Considerations

The Nevada Statewide Intermodal Goods Movement Study provides a definition of a multimodal corridor using certain criteria to determine which roadways qualify. Nevada also has definitions for different types of corridors and their use within the state and this has proven helpful in multimodal transportation planning. Nevada has planned its freight issues around being a pass-through state. This is an issue parallel between Nevada and New Mexico including having one or two major economic urban centers. Taking a broad view of the economic impact of freight on the state in terms of employment, economic development activities, manufacturing potential, and infrastructure could help to create a quantifiable view of the effect of freight trade on the New Mexico economy. Also, determining the imbalance between imports and exports could help to illuminate a beginning point for freight corridor planning. Expanding potential for air cargo service by building infrastructure and implementing any necessary policy changes are critical moves in capturing the fastest growing segment of the freight system. Equally critical is endeavoring to maintain and improve existing infrastructure, particularly rail lines that

may be in danger of abandonment. Nevada has shown that an essential element to their freight planning is working to keep transportation planning broad and encompassing through soliciting input from a range of stakeholders.

The NEVPLAN examines the feasibility of integrating the input of a wide variety of planning committees into its development and implementation. The plan creates "action strategies" that are responsive to the various planning entities. Nevada seems to have a policy of "leave no stone unturned" in terms of securing funding to implement various freight strategies.

The Intermodal Freight Plan for Nevada shows evidence of Nevada's effort to create a seamless and comprehensive freight delivery system.

Florida Study Factors

Policy Considerations

More than other states reviewed, Florida takes a perspective toward economic development in its freight corridor planning. Other factors such as mobility, accessibility, safety and the environment are secondary to Florida's emphasis on doing with freight what is best for the Florida economy.

Designation of systems, i.e., ***hubs, corridors,*** and ***intermodal connectors*** represent a different method of categorization than, for example, truck, rail, and air cargo. Florida's emphasis on systems creates an environment for varied transportation interests and funding sources to work together to accomplish more holistic transportation solutions.

Data Collection

The element of consensus-building that is inherent in having a larger diverse group of planning partners creates a check and balance system against the potential for abuse. Florida's attention to the economic concerns of rural communities is crucial and the transportation freight studies take into consideration that 16 percent of the state's population lives in rural communities and access to market areas is critical to the alleviation of poverty.

As for the data collection done by Florida to support its freight efforts, long-range plans are continually revisited and updated and seems to be a workable joining of meeting the sometimes opposing requirements of long-range planning and being continually responsive to issues that arise on an ongoing basis.

Funding Recommendations

The state's finance strategy of creating a system where local governments, independent authorities, and private sector partners are eligible for state transportation funding dollars creates a more competitive market for transportation interests. Florida believes that such a strategy could build a new level of competence and responsibility into the freight transportation planning process thereby reducing costs and making funding available in other areas.

RECOMMENDATIONS

New Mexico has a lack of outbound freight both in rail and commercial vehicles not unlike other states like Nevada which have devoted much of their freight (rail, truck, air) planning to economic solutions to attract freight as a Nevada destination versus a "pass through" state currently. Should New Mexico choose to move forward with truck and rail freight corridor designations, a look at the *Five State Case Studies* in this report will illustrate how other states began their policy development, data collection, economic and cost benefit analysis. Most states chose to develop long term policies and strategies that would attract freight related businesses and consider the social and community implications. ATRI makes the following recommendations for NM DOT's consideration in rail and truck freight planning and implementation strategies.

- **Create a freight office and dedicated freight coordinator position** and staff within NM DOT. The office would: (1) serve as a single point of contact for commercial vehicle and rail freight stakeholder issues in the state; (2) provide expertise in cross modal transportation issues; (3) provide technical modeling, data collection, and analysis to support freight rail and truck freight planning; and (4) set truck and rail freight vision in the state. One area where the office can serve as a national conduit would be to e**stablish an affiliate membership** with the Freight Stakeholders National Network, a coalition of freight carriers and shippers formed to improve freight transportation in our cities.

- **Create a Freight Rail/Truck Advisory Committee (FAC)** made of private sector and public sector stakeholders of truck and rail freight in New Mexico. A FRAC could provide valuable input into the NM DOT's multimodal long range

and strategic plans. A **FAC would provide freight rail advise on multimodal planning activities,** give professional knowledge and resources from the private sector on transportation planning efforts, advise on short-term improvements, conduct/assist in large-scale corridor studies, work on specific projects, and collect data or assist in modeling efforts. Freight advisory groups can often provide valuable information on bottlenecks or other inefficiencies in the freight network which can be relatively easily remedied. Brainstorming and prioritizing sessions can often identify lists of cost-effective efforts which can be implemented and provide benefits for the freight community and its customers. When such improvements are implemented, the local planning entity generates a positive track record which encourages the private sector to continue participating in public-private planning efforts. The FAC would have a collaborative and action-oriented focus.

- **Expand** the rail and truck freight transportation component in the *2025 Multimodal Plan* by developing **freight-related performance measures** including the economic impact of freight to the state's economy.
- Address **freight planning at the MPO and RPO levels in collaboration with NM DOT's** *2025 Multimodal Plan* and related rail and freight implementation strategies and provide for public local input to recommended activities and long-range plans.
- Explore the possibility of air freight hubs, or as the term is used in Florida ***hubs, corridors,*** and ***intermodal connectors*** or develop the **definition of an *"Interport"*** as used in Texas. The Santa Teresa Airport and Double Eagle near Albuquerque

could support both the expansion of freight rail and commercial vehicle transportation.

- **Direct modeling efforts** for rail and truck freight transportation planning and collect supportive data from freight carriers and shippers as well as from the industry that supports this transportation. Freight data is necessary to understand current flows and prospective freight transportation increases as well as to plan for future changes needed in funding and infrastructure.
- **Collect "issue-based" data** to support the use of performance measures in freight planning. Develop methods and tools to quantify public benefits of freight improvement projects.
- Gather data through private sector surveys and from public sector agencies for rail and truck freight forecasting methods.
- **Inventory the state's freight transportation infrastructure** and freight flows by commodity and mode, and create an ongoing database of the inventory to keep current state data and to allow for an overall understanding of the state's current freight transportation system.
- **Perform an analysis of legal and regulatory rules,** statutes and authorities at the state level which pertain to rail and trucking operations. Because different state agencies are involved in either regulatory or planning oversight for rail and trucks in New Mexico, a legal analysis of agency oversight should be updated. This is particularly important in view of new 9/11 security issues which have been mandated for rail, air, and truck freight service.
- Host an **annual rail and truck freight peer review workshop** which will allow

the State to take a proactive role in all future rail actions with both public and private sector involvement. National issues can be identified as well as regional and statewide elements. This will allow for identification of interested parties and their roles, provide an opportunity to demonstrate new technologies, and give a forum for new security issues as applied to freight and passenger rail and for development of intermodal facilities.

- **Develop a Technology-ITS Plan** for supporting work in commercial vehicle and rail freight and development of freight corridors to be included in the *2025 Multimodal Plan.*
- **Develop regional based intermodal facilities** that will assist the local transportation and economic development for that region of the state and include rail, truck and air as appropriate.

APPENDIX A: STATE DOTs AND REGIONAL COALITIONS

State DOTs and Regional Coalitions: Alabama, Arizona, California, Florida, Louisiana, Mississippi, New Mexico DOTs, FHWA

Source Document: The National I-10 Freight Corridor Study, 2003	
Why designate freight corridors?	Purpose of the I-10 Freight Corridor Study (I-10 Study) is to provide the eight state DOTs (CA, AZ, NM, TX, LA, MS, AL, and FL) with options for accommodating traffic growth, namely to assess the importance of freight moving on Interstate-10 to the economies of the affected states and the nation; to identify current and future traffic operations and safety problems; and to identify and evaluate strategies needed to facilitate freight flow within the Corridor (p. 1).
Analysis framework for the designation of freight corridors:	The DOTs in the eight states came together as partners to conduct a comprehensive evaluation of the entire corridor system. Freight travel along the Corridor is expected to **increase significantly by 2025**, with growth in **truck travel outpacing automotive travel by a factor of nearly 2 to 1** (p. 3).
What is the effect of border trade on freight corridors?	Not addressed in this document.
How well integrated are freight corridors into the overall plan?	Truck/auto separation has been proposed as a viable alternative to mixed-use travel, in response to congestion, productivity, and safety concerns. Economic security is a potential payoff for all-truck facilities. Separating commercial vehicles and autos allows for the use of technologies and vehicles that are less feasible on mixed-use facilities. Separated facilities might include: **dedicated lanes, dedicated facilities, dedicated technology**, and **modal alternatives** (p. 16).
What are the public safety concerns?	Not addressed in this document.
What are the multimodal considerations?	Strategic scenarios developed to examine freight-oriented alternatives include: Widen I-10 as much as needed; deploy **ITS** Technologies along the corridor; separate truck traffic from automotive traffic; rail intermodal; waterway intermodal; urban truck bypass; truck productivity; freight villages; etc (p. 10).

Source Document: The National I-10 Freight Corridor Study, 2003	
Cost Analysis:	As the level of congestion increases, travel speeds decrease, translating to significant delay for freight and passengers. Possible **227.5 million annual truck hours** of delay, at an annual cost of **$5.69 billion** (p. 7).
Economic Analysis:	Inter-regional trade, between the I-10 Corridor region and the rest of the US generates significant economic benefits in terms of jobs, earnings, and economic input. Improvement scenarios provide travel time and vehicle operating cost savings data used as inputs to estimate the total economic impact of the I-10 improvement scenarios (pp. 29, 30).
Performance Measures:	Base Case conditions measured for years 2000, 2008, 2013, and 2025. If no improvements made, measures include: capacity deficiency, deficient Levels of Service, truck and car speeds, and number of lanes needed (p. 5).
Data Collection:	The Study focuses on the development of three analyses**: base conditions** along the Corridor, **analysis of freight-oriented alternatives,** and **strategies forward**: Developing a **Comprehensive Freight Congestion Management Approach (CFCMA)** (p. 5).
Intelligent Transportation Systems Technologies:	Proposed **ITS** for freight management along Corridor include: Highway Advisory Radio (HAR), Dynamic Message Signs (DMS), Closed Circuit TV (CCTV), Vehicle Detection and Fog Detection Systems, Port information technologies, Road Weather Information Systems (RWIS), Research in-vehicle technologies, Speed Warning Systems at critical locations, etc. (p. 13).

State DOTs and Regional Coalitions: Chicago Public Transit Authority

Source Document:	**Commuter Rail, Freight Railroads, and the Debate on Open Access, Regional Transportation Authority, Metropolitan Conference on Public Transportation Research, Chicago, 2000.**
Why designate freight corridors?	The US commuter rail industry is inextricably linked to that of the freight railroads. As a result of recent mergers and associated operating issues, some shipper interests are seeking fundamental change in the organization of freight railroading. (abstract)
Analysis framework for the designation of freight corridors:	Freight railroads are experiencing a capacity shortage for the first time since World War II. Wherever commuter trains are operating on busy freight lines, commuters are feeling the effects. (Introduction)
What is the effect of border trade on freight corridors?	Not addressed in this document.
How well integrated are freight corridors into the overall plan?	Open access is expected to lead to greater volatility in freight scheduling, as bulk shippers would change service providers to maximize their commercial advantage. With freight railroads already at capacity in several metropolitan areas, open access would probably exacerbate capacity problems. If the US moves towards open access, commuter railroads should ensure that operating rights are preserved, especially during rush hours. (abstract)
What are the public safety concerns?	Not addressed in this document.
What are the multimodal considerations?	An open access concept is being introduced in which railroads would be required to accommodate competing carriers, particularly in instances where lines were found to be monopolizing strategic geographic positions but offering inadequate service (p. 4). Although freight is most affected by open access, commuter railroads should be concerned because the future of rail passenger service is coupled to the railroad industry as a whole (p. 5). Unlike highway and water modes, track paths must be allocated in advance. An extreme example can be found in Great Britain's open access regime in which three planning iterations are required 15 months in advance of proposed timetable changes (p. 7).
Cost Analysis:	Where railroads saw commuter trains as welcome sources of revenue in the 1980s, they are now viewing them as potentially costly causes of delay for time-sensitive freight. Congestion caused by both commuter and freight rail traffic may result in opportunities being lost for freight, and is having an effect on investment priorities for arranging trackage rights (p. 4). Political pressure may lead states and regions to invest in additional track capacity in return for guaranteed, long-term rights to operate commuter trains. Sharing the costs of providing capacity can help commuter rail agencies develop positive, win-win relationships with the congested freight railroads whose track they use (p. 11).

Source Document:	**Commuter Rail, Freight Railroads, and the Debate on Open Access, Regional Transportation Authority, Metropolitan Conference on Public Transportation Research, Chicago, 2000.**
Economic Analysis:	Metra (Public Transit Authority, Chicago) is exploring the possibility of new services, as sustained economic growth is also causing a sustained increase in commuting throughout "Chicagoland" (p. 11).
Performance Measures:	The most commonly used performance measure for rail transport is on time service in which a train must arrive within five minutes of its scheduled arrival at its destination. Percentages of on time service cited in the study ranged from 80% to 97% (p. 8).
Data Collection:	Anecdotal data were used from a variety of railways serving the Northeast and Midwest regions of the US.
Intelligent Transportation Systems Technologies:	Not addressed in this document.

State DOTs and Regional Coalitions: Ports-to-Plains Trade Corridor, 2005

Source Document: Ports-to-Plains Trade Corridor, 2005	
Why designate freight corridors?	The Ports-to-Plains (PTP) Trade Corridor is a joint effort by four state DOTs, including Colorado, Texas, Oklahoma, and New Mexico. The purpose for developing the Corridor is to create a Development and Management plan for the PTP Corridor which will serve as a tool for securing federal funding for corridor development (p. 1, Focus).
Analysis framework for the designation of freight corridors:	The study addresses existing/future truck traffic, accident history, pavement condition, multimodal connection, system connection, total future traffic, travel time savings, cost/vehicle mile, and route capacity (p. 2, Focus).
What is the effect of border trade on freight corridors?	PTP features the Multistate International Corridor Development Program, the purpose of which is to develop international trade corridors to facilitate the movement of freight from international ports of entry and inland ports through and to the interior of the United States. Selection criteria for the project include: having significant levels of increases in truck and traffic volume relating to international freight movement; connecting to at least one international terminus or inland port; traversing at least three states; and being identified as a Federal High Priority Corridor (p. 5, Focus).
How well integrated are freight corridors into the overall plan?	The project depends heavily on approval by Congress and particularly on the Senate Environmental and Public Works (EPW) Committee. Involved in the planning for PTP are the House's National Corridor Infrastructure Improvement Program (NCIIP) and the Coordinated Border Infrastructure Program (CBIP). Additionally, the EPW approved the Multistate Corridor Program and the Border Planning, Operations, Technology, and Capacity Program. PTP proposes to access funding from all of these federal sources for combined funding of $720 million, or $140 million per year (p. 4, Focus).

Source Document: Ports-to-Plains Trade Corridor, 2005	
What are the public safety concerns?	One initiative of the project is the High Risk Rural Road Safety Improvement Program. Much of the proposed corridor transects rural areas, and for the purposes of the project, a "high risk rural road" is any roadway functionally classified as a rural major collector or a rural local road on which the accident rate for fatalities and incapacitating injuries exceeds the statewide average for these functional classes of roadway; or which will likely have increases in traffic volume that are likely to create an accident rate for fatalities and incapacitating injuries that exceeds the statewide average for these functional classes of roadway (p. 4, Focus).
What are the multimodal considerations?	An aspect of the PTP is the Freight Intermodal Connections Program, which would establish a freight transportation gateways program to improve productivity, security, and safety, while mitigating congestion and community impacts in the area of the gateways. Purposes of the program are to facilitate and support multimodal freight transportation initiatives at the state and local levels in order to improve freight transportation gateways and mitigate the impact of congestion on the environment; to provide capital funding to address infrastructure and freight operational needs at freight transportation gateways; to facilitate access to intermodal freight transfer facilities; and to increase economic efficiency by facilitating movement of goods (p. 5, Focus).
Cost Analysis:	Not addressed in this document.
Economic Analysis:	Economic benefits would take three different courses should the PTP corridor be fully implemented, in response to three different types of communities along the corridor. The communities described along the corridor are: the smallest communities, which tend to have farm-based economies, with wages on the low end of the scale by income on the higher end; manufacturing communities, which tend to be small to mid-size communities; and larger, urban areas, which tend to have higher wages and income and high concentrations of services and transportation employment. Services and transportation-related employment will be important in generating well-paying professional opportunities along the corridor that will keep and attract people (p. 3, Economic Development).
Performance Measures:	Not addressed in this document.

Source Document: Ports-to-Plains Trade Corridor, 2005	
Data Collection:	Commonwealth Consulting Corporation conducted an economic development research project supporting PTP. It was determined through the study that: communities along the corridor are relatively small, income and wages are well below the US average in most communities, and employment in the corridor is more farm and transportation-oriented than manufacturing and services oriented. Additionally, most communities along the corridor have limited labor pools, with small populations and low unemployment. Many locations along the corridor would like to increase jobs in order to keep people in their communities (pp. 2, 3 Economic Development).
Intelligent Transportation Systems Technologies:	ITS applications are being considered for a variety of purposes in conjunction with the PTP plan, including: improvements to existing systems; improved procedures by government agencies; new agreements among government agencies; projects funded by other private/public organizations; applications that are consistent with national ITS architecture; automated truck inspections, fleet permitting and registrations; reduced emergency response time; traveler information; weather reports; construction reports; other hazard notification; reduction of delay at traffic signals and generally improved safety; and agreements for sharing data among agencies; (pp. 2, 3, Focus)

State DOTs and Regional Coalitions: Florida

Source Document: Florida Intermodal Statewide Highway Freight Model, 2000	
Why designate freight corridors?	Freight forecasting is a relatively new area of expertise in the development of travel demand. The evaluation focuses on techniques, as well as the advantages and disadvantages for model development, application, and forecasting purposes (p. 1). The data illustrate the locations of major freight flows, which are valuable for future infrastructure and land use planning. Considered in the rationale for the development of freight corridors were: the differentiation between interregional and intraregional freight flows; the identification of key commodities, modal shares, key commodities by mode, key trade corridors by mode; and calculation of the commodity flows for through-trips (pp. 8-10).
Analysis framework for the designation of freight corridors:	To evaluate existing freight forecasting models throughout Florida and the US that may be relevant to the development of the Florida Intermodal Statewide Freight Model (FISFM). The evaluation will assess the range of available techniques used in freight forecasting, focusing on statewide modeling efforts, and including certain relevant urban area modeling techniques (p. 1).
What is the effect of border trade on freight corridors?	Not addressed in this document.
How well integrated are freight corridors into the overall plan?	Trip generation, distribution, and mode choice procedures were developed to operate within the Florida Standard Urban Transportation Model Structure (FSUTMS) framework, using FSUTMS naming conventions and scripting protocols. The report proposed a detailed understanding of the relationship of the proposed freight model to existing FSUTMS truck modeling and the freight forecasting needs of planners (p. 18).
What are the public safety concerns?	Assignment of truck trips was considered in relation to the larger highway usage environment. Included were preloading truck trips based on all-or-nothing highway times, assigning truck trips based on congested general traffic times; or assigning truck traffic jointly with general traffic in order to identify the most appropriate assignment procedure. A recommendation concerning the desirability of converting truck trips into passenger car equivalents was an output of this study (pp. 7, 17).

Source Document: Florida Intermodal Statewide Highway Freight Model, 2000	
What are the multimodal considerations?	During this planning phase, FDOT was in the process of developing a statewide intermodal systems plan focusing on analyzing historical trends and addressing policy issues. The Freight Stakeholder Task Force's action plan was to be incorporated into the plan upon completion in January, 2000. The study also proposes to institute an ongoing intermodal planning process. Included in the intermodal plan is the Florida Seaport Transportation and Economic Development Council, which comprises 14 port directors, FDOT, and the Governor's office (p. 21).
Cost Analysis:	Not addressed in this document.
Economic Analysis:	Based on commodity flows, the study proposes to evaluate the utility of using population and employment forecasts, of input-output economic analysis, or of economic forecasting tools as indicators of commodity growth (pp. 8-10, 12).
Performance Measures:	Performance measures consist of: testing each component of the model using the required forecasting variables for the base year; observing outputs of each component of the model to ensure that model projections are reasonable; and refining model specification until projections replicate observed conditions. Additionally, the model will be tested using future forecast year to ensure that model forecasts appear reasonable (p. 17).
Data Collection:	Data for the FISFM was collected from a variety of sources, including: the Southeast Florida Regional Travel Characteristics Survey of Trucks; the Tampa Bay Goods Movement Survey; the Atlanta Area Commercial Vehicle Survey; Commodity Flow Survey for Metro and the Port of Portland; FDOT's Telemetry Count System; Florida roadside origin/destination surveys; Reebie Associates' commodity flow database; US Bureau of Economic Analysis commodity flow information (CFS); Travel Inventory and Use Survey (TIUS); freight-related classification codes; and freight volumes at key intermodal transfer points (p. 4).
Intelligent Transportation Systems Technologies:	At the time of this report, a system of GIS tools for storing, retrieving, processing, and graphically displaying data was still needed. A goal of the study was to identify GIS tools that could be used to exchange information with existing databases such as the Roadway Characteristics Inventory (RCI) and the Florida Intrastate Highway System (FIHS) Decisions Support System (pp.7, 8).

State DOTs and Regional Coalitions: Maine

Source Document:	**Maine Integrated Freight Plan, Final Report, Maine Department of Transportation, 2002**
Why designate freight corridors?	The Maine Department of Transportation (MDOT) recognizes the important role played by freight transportation in the management and growth of its region's overall transportation infrastructure, and in the promotion of Maine's economic vitality (Ch. 2, p. 24).
Analysis framework for the designation of freight corridors:	The study recommends that MDOT consider trade corridors during freight planning efforts. To do so would require the collection of detailed origin-destination data, through intercept surveys along major trade routes or through the purchase of Reebie TRANSEARCH origin-destination data for freight movements into, out of, and within the State (Ch. 2, p. 22).
What is the effect of border trade on freight corridors?	Fourteen percent of respondents to a survey conducted by MDOT cited customs and border crossing delays as having a major impact on their ability to efficiently export goods to Canada. Among issues noted were the amount of paperwork, tariffs, and fees required by Canadian Customs, which contributed to shipment delays and higher transportation costs. Also cited was the lack of a customs clearance facility at the border crossing in Auburn (Ch. 4, p. 40).
How well integrated are freight corridors into the overall plan?	Prior to 1996, MDOT maintained individual modal divisions for water, rail, highway, mass transit, and air transportation. However, in the spring of 1996, the modal divisions were dissolved, and planning and programming responsibilities were divided between the newly formed Office of Freight Transportation (OFT) and Office of Passenger Transportation (OPT). The OFT was charged with developing a free-flowing intermodal freight network that would offer greater choices among modes, increased productivity, environmental benefits, and reduced transportation costs (Ch. 2, p. 25).
What are the public safety concerns?	Surveys also were conducted among 17 municipalities in Maine, and local stakeholders cited such safety issues as truck traffic being routed through main streets causing congestion and safety concerns and the lack of paved shoulders along highways, which created safety issues for pedestrians and bicyclists (Ch. 4, p. 41).
What are the multimodal considerations?	Under consideration is the development of a strategy to improve intermodal access to the port of Eastport. In this strategy, MDOT would assemble a focus group of shippers, carriers, railroads, members of the Eastport Port Authority, and other local stakeholders (Ch. 2, p. 21).

Source Document:	Maine Integrated Freight Plan, Final Report, Maine Department of Transportation, 2002
Cost Analysis:	MDOT needs for improving freight movement in the state: training, education and information efforts; operations of MDOT or other public agencies; projects with local emphasis; statewide construction projects; and institutional issues. Public-private partnerships are encouraged for the implementation of the recommendations (p. A-99)
Economic Analysis:	The Maine economy is growing at a slower pace than the nation as a whole, but expects to continue to maintain a positive economic position relevant to the region, nation, and international economy. Continued economic prosperity and growth will depend on Maine's ability to maintain and improve its transportation infrastructure (p. ES-10).
Performance Measures:	To improve efficiency and speed, several types of performance were considered including: backhauls, roadway conditions, size and weight limits, availability and performance of rail service, availability of rest areas, and customs and border crossings (Ch. 4, p. 40).
Data Collection:	Maine's freight profile is based on an extensive data collection effort, including a review of existing data, the purchase of county-level commodity flow data, mail-out surveys to selected manufacturers and municipality representatives, and the conduction of three focus groups (p. ES-9).
Intelligent Transportation Systems Technologies:	One recommendation of Maine's Integrated Freight Plan is to develop two-way communication protocol on the Maine Office of Transportation website. The study suggests a more formal communications protocol through the development of an electronic dialog feature, which would allow website users to provide feedback, ask specific questions, and generate discussion among MDOT personnel and other users (Ch. 2, p. 20). The study also recommends the use of internet-based technologies to improve freight efficiency through: management of empty backhauls; truck permitting for oversize and overweight vehicles; perhaps even providing load-match information (Ch. 2, p. 22). Additional ITS technologies could include: the use of weigh-in-motion (WIM) technology to replace traditional commercial vehicle weight stations; the use of laptops by inspection personnel to facilitate processing of inspection reports; the development of an automated oversize/overweight routing and permitting program; and the integration of existing traveler information systems that provide traffic flow information with information systems in use at ports and

Source Document:	Maine Integrated Freight Plan, Final Report, Maine Department of Transportation, 2002
	intermodal facilities that can provide information on vessel arrival and container availability (Ch. 2, p. 23).

State DOTs and Regional Coalitions: Minnesota

Source Document: Feasibility of a Shipper Panel to Measure Transportation Services, 2003-04 (Minnesota Department of Transportation)	
Why designate freight corridors?	Not addressed in this document.
Analysis framework for the designation of freight corridors:	This project examines the feasibility of establishing a standing panel of shippers who would contribute carrier evaluation data to a central database. The panel would contribute a broader range of experience than any individual shipper and presumably improve the evaluation process (P.E.S.).
What is the effect of border trade on freight corridors?	Rural participants have more difficulty in obtaining service for international shipments for gaining equipment or pick-up service resulting back-haul data in order to find carriers in their area (p. 8).
How well integrated are freight corridors into the overall plan?	Out-state (or rural) participants were more relationship oriented with their carriers to avoid finding other carriers because of the perception that carrier choices were limited. Metro area participants perceived less cost to switching carriers and were much more systematic in terms of the application of metrics and the frequency of reviews of carriers (p. 7).
What are the public safety concerns?	Not addressed in this document.
What are the multimodal considerations?	Out-state participants relied more on the rail mode than metro participants while there was little difference in the criteria either group used in selecting modes and specific carriers. In comparison with a national control group, the data suggests a greater dependence on motor carriage for local respondents and less dependence on airfreight. In rural areas hybrid modes such as intermodal represent twice the complexity of conventional truckload shipments (pp. 16-17).
Cost Analysis:	Data collection may be expensive (p. 1). Respondents indicated a relatively high sense of control over inbound and outbound shipments. Since control is normally associated with payment of transportation costs, one implication is that respondents are paying both for inbound and outbound shipments (pp. 18-19).
Economic Analysis:	Participants identified a trend toward consolidation of the carrier evaluation process to a central office. This is apparently being driven by increased consolidation among firms, merger and acquisition activity and the deployment of enterprise information systems on the firm's part as well as the carriers (p. 36).

Source Document:	**Feasibility of a Shipper Panel to Measure Transportation Services, 2003-04 (Minnesota Department of Transportation)**
Performance Measures:	The study included: develop benchmark information in terms of how firms currently evaluate transportation carriers; develop conclusions relative to the perceived value, on the part of shippers, of additional evaluation data from a pooled resource; develop conclusions relative to the ability and willingness of firms to share information and participate in a panel; and develop conclusions relative to how such panels should be organized in terms of geographic scope and definition of affinity groups (pp. 2-3). Evaluation criteria are dominated by on-time performance and transport costs (p. 30).
Data Collection:	The project was a two-step process involving focus groups followed by a more comprehensive survey questionnaire (p. 3).
Intelligent Transportation Systems Technologies:	There was a question of the existence of a technological barrier to the adoption and use of pooled data for carrier evaluations. The data suggest that there is not a barrier to the use of a web-based system that could be downloaded into a simple spreadsheet or database. The requirements for an evaluation system include compatibility with commercial spreadsheets or database products and ease of implementation by those using manual systems (p. 38).

State DOTs and Regional Coalitions: Minnesota

Source Document: Minnesota Statewide Freight Plan, 2005	
Why designate freight corridors?	Before the 1990s, State DOTs focused primarily on passenger transportation. The multimodal Minnesota Statewide Freight Plan (MSFP) identifies freight trends, needs, and issues. The Interregional Corridor System (IRC) was designated to enhance the economic vitality of the state by providing safe, timely, and efficient movement of goods and people (Ch. 1, p. 2).
Analysis framework for the designation of freight corridors:	The freight policy recognizes the importance of all modes for a balanced freight transportation system, the need for connections between modes, and that efficient access to expanding markets is increasingly significant to State businesses operating in a global economy (Ch. 8, p. 1).
What is the effect of border trade on freight corridors?	International trade, particularly with Canada, is a growing sector of Minnesota freight shipments. In today's security-conscious environment, freight entering through Canadian border crossings must be properly inspected and monitored. Mn/DOT works to coordinate with the Minnesota Department of Homeland Security and US Customs and Border Security on security issues as needed and participates in border coalitions that are working to improve security while protecting the flow of commerce (Ch. 8, p. 11).
How well integrated are freight corridors into the overall plan?	The Mn/DOT is one of many public agencies that aim to promote the state's economic development by improving freight infrastructure and services. Coordination with other agencies, such as the US Department of Agriculture and the Minnesota Department of Employment and Economic Development, would reveal areas where investment programs intersect, yielding complementary funding for specific improvements. Forming public-private partnerships would help these agencies to better meet freight-enhancing objectives (Ch. 5, p. 7).

Source Document: Minnesota Statewide Freight Plan, 2005	
What are the public safety concerns?	Among the efforts of the office of Commercial Vehicles Operations, are to: conduct vehicle safety inspections; provide truck size and weight policy and coordinate maintenance of all weigh scales; provide technical assistance at hazardous materials transportation incidents; conduct training classes; and provide outreach on technical topics related to driver qualifications, vehicle safety, carrier operating requirements, and transportation regulations for hazardous materials (Ch. 5, p. 1).
What are the multimodal considerations?	Trucks carry the largest proportion of freight in Minnesota; however, the state has a relatively high percentage of freight moved by rail and water compared to the rest of the US. Air cargo represents a negligible portion of freight movement in the state (Ch. 3, p. 7). The number of intermodal terminals in Minnesota is limited, creating impediments to freight movement. To help improve access, the FHWA provides a special status as "intermodal connectors" for the primary access roads between large intermodal terminals and the National Highway System (Ch. 4. p. 9).
Cost Analysis:	Minnesota has and expects over the next twenty years to maintain a relative balance between directional freight flows by value and weight. The top five freight commodities moving in Minnesota by tonnage are high-weight, low-value, non time-sensitive bulk shipments including: farm products, non-metallic minerals, food products, metallic ores, and coals (Ch. 3, p. 7).
Economic Analysis:	Minnesota is moving toward a service-oriented economy; service industries typically consume rather than produce freight. Among the manufacturing industries in the state, the high-technology electronic equipment and industrial equipment sectors have grown most rapidly. These sectors tend to ship high-value, low-weight goods using premium transportation services, transport smaller sized shipments, and require more vehicles per ton than other sectors. Inbound shipments by weight are forecast to grow at a rate of 92 percent over the next 20 years, compared with outbound tonnage increasing by 52 percent over the same period of time (Ch. 6, pp. 1, 4).

Source Document: Minnesota Statewide Freight Plan, 2005	
Performance Measures:	Performance measures have been developed to: **safeguard what exists**; **make the network work better**; and to **make Mn/DOT work better** (Ch 7, p. 2). The State monitors performance by freight mode, such as benefit of truck weight enforcement on pavement service life; percent of rail track miles with track speeds of ≥ 25 mph; and for waterways, average delay time at river locks (Ch. 7, pp. 3, 4).
Data Collection:	MSFP was developed with input from Reebie Associates, "2001 TRANSEARCH® Commodity Flow" Data, and FHWA's "Freight Analysis Framework, 2004" (Ch. 1, p. 1).
Intelligent Transportation Systems Technologies:	Technological improvements to the transportation system have the potential to increase throughput on the transportation system. Considered among available ITS technologies are systems to: assist in freight traffic prioritization strategies, lower cost highway-rail crossing warning devices, and improved traveler information for truckers regarding road/weather conditions and directions to destinations. New technologies are also important for speeding border security clearances for truck and rail international borders (Ch. 8, p. 8).

State DOTs and Regional Coalitions: Minnesota

Source Document:	**Statewide Multimodal Freight Flows Study: Preserving Minnesota's Economic Competitiveness, 2000**
Why designate freight corridors?	Mn/DOT is working in the interests of businesses throughout Minnesota to identify potential improvements to the statewide freight transportation system. Important to this goal is to understand how goods move through the State and what corridors are critical to freight movement and the State's economic vitality (p. 1).
Analysis framework for the designation of freight corridors:	The goal of the study was to provide data, recommendations and direction regarding freight flows, including: The volume, density, and character of major freight flows by mode and corridor; the origins and destinations of freight flows by mode to and from major regional centers in the state; critical freight transportation planning, infrastructure, and policy issues; and data, freight system performance measures, and recommendation to support and compliment the Interregional Corridors study (pp. 1, 2).
What is the effect of border trade on freight corridors?	One issue affecting border trade between Minnesota and Canada has to do with upgrading the dam and lock system along the Mississippi River and the Great Lakes/St. Lawrence Seaway systems. The US Army Corps of Engineers and the Canadian government need to partner to build a system that can accommodate larger more efficient ships (pp. 9, 10).
How well integrated are freight corridors into the overall plan?	At the time of this study, it was recognized that it is critical that Mn/DOT maintain a dedicated freight planning office as represented by the Office of Freight, Railroads, and Waterways. Addressing this need, the state instituted new Mn/DOT positions for corridor and modal operations managers; created two subcommittees on motor carriers and metropolitan area issues; and focused on implementing rail passenger transportation programs in Metro Areas (p. 14).

Source Document: Statewide Multimodal Freight Flows Study: Preserving Minnesota's Economic Competitiveness, 2000	
What are the public safety concerns?	Recommended strategies for highway freight include: Ensuring that the local roadway system can meet the requirements of truck transport, including solving "hot spots" with high levels of congestion or accidents; developing new truck lanes, bypass ramps, staging areas and haul roads; reassessing the statewide 80,000 pound weight limit and springtime local road restrictions; pursuing the development of more public and private truck rest stops and parking areas on key corridor routes and in congested metropolitan areas (p. 7).
What are the multimodal considerations?	Minnesota's economy requires a multimodal approach to freight transportation focusing on: highways, because trucks move most consumer products and account for the majority of freight movements by value; rail, because the largest share of freight movements by weight, representing the state's major export commodities, are carried by the extensive rail network; waterborne freight, because bulk shipments of coal, iron ore, and grain move through the state's ports and waterways; and air freight, because the highest-value shipments move on airplanes (p. 5).
Cost Analysis:	Costs fall into several modal categories: logistics trends are placing increasing strain on the state's roadway infrastructure, already under pressure from the state's continued strong economic growth (p. 5); planning for traffic delays and lower speeds due to congestion is part of a carrier's business practices, but it increases operating costs and lowers profit margins (pp. 6, 7); and large railroads are merging to consolidate their operations and to reduce costs. The entire North American continent is now served by only six large rail systems. This trend potentially threatens the state's sizeable investment in maintaining and growing a healthy short-line network (p. 8).
Economic Analysis:	Minnesota is a key production state that exports 50 percent more than it imports. It is the ninth largest state for outbound interstate shipments by weight, following only Illinois and the large coal and oil-producing states. An extensive system of highways, rail lines, water ports, and airports supports goods movement within the state, as well as to and from other states and countries (p. 3).

Source Document:	**Statewide Multimodal Freight Flows Study: Preserving Minnesota's Economic Competitiveness, 2000**
Performance Measures:	The study recommends that the state develop and maintain databases and decision support tools, including a set of performance measures for evaluating freight projects across mode, commodity and geography (p. 16).
Data Collection:	The study recommends the incorporation of freight flow data developed for this project into the MPO travel demand forecasting models to support a higher degree of precision in modeling large freight flows on the State's highway system (p. 16).
Intelligent Transportation Systems Technologies:	A strategy developed as a result of the study was to undertake efforts that result in closer coordination between freight and highway planning functions. Among the coordination efforts would be data exchange in the application of ITS for regulatory and information purposes (p. 7).

State DOTs and Regional Coalitions: Minnesota

Source Document:	**Winona Intermodal Study, Minnesota Department of Transportation, Final Report, 2002**
Why designate freight corridors?	The City of Winona serves as one of the region's principal transportation centers due to the city's location and access to the Mississippi River, Interstate highways, the national rail system, the presence of over 100 diverse manufacturers, and two nationally recognized universities. There are also plans for high-speed rail service through the Midwest Regional Rail Initiative. All of these factors indicate a need to explore the range of needs for transportation planning for the City of Winona (p. 3).
Analysis framework for the designation of freight corridors:	The study identified the following goals to improve Winona's transportation system: to relieve congestion and improve traffic flow into and through the City and Port of Winona; to improve the quality of life for citizens of Winona; and to improve safety for the traveling public (p. 5).
What is the effect of border trade on freight corridors?	The Canadian Pacific Railway (CPR) provides freight rail service within the City of Winona, and Amtrak provides passenger rail service (via a CPR trackage agreement) (p. 31). The CPR is a Class I North American railroad, providing freight transportation services over a 14,000-mile network in Canada and the US (p. 14).
How well integrated are freight corridors into the overall plan?	In spring of 2001, the City of Winona convened a meeting of the Office of Freight, Railroads, and Waterways, Mn/DOT's District 6 (Rochester), the City of Winona, and the consulting firm of Edwards and Kelsey to initiate the Winona Intermodal Study (p. 3).
What are the public safety concerns?	Winona is experiencing traffic congestion and delays within its transportation system, most specifically where transportation modes meet or intersect. By 2020 the number of trains traveling through the city is projected to more than double from 30 trains per day to 64. Motorists in the city are already experiencing significant delays due to through-trains, and the storage of rail cars is affecting the quality of life in the city by obstructing the view of the Mississippi River, the City's historic district, and the adjacent Levee Park. Automobile and truck traffic can expect travel speeds to be reduced by up to 75% if congestion issues are not addressed. Bicyclists and pedestrians also face delays and safety issues at the numerous rail crossings (pp. 4, 5).

Source Document:	**Winona Intermodal Study, Minnesota Department of Transportation, Final Report, 2002**
What are the multimodal considerations?	The City of Winona Comprehensive Plan, 1995, addresses the following transportation considerations: designate bike lanes, construct bike paths, and maintain both; review and modify truck route system to allow access to all industrial areas; work with railroads to keep crossings open during peak travel hours; support the efforts of the Port Authority to relocate the railroad tracks along Levee Park; encourage the development of a transportation center which would serve as the Amtrak stop, the inner-city bus stop, a stop on the mass transit system, and a taxicab stop; and explore options for the rail storage area (pp. 10, 11).
Cost Analysis:	The proposed Midwest Regional Rail System (MRRS) could cost an estimated $4 billion over ten years to develop, but ridership could increase from 1.6 million passengers per year to an estimated 9.6 million in 2010, greatly reducing highway congestion (p. 17).
Economic Analysis:	In a 1999 study completed for the National Waterways Association, the economic value to the State of Minnesota for the Winona Port was estimated to be over $123 million while all water transportation was worth $1.2 billion to the state (p. 34).
Performance Measures:	In the Mn/DOT Interregional Corridor Program performance measures have been developed for peak period corridor operations and corresponding guidelines for intersections, signals, and private access spacing and design (appropriate to each category). To achieve and maintain desired performance measures, the guidelines discourage signal proliferation and seek a balance between access and mobility in developed and urbanizing areas (p. 21).
Data Collection:	Data from the following previous studies were used in this analysis: Railroad Relocation Study, 1976; City of Winona Comprehensive Plan, 1995; Midwest Regional Rail Initiative, 1996; A Comprehensive Study of Housing and Industrial Development in Winona County Minnesota, 1999; Southern Minnesota Rail Corridor Safety Plan, 2000; Railroad Grade Crossing Safety Review—Winona County, 2000; and the Statewide Multimodal Freight Flows Study, 2000 (p. 8).

Source Document:	**Winona Intermodal Study, Minnesota Department of Transportation, Final Report, 2002**
Intelligent Transportation Systems Technologies:	Draft guidelines have been established for operations and access management on Minnesota's Interregional Corridor system. Current and projected operating conditions on local roads were analyzed using computerized traffic simulation models. The traffic analysis software used was Synchro Plus SimTraffic, Version 5 (p. 40).

State DOTs and Regional Coalitions: New Mexico

Source Document:	**Long Range Major Transportation Investment Study, North Central Region, Final Report, 2001.**
Why designate freight corridors?	The study focused on major transportation investments that may improve regional transportation operations within the North Central region (p. 1-1).
Analysis framework for the designation of freight corridors:	The purpose of the study was to identify existing and future regional transportation deficiencies in North Central New Mexico at a planning level, along with their causes, and to conceptualize a long-range multimodal plan to address identified deficiencies (p. 1-1).
What is the effect of border trade on freight corridors?	Not addressed in this document.
How well integrated are freight corridors into the overall plan?	The study represents a collaborative effort between the New Mexico State Highway and Transportation Department, City of Santa Fe, Santa Fe County, Los Alamos County, the City of Española, and several tribal entities (p. iv).
What are the public safety concerns?	Safety concerns identified by the study include: highway conges-tion, lack of alternative travel routes, lack of redundancy in the region's highway network, limited alternative travel modes (p. iv).
What are the multimodal considerations?	Funding of alternative travel modes was an important concern in the study. Issues addressed included: implementing a Regional Transportation Authority (RTA), a Regional Public Transportation System (RPTS), vanpool programs, and looking at ways to further utilize the Santa Fe Southern Railway Corridor (p. v).
Cost Analysis:	In order to build a funding structure for alternative travel mode programs, an RTA needs to be established. An RTA would have the power to construct, operate, and maintain alternative travel mode facilities and services on an area-wide basis and could span existing jurisdictional boundaries (p. v).
Economic Analysis:	With no redundancy in routes, a road closure along certain portions of the north central region could potentially bring a freeze on the movement of freight and consequently lost revenue (pp. 2-4).
Performance Measures:	Deficiencies identified include: highway congestion; lack of alternative travel routes/lack of redundancy in highway systems; long distance commute travel conditions; limited alternative travel modes; highway safety; and continued growth without corresponding transportation improvements and programs (pp. 2-16-18)

Source Document:	**Long Range Major Transportation Investment Study, North Central Region, Final Report, 2001.**
Data Collection:	Data collected for the study includes: commute travel times between specified locations in the region (p. 2-5); growth expectations (p. 2-9); population projections (p. 2-10); employment projections (p. 2-11); and cataloging of projected traffic conditions for the year 2020 (p. 2-13).
Intelligent Transportation Systems Technologies:	Proposed solutions have some ITS features. Among proposed services are: local (fixed route) bus service; express bus service; park and ride facility service and development; vanpool commuter services; ridesharing services; highway helper service; paratransit service (Americans with Disabilities Act (ADA), special needs); subscription service (curb-to-curb monthly transport to: work, school, medical facilities); community service shuttles; and bike and ride programs. Also the study looks at the development of a commuter rail service along the Middle Rio Grande corridor (pp. 3-8, 9). A set of secondary solutions strategies is also described in which the effort to integrate transportation needs with various stakeholders and users is suggested. Solutions raised by this portion of the study include: rideshare incentives; alternative work schedules; transit incentives; and incentives to use alternative modes and reduce driving (p. 3-10).

State DOTs and Regional Coalitions: Ohio Department of Transportation

Source Document: Truck Trip Data Collection Methods, Final Report, SPR 343, 2004	
Why designate freight corridors?	Development of an effective data generation methodology would put ODOT in a leadership position among state departments of transportation, federal entities and academic researchers, because such a data generation model has yet to be found in the literature or known studies (p. 1).
Analysis framework for the designation of freight corridors:	The overall goal of this study was to identify a reliable data collection method capable of generating the information at a level of detail useful to ODOT's modeling and freight planning needs for data on truck movements at the metropolitan level (p. 2).
What is the effect of border trade on freight corridors?	Not addressed in this document.
How well integrated are freight corridors into the overall plan?	ODOT has limited information on truck trips, their origins and destinations, routes traveled and commodities carried. Intermodal distribution centers have increased dramatically in response to industry demands, but almost nothing is known about the extent or frequency of their use, or their role in urban congestion (p. 1).
What are the public safety concerns?	Not addressed in this document.
What are the multimodal considerations?	In the roadside interview portion of the study, Pilot Study I, a variety of transportation mode locations were selected as interview sites, including interstate highway weigh stations, port facilities, and warehouse/distribution centers (pp. 38, 39).
Cost Analysis:	Collecting of desired data entails differing financial implications, but can be summarized as below: Additional detail in a questionnaire, once a vehicle is stopped or once a mail questionnaire is being answered, does not add much marginal cost; and, the data costs are very different depending on whether flow data is being collected at an interregional or major gateway level versus at the level of intra-regional flows documenting reshipment, consolidation, retail versus wholesale, route, time, stops, etc. (p. 28).
Economic Analysis:	Not addressed in this document.
Performance Measures:	The amount of information obtained and detail provided on trip origin and destination varied by data collection methodology: roadside interviews generally provided the most complete origin-destination information. Also, identification of trip routes used by

Source Document: Truck Trip Data Collection Methods, Final Report, SPR 343, 2004	
	inter- and intra-regional shipments was best obtained through roadside surveys. Information and data characteristics related to the facility or land use at specific freight stops was generally more complete via mail and fax surveys. Greatest detail and data for description of commodity, payload weight and vehicle configuration were obtained through roadside interviews. The location of stops and trip generator data were not easily obtained from any of the tested data collection methods. Volume of shipments into and out of warehouses and distribution centers was best obtained either from mail/fax surveys or via roadside surveys at the warehouse/distribution center location (pp. 67-69).
Data Collection:	The study objectives were to: Identify and evaluate alternative methods of collecting truck data, defining the advantages and disadvantages of each, and assessing the utility of the methods for transportation modeling work in Oregon; to recommend a data collection method that will provide the necessary data for modeling and freight planning needs; to select one or more data collection methods for pilot studies; and to analyze field test results (p. 2). Two pilot studies were conducted in conjunction with this study, one involving roadside interviews, and the other consisting of a combination of mail and fax surveys. (pp. 37-39) Specific data types that were identified as necessary were: origin-destination, route identification, land use, commodity, weight, and vehicle type configuration, location of stops, location of trip generators, time of day, and volume of shipments (pp. 67-69).
Intelligent Transportation Systems Technologies:	Newer methodologies for collecting freight movement data include video surveillance and GPS Receiver technology. The strength of the video surveillance methodology is that it provides good information on traffic flows without disrupting traffic, but it does not provide information on data attributes such as origin-destination, trip purpose, commodity, route, or trip-chaining. GPS does provide additional information regarding individual truck travel activity and truck type frequencies on given corridors, and may offer future data collection possibilities; however, current drawbacks to widespread reliance on such systems include frequent equipment malfunctions, and the inability to capture weight, trip purpose and commodity hauled (pp. 33, 34).

State DOTs and Regional Coalitions: Oklahoma Department of Transportation

Source Document:	**2005-2030 Statewide Intermodal Transportation Plan, Planning and Research Division, Oklahoma Department of Transportation, 2005**
Why designate freight corridors?	The study has identified three types of transportation corridors: Transportation Improvement Corridors, in which project traffic volumes indicate additional capacity will be needed by 2030; National High Priority Corridors, in which Congress has identified corridors of national significance; and Freight Operational Improvement Corridors, in which highways with high truck traffic do not indicate capacity needs by 2030. Conditions of the latter include stops in towns and cities, bridge deficiencies, geometrics, urban speed zones, school zones, at grade rail crossings, or other operating conditions that reduce the efficiency of freight movements (unnumbered section titled Transportation Corridors).
Analysis framework for the designation of freight corridors:	This plan was developed to examine the link between transportation and economic development, especially in cooperation with the Oklahoma Department of Commerce, to examine how existing and future transportation infrastructure can aid Oklahoma's economic development (1).
What is the effect of border trade on freight corridors?	Rail is an important part of border trade for the state of Oklahoma, with the Union Pacific's (UP) north-south corridor linking the Midwest with the Gulf Coast; also the Kansas City Southern Railway (KCS) provides the shortest route between Kansas City and the Gulf of Mexico. KCS also is credited with creating the "NAFTA Railway," connecting the heartland of the United States to central Mexico. The majority of KCS traffic in Oklahoma, however, is interstate traffic that neither originates nor ends within the state (Ch. 2, p. 13).
How well integrated are freight corridors into the overall plan?	As a result of this study, Oklahoma Department of Transportation is in the process of developing policies and objectives that will institute an Intermodal Advisory Council with the following functions: to improve communication for intermodal needs such as disabled transportation, pedestrian needs, bicycle needs, passenger and freight rail, air transportation, and waterway transportation; and to recommend improvements to transportation projects to assist with intermodal transportation (frontispiece section titled "Rail Transportation: Freight and Passenger, modal/economic development policies and objectives").

Source Document: 2005-2030 Statewide Intermodal Transportation Plan, Planning and Research Division, Oklahoma Department of Transportation, 2005	
What are the public safety concerns?	Not addressed in this document.
What are the multimodal considerations?	There is currently in existence a Designated National Highway System Intermodal Connectors program that provides service to two of Oklahoma's ports: Port of Catoosa and Johnson's Port 33 (frontispiece section titled "waterways transportation"). Oklahoma has an intermodal system that encompasses highways, waterways, air transportation, public transportation (both rural and urban), rail transportation (both freight and passenger), and bicycle/pedestrian transportation, all of which are increasingly becoming more interconnected to develop Oklahoma's economy, environment, and culture (1).
Cost Analysis:	Not addressed in this document.
Economic Analysis:	Not addressed in this document.
Performance Measures:	Not addressed in this document.
Data Collection:	Data for the plan came from primary and secondary sources including OKDOT files, federal statistical publications and data-bases, and local metropolitan transit providers (Ch. 2, p. 1).
Intelligent Transportation Systems Technologies:	Not addressed in this document.

State DOTs and Regional Coalitions: Oregon Department of Transportation

Source Document:	**Freight Rail and the Oregon Economy: A Background Paper, Final Report, 2004.**
Why designate freight corridors?	Of five identified freight corridors serving the Portland area, one example of the benefits of freight planning relevant to freight corridor designation can be found in the West Coast rail corridor. The West Coast rail corridor, which parallels I-5, is one of the nation's most heavily used routes for both automobile and truck traffic. Absent improvements, FHWA estimates that by 2020 traffic on I-5 could operate at level of service E and F for many hours a day for virtually the entire distance between San Diego and the Bay Area, as well as through the Portland and Seattle-Tacoma metropolitan regions. Severe highway congestion and the fact that the average length of a truck haul in the corridor is 936 miles suggest there is room to improve rail service along the corridor (pp. 8-7, 8).
Analysis framework for the designation of freight corridors:	Four major corridors and the Portland Triangle have significant rail capacity and service problems that will affect business and industry in Oregon and the Portland metropolitan region as freight demand and rail congestion increase (pp. 8-1).
What is the effect of border trade on freight corridors?	The West Coast rail corridor extends 1,200 miles north-south, paralleling I-5, and linking Seattle, Portland, and Southern Oregon to the Bay Area, Los Angeles, and San Diego. Import and export traffic to and from Canada and Mexico accounts for 17 percent of total tonnage in the corridor. Currently rail is not competitive with trucking along the West Coast corridor with respect to transit time and service reliability. Rail captures a modest share of southbound carload traffic, but captures only a small share of northbound intermodal traffic. Rail capacity is constrained because of mountainous terrain (pp. 8-7).
How well integrated are freight corridors into the overall plan?	Public investment in the rail system has historically treated the bottom of the freight rail system: grade crossings, branch lines, and commuter rail service. This study proposes a more global perspective on rail involving thinking and action on major corridors, intermodal terminals and connectors, and urban rail interchanges. Two options for handling the changes that must take place present as: a market-driven evolution of the freight rail system in which state involvement would be minimized assuming that the rail industry could continue to be stable, productive, and competitive; or a policy-driven expansion of the freight-rail system in which a new public-private partnership would be forged. The second option assumes increasing state involvement and investment to achieve a

Source Document:	Freight Rail and the Oregon Economy: A Background Paper, Final Report, 2004.
	freight-rail system that provides the cost-effective transport needed to serve national and global markets, relieve truck pressure on highways, and support Oregon's economic development (ES-2).
What are the public safety concerns?	Portland is a major export center for soda ash and potash. The region also imports a large volume of chemicals and allied products to support the lumber and pulp industry, the food processing industry, manufacturing, and other industries. The corridor-level rail problem affecting the industry is congestion in the Portland Triangle. Because chemicals, especially liquid chemicals, are heavy and often hazardous, there is limited opportunity to shift from rail to truck, so delays are felt directly as increased costs of production for the industry (pp. 9-4).
What are the multimodal considerations?	Rail plays a modest role in container movement through the marine terminals. About seven percent of the container tonnage shipped to international and domestic ports arrived at the marine terminals by rail (Ch. 7-4). There have been discussions across the Pacific Northwest about breaching dams along the Columbia River to restore free-flow conditions and help replenish the stock of salmon. If this were done, it would reduce the number and extent of barge operations on the Columbia. In a recent analysis, barges carried 41 percent of the grain moving down the Columbia to the Port of Portland marine terminals; rail carried 58 percent; and trucks, one percent. If barge capacity were reduced, much of this freight would be shifted to rail, stressing the capacity of the Columbia Gorge rail corridor, forcing grain transportation prices up, and making Northwest grain producers less competitive in global markets (pp. 8-5, 6).
Cost Analysis:	If railroads are unable to maintain their current share of national freight due to operating costs and lack of investment capital, rail freight share will be shifted to trucks, which already use the overly congested highway system. If this happens, greater costs will be imposed: on state and local highway agencies for road maintenance; on highway users, who will experience increasingly congested roadways; and on shippers who will pay higher rates for truck service than they have been paying for rail service. The net effect will be less competitive industries, slower economic growth, and possibly fewer jobs should industries choose to cut back on production rather than pay higher rates for freight (ES-1).
Economic Analysis:	Railroads have increased productivity and decreased rates significantly since economic deregulation of the industry

Source Document:	**Freight Rail and the Oregon Economy: A Background Paper, Final Report, 2004.**
	in 1980; however, the benefits have gone to the shippers and the economy in terms of rate cuts rather than to the railroads and their investors. Railroads are not earning their cost of capital, and may not be able to keep pace with economic growth at the current level of investment (ES-1).
Performance Measures:	When measured in terms of delay per train, rail congestion in the Portland Triangle is about twice that of Chicago, the Nation's largest rail hub (pp. 8-4).
Data Collection:	Not addressed in this document.
Intelligent Transportation Systems Technologies:	Not addressed in this document.

State DOTs and Regional Coalitions: Oregon Department of Transportation

Source Document: Mapping Perceived Travel Problems Along Oregon's Roads: Geo-Coding Motor Carrier Survey Responses for the Oregon Department of Transportation, 2004.	
Why designate freight corridors?	Not addressed in this document.
Analysis framework for the designation of freight corridors:	The study facilitates the spatial analysis of the perceptions of motor carriers on issues such as problems with roadway infrastructure, difficulties in permit processes or other administrative concerns, and the location of reported and previously unreported problems such as those related to congestion (p. 1).
What is the effect of border trade on freight corridors?	Not addressed in this document.
How well integrated are freight corridors into the overall plan?	The mapping of problems identified in the motor carrier survey is intended to serve as a tool for transportation planners and others to visualize and interpret the spatial attributes of the data; the discussion of the geo-coding of problems identified by motor carriers may be useful for similar studies in the future (p. 21).
What are the public safety concerns?	
What are the multimodal considerations?	Not addressed in this document.
Cost Analysis:	Not addressed in this document.
Economic Analysis:	Not addressed in this document.
Performance Measures:	Not addressed in this document.
Data Collection:	The initial survey data evolved from a series of pilot surveys that Portland State University performed in 2000-01. The survey consisted of responses from 1,872 firms where 1,255 of the firms represented registered one or more problems with roadways in Oregon. The problems were geo-coded by region and problem type. Problem types included: infrastructure, congestion, restriction, other drivers, construction, and other (pp. 2-4).
Intelligent Transportation Systems Technologies:	The University of Oregon's InfoGraphics Lab created geo-spatial data and maps, graphs, and tables to portray data in a GIS, which allowed for analysis of the spatial location and distribution of roadway problems motor carriers mentioned in survey responses (p. 2).

State DOTs and Regional Coalitions: Oregon Department of Transportation

Source Document:	**Motor Carrier Concerns about Transportation Problems in Oregon, Final Report, 2004.**
Why designate freight corridors?	Not addressed in this document.
Analysis framework for the designation of freight corridors:	The Oregon Department of Transportation (ODOT) contracted with Portland State University to gather information on problems truck freight transportation firms encounter in moving freight on Oregon's roads (p. 1).
What is the effect of border trade on freight corridors?	Not addressed in this document.
How well integrated are freight corridors into the overall plan?	One third of problems identified were infrastructure problems, such as physical features of the road system, pavement conditions, bridge problems, sharp curves, etc., and these kinds of problems are of interest to freight planners as they address impediments to freight mobility throughout the state (p. 1).
What are the public safety concerns?	Safety concerns cited by respondents to survey include: Unsafe road conditions at intersections, tight turns, sharp curves, lack of sight distance, lack of road markings, signs; narrow roads, bridges, lack of bike lane, lack of shoulders, lack of pullout area; rough roads, ruts, uneven surface; behavior of other drivers—speeding, cutting in, carelessness, ignorance; traffic, congestion, differential speed limit; bicyclists, pedestrians, weight station location, chain-up areas (lack of), and chain-up requirements (p. 7).
What are the multimodal considerations?	Not addressed in this document.
Cost Analysis:	85 respondents (6%) cited problems with taxation such as: taxes paid do not appear to result in better roads; urban road improvement needs favored over rural; truck route needs ignored; weight-mile taxes too high (p. 11).
Economic Analysis:	Not addressed in this document.
Performance Measures:	Not addressed in this document.
Data Collection:	A professional survey firm conducted telephone interviews of a randomly selected representative sample of freight shipper and motor carrier firms in each of the five ODOT administrative regions of the state. The survey achieved a 61% response rate, yielding responses from 1,872 firms out of a sample of 3,064 firms.
Intelligent Transportation Systems Technologies:	Not addressed in this document.

State DOTS and Regional Coalitions: Oregon Department of Transportation

Source Document:	**Oregon Commodity Flow Forecast, Oregon Department of Transportation, Transportation and Land Use Model Integration Project, Phase 3I, 2005.**
Why designate freight corridors?	Not addressed in this document.
Analysis framework for the designation of freight corridors:	The purpose of the Commodity Flow Forecast was to use the 1997 commodity baseline to project future modal commodity flows for use in the Oregon Department of Transportation's (ODOT) Transportation and Land Use Model Integration Project (TLUMIP) (p. 4).
What is the effect of border trade on freight corridors?	North-south trade associated with the NAFTA is important to Oregon. The Western states are major trading partners with Western Canada, and the impacts of trade into, out of, and through Oregon is projected to grow in the future. With a pro-business climate in British Columbia, Western Canada exporters seek a wider market in the US, possibly influencing the total flow of Canadian goods along the West Coast, and the creation of stronger east-west trade lanes linking to the Pacific Northwest. Another result could be greater competition with Canadian sea ports and Canadian manufacturing in the North American marketplace (p. 20).
How well integrated are freight corridors into the overall plan?	Not addressed in this document.
What are the public safety concerns?	With reduced emphasis on manufacturing and distribution and more emphasis on a service-based economy, society is more concerned with freight transportation's effect on the environment and local quality of life. Most decisions about transportation investment are made at state and local levels with public input. These trends are affecting the ability of transportation hubs to grow (p. 23).

Source Document:	**Oregon Commodity Flow Forecast, Oregon Department of Transportation, Transportation and Land Use Model Integration Project, Phase 3I, 2005.**
What are the multimodal considerations?	All modes of transportation will see growth, though at different rates, reflecting the mix of commodities they carry and the routes on which they operate. The largest volume of commodities shipped in, to, from, and through Oregon moves by truck, and is expected to increase by 1.98% by 2030; rail is the second most highly used freight mode, and is expected to increase by 1.83%. Air cargo is the fastest growing mode, and is expected to increase by 2.62%, while waterborne cargo will see growth of about .50% and pipeline volume is expected to remain the same. When measured in value terms, the growth in commodity movements in Oregon over the forecast period is greater than the rate of increase in tonnage (pp. 11, 12).
Cost Analysis:	With the completion of the interstate highway system, transportation investment can turn to other areas of need, such as: portions of the freight system require substantial rehabilitation; the costs of congestion associated with bottlenecks are threatening industrial productivity; rising costs for land, fuel, and labor are beginning to reverse trends in transportation system productivity growth; and increasing difficulties obtaining land and investment capital are making it hard to expand facilities and add capacity (p. 26).
Economic Analysis:	Following expansion between the years of 1993-97, Oregon experienced a sharp decline in 1998, and has continued to struggle since the national recession of 2001. Manufacturing was negatively affected, as were services, trade, and construction. Only moderate growth is expected through 2010, though employment growth will accelerate. Industries such as timber, agriculture, fishing, and tourism as well as the high-tech industry are important to the State's economy (pp. 7, 8).
Performance Measures:	Not addressed in this document.
Data Collection:	Data used for this forecast include the Standard Transportation Commodity Classification (STCC) codes. ODOT staff has contributed data and reviewed comments for the structure and content of the baseline estimated flows, which have carried through to the forecasts (p. 4).

Source Document:	**Oregon Commodity Flow Forecast, Oregon Department of Transportation, Transportation and Land Use Model Integration Project, Phase 3I, 2005.**
Intelligent Transportation Systems Technologies:	Better transportation and information services have allowed manufacturers to reach wider markets and ship over larger distances. Future commodity flow patterns should reflect an even greater application of information and communications technology (p 22). Specific ITS technologies can be seen in the area of coordinated logistics efforts in: shipment and asset tracking, routing and dispatch optimization models, and commercial transaction management software (p. 25).

State DOTs and Regional Coalitions: Oregon Department of Transportation

Source Document:	**Oregon Commodity Flow Forecast Update and Lower Columbia River Cargo Forecast, 2002**
Why designate freight corridors?	The Standard Classification of Transported Goods (SCTG) was established as the classification system for use in organizing the commodity data in order to be consistent with the 1997 U. S. Bureau of Transportation Statistics' Commodity Flow Survey. The development of base year commodity flow data included fusion of commodity flow data from several sources and validation against other data sets (p. 7).
Analysis framework for the designation of freight corridors:	This study produced two related long-term 2030 forecasts with reconciled assumptions, baseline data, and forecasts of all commodities moving to, from, in, and through the Portland/Vancouver metropolitan area by any mode of transport. Because the end uses and the requirements for the data from the two studies differed, they were conducted as separate studies linked through common coordination and reconciliation tasks (p. 5).
What is the effect of border trade on freight corridors?	International trade is expected to influence the pace of future economic globalization as well as influence which gateways and trade corridors will feel the greatest impacts. Development of multi-national trade blocks and the integration of the national economies within these trade blocks are two major factors in this phenomenon. Growth in the economies of South Asian countries and the emergence of the Asia Pacific Economic Cooperation (APEC) countries as a trade community has had a significant impact on West Coast ports. High levels of growth in Pacific Rim container trade are expected to continue, especially with China, and the emergence of a Western Hemispheric trade block is likely to emerge as another major trade story for the US (p. 53). With increases in international trade, many port facilities are experiencing serious congestion problems and landside access to these facilities is likewise threatened by continuing growth (p. 54). Canadian and US truckers increasingly operate on both sides of the border, but operations are constrained because of delays and complications associated with border crossing, especially with added security concerns since September 11, 2001 (p. 56).
How well integrated are freight corridors into the overall plan?	A major growing issue is how to finance capacity investments in nationally significant freight facilities. There is growing interest in user-fee solutions. There are unlikely to be any major new sources of dedicated grant aid funding for freight. There is movement towards more

Source Document: Oregon Commodity Flow Forecast Update and Lower Columbia River Cargo Forecast, 2002	
	multi-state planning for freight transportation, particularly in trade corridors. The Portland-Vancouver area has been a participant in this process for the I-5 corridor. An effort to institutionalize emerging multi-state planning processes is an area of federal policy that is likely to be a part of the reauthorization debate. There is growing recognition of a mismatch in the planning timeframes of the public—with public sector planning tending to be more long-term—and private sectors that impede cooperation on freight planning. Also, states and Metropolitan Planning Organizations lack basic freight data and analysis tools for evaluating project alternatives or understanding the implications of future freight industry trends (pp. 63, 64).
What are the public safety concerns?	Not addressed in this document.
What are the multimodal considerations?	Truck dominates submode tonnage of all shipments, with significant secondary shipments that are "truck-to-truck." Rail and barge are also used as submodes, though for much less tonnage. Intra-regional shipments that rely on multiple transportation modes are limited to those modes that are efficient for the short distances of transport within the region. Truck transportation is the only submode used for intra-regional shipments.(pp. 11, 12).
Cost Analysis:	In large part due to e-commerce, a shift from "push-based" to "pull-based" logistics is creating a major shift and many associated costs in the transportation industry. Oftentimes, no warehousing is required, in cases where customers are purchasing directly from factories. Impact is being felt in the types of commodities shipped, the types of shipping services required, the size, and frequency of shipments, the modal choices, and the performance requirements for transportation networks. These types of changes in the market require a highly reliable high-speed transportation system (p. 58). Across the transportation industries, carriers have found returns squeezed to the point where they do not cover costs of capital to make the types of investments that are needed to support these changes. In addition, carriers report that large financial institutions and investors have no interest in dealing with small carriers given the high capital requirements of the industry (p. 60). A big question for the future is who will make the information technology investments that will be needed: shippers or carriers. Each side feels the other has the most to gain and neither want to bear the lion's share of the costs (p. 61).
Economic Analysis:	Export-dominated industries and areas, such as in the US

Source Document:	Oregon Commodity Flow Forecast Update and Lower Columbia River Cargo Forecast, 2002
	Pacific Northwest, suffer from lower export sales and the resulting slowdowns in production and employment. Industries of imported materials as inputs to their own production benefit from the lower dollar prices of imported goods. Since the 2001 recession, the US economy has faced huge outflows of interest payments overseas, and it is predicted that foreign investors are reducing their appetite for investments in the US. The forecast is for the US dollar exchange rate to fall over the long term. A decline of 20% in the dollar would not turn US goods exports into a substantial growth engine, because so much manufacturing production has been moved offshore in the interim (pp. 22, 23).
Performance Measures:	Not addressed in this document.
Data Collection:	The commodity flow forecast is a long term projection of the demand for goods through the year 2030, with projections for freight flow demand for the years 2010 and 2020 also computed in the model. The methodology involved taking the base year values for 1997, and growing these values based on appropriate growth rates. The company that conducted the study, DRI-WEFA, an international and multinational private company, used a Business Demographic Model (BDM) and their Business Transactions Matrix (BTM) to project industry growth and subsequently transport of products produced by the industries. In order to build the projective model, it was necessary to prepare underlying macroeconomic, regional, industry, and price forecasts for input to the commodity flow forecasting models (p. 21). Cambridge Systematics produced the base year values for 1997 for freight flows by origin, destination, commodity, and mode based on the US Commodity Flow Survey, Reebie Associate's TRANSEARCH database and other sources (p. 77).
Intelligent Transportation Systems Technologies:	Not addressed in this document.

State DOTs and Regional Coalitions: Oregon Department of Transportation

Source Document:	**Oregon Freight Truck Commodity Flows: Analysis and Summary, 1998**
Why designate freight corridors?	This study was initiated by the Oregon Department of Transportation (ODOT) Transportation Planning Analysis Unit (TPAU) to address gaps of commodity movements by truck within Oregon (p. i).
Analysis framework for the designation of freight corridors:	The research addresses goods movement in the context of truck volumes, payload weight, economic value, time-of-day travel and fleet ownership attributes by key commodity group. For the purposes of the report, three commodity flow analysis regions are identified: the Portland-Metro region, the Valley/SW Oregon region, and the Eastern Region (p. i).
What is the effect of border trade on freight corridors?	Exports from Oregon decrease with increasing distance from trade markets, including Canadian Provinces east of British Columbia, described in this report as Other Canada (10). An example is that of 3,120 estimated truck trips of lumber leaving Oregon on an average weekday, imports from Canada account for approximately 150 trips; a large percentage of lumber products leaving Oregon are shipped to Washington State (19-20).
How well integrated are freight corridors into the overall plan?	ODOT sponsored a statewide commodity flow survey in support of statewide travel model development (1).
What are the public safety concerns?	Heavy-weight trucks carrying farm products, clay and stone, pulp, and paper goods have an adverse impact on traffic flow. These movements are larger than most, occupy more road space, have poor operating characteristics (accelerating, decelerating, and ability to maintain speeds on grades), and are most likely of all truck movements to conflict with commuters (22).
What are the multimodal considerations?	The Portland-Metro region serves as the state's major trade hub, partly due to the proximity of world-class marine and rail terminals and two interstate highways (p. ii). Many goods shipped to outlying regions in Oregon from Portland-Metro travel via less-than-truckload (LTL) and small delivery trucks (iii). The movement of goods by private truck carriers is dominant in Oregon, despite the inherent costs and empty miles involved in running private fleets (iv); however, candidates for modal diversion are already taking advantage of other modes. Rail and barge carriers compete with truck carriers for low-valued, time-insensitive commodities, while high-valued express parceled freight competes with air modes and intermodal rail (iv).

Source Document:	**Oregon Freight Truck Commodity Flows: Analysis and Summary, 1998**
Cost Analysis:	A major cost consideration for drivers is the LTL status of many loads shipped on Oregon highways (iii), but general freight, usually heavier and higher value is the type most likely to move via multiple-trailer combinations, representing an economy-of-scale associated with moving more cargo per driver and vehicle mile. These multiple-trailer combination flows during off-peak periods result in transport cost savings (26).
Economic Analysis:	The Portland-Metro region has the role in the state economy of distribution hub for exporting high-valued general freight. Proximity to other transportation hubs heightens the region's ability to move freight. On a given day, 2,339 trucks haul 28 thousand tons of general freight worth $21.8 million to out-of-state and in-state destinations; over 60 percent are destined for markets external to Oregon's borders. By payload weight and economic value, however, California shipments have a greater impact on the general economy (24).
Performance Measures:	Not addressed in this document.
Data Collection:	Data collection consisted of an intercept survey of freight trucks at Oregon ports of entry (POEs) to collect weight, vehicle, and commodity classification, and origin-destination information, in which over 16,000 truck drivers were interviewed. The survey focused on long-haul truck movements on the Interstate and US Highway system (1).
Intelligent Transportation Systems Technologies:	Not addressed in this document.

State DOTs and Regional Coalitions: Oregon Department of Transportation

Source Document: Oregon Transportation Plan Update: Freight Issues (undated)	
Why designate freight corridors?	The National Highway System (NHS) is a federally designated system of roadways that are important to the nation's economy, defense, mobility, and freight transportation. NHS mileage accounts for about 49 percent of Oregon's state highway system. The NHS in Oregon includes approximately 59 miles of intermodal connectors (p. L-6).
Analysis framework for the designation of freight corridors:	Much of the movement of commodities throughout Oregon is concentrated along major freight corridors, with a significant portion of freight moving along highways, rail lines and waterways in the Interstate 5 (north-south) and Interstate 84 (east-west) corridors. Truck movements dominate the I-5 corridor, while I-84 sees significant movement of goods by truck, rail, and waterways (p. L-6).
What is the effect of border trade on freight corridors?	The Oregon Economic and Community Development Department reports that Canada, Japan, the Korean Republic, and the Philippines were Oregon's top trading partners in 2002. Over $1.4 billion in commodities were exported to Canada alone during 2002. In part due to NAFTA, Oregon's trade with Canada and Mexico is growing: Canada accounted for 80 percent of Oregon's NAFTA trade. Oregon's top export commodities by value include electrical machinery, general machinery, cereals, vehicles (excluding railway), optic and medical equipment and wood and paper products (p. L-2).
How well integrated are freight corridors into the overall plan?	The role of freight transportation has taken on a greater importance, in recent years, due to the increase in international and domestic trade by companies and consumers. Freight transportation and logistics management are being shaped by deregulation, changes in markets and trading patterns and new technologies. Improvements in freight productivity have helped the US maintain its competitive position, and federal and state legislation of the last ten years has elevated the importance of the movement of freight and its ties to the economy at the federal, state, and local planning levels (p. L-11)

Source Document: Oregon Transportation Plan Update: Freight Issues (undated)	
What are the public safety concerns?	Increasing freight movements is creating a worldwide demand for longer and heavier trucks, heavier rail cars, and bigger ships. Regulating authorities are becoming more liberal in increasing widths and lengths of carrying containers, which raises concerns about safety and maintenance of the roadway system and infrastructure (p. L-12).
What are the multimodal considerations?	Truck-rail facilities, including rail intermodal yards and commodity reload facilities are an important link in the freight transportation system. The majority of intermodal facilities involve trucks bringing in various products, which are then shipped out by rail. NHS intermodal connectors are located in Astoria, Boardman, Coos Bay-North Bend, Eugene, Medford, and Portland. Additionally, truck distribution centers, warehouses and other truck reload facilities involve goods arriving and leaving by truck , but commodities are brought to these facilities, stored for various amounts of time, and reloaded onto outgoing trucks, which are often destined for retailers. Oregon also has intermodal pipeline terminals for petroleum. In general, air, truck, and intermodal modes carry higher value commodities than the other modes of freight transportation. Rail, ship, barge, and pipeline modes carry lower value, bulk commodities (p. L-8, 9).
Cost Analysis:	It is critical to businesses and consumers that the costs associated with moving commodities are kept as affordable as possible. The cost of moving freight dropped from 16.1 percent of the US Gross Domestic Product (GDP) in 1980 to near 10 percent in 2000. The savings in freight costs enable companies to invest in equipment upgrades and work force developments and increase equity, benefiting both businesses and consumers (p. L-1).
Economic Analysis:	The value of goods moved in Oregon is expected to increase from $201 billion to $704 billion between 1998 and 2020; international freight shipments and commodity values are forecast to increase at a faster rate than domestic freight transportation through 2020. In total value of exports per capita, Oregon ranked ninth nationally, and it is estimated that for each $1 billion dollars of exported products 15,000 jobs are created in the region (pp. L-1, 2).

Source Document: Oregon Transportation Plan Update: Freight Issues (undated)	
Performance Measures:	Issues that can have a serious impact on freight performance in coming years include: capacity constraints and network limitations; maintenance and operational issues; security and safety; planning, funding, and programming challenges; and policy, regulatory and institutional concerns (p. L-16).
Data Collection:	The Oregon Department of Transportation is currently involved in a Statewide commodity Flow Study to develop better freight transportation information. The study will utilize base year 1997 data and develop forecasts to 2030. Baseline estimates of commodity flows are grouped by major commodities, by mode and by type of freight movement (internal, inbound, outbound, and through) (p. L-4).
Intelligent Transportation Systems Technologies:	ITS changes have occurred in two stages, the first being the transition from a paper-based to electronic system for information exchange. The second stage of change is the integration of real-time operations. Technologies include satellite location and communications systems, and the use of integrated information technologies. Part of the change is due to a shift from inventory-based logistics to "manufacture-to-order" logistics, also called "pull logistics." Global Position Systems (GPS), digital mapping and turn-by-turn voice instructions assist in navigation and tracking. GPS is enabling the rerouting of trucks around congested areas. Wireless connections via laptop or Personal Digital Assistant (PDA) and Electronic Data Interchange (EDI) systems are being used by larger long distance freight carriers for email, paperless forms, and activity reports. Radio Frequency Identification (RFID) is emerging as a way to track cargo and transmit product information, through non-contact reading of data through the use of a transponder (RFID tag). Automated Vehicle Identification (AVI) systems like the Green Light Program in Oregon, which provide weigh-in-motion pre-clearance on high-volume truck routes, are becoming more common on major highways. GPS is being used on some railroads to monitor the location, temperature, and other data of perishable railcars. In the maritime industry, Differential GPS (DGPS), Vessel Traffic Services (VTS) and Physical Oceanographic Real-Time Systems (PORTS) are increasing productivity, reliability, safety and security. These systems and other technological advancements provide real-time information on maritime operations such as the safe and orderly flow of vessels through

Source Document: Oregon Transportation Plan Update: Freight Issues (undated)	
	ports and waterways, tidal information, customs clearance, security, and hazardous material accidents. Also in use are electronic navigational charts, which are updated weekly. Aviation is also experiencing technology advancements including GPS approaches, navigation surveillance, weather prediction system improvements, and air traffic controller aids. Electronic container seals are being integrated into information systems to help create a secure intermodal electronic manifest system and reduce operations costs. Freight Information Real-Time System for Transport (FIRST) uses the internet to facilitate the safe, efficient, and secure movement of freight through the Port of New York and New Jersey. When fully developed, FIRST will enable port users to post and receive information on the location and status of intermodal freight shipments, including export bookings, customs manifests, receipts and invoices, gate moves, carrier insurance/credit status, delivery confirmation and truck identification (pp. L-14-16).

State DOTs and Regional Coalitions: Southern California Council of Governments and San Bernardino Associated Governments

Source Document:	**Subregional Freight Movement Truck Access Study, Southern California Association of Governments (SCAG) and Sand Bernardino Associated Governments (SBAG), 2004.**
Why designate freight corridors?	The main goal of the sub-regional freight movement truck access study was to help develop strategies and planning tools to improve the forecasting of goods movement and trucking trends and to better characterize truck access to intermodal facilities and truck activity centers in western San Bernardino and the Riverside County area (p. 4).
Analysis framework for the designation of freight corridors:	The major tasks of the study were to: document the designated truck routes and restrictions; research and document truck trip generation rates from national, regional, and local sources; collect and assemble truck classification counts from local and regional sources; identify high truck-related accident locations; conduct trucker surveys and shipper/carrier surveys; and to identify potential future truck-related problem areas and facilities (p. 4).
What is the effect of border trade on freight corridors?	Not addressed in this document.
How well integrated are freight corridors into the overall plan?	Not addressed in this document.
What are the public safety concerns?	Research shows that travel time delays due to congestion caused by traffic incidents account for as much as one half of total delay experienced by motorists. Incidents involving trucks are especially significant, since they typically result in larger highway closures and longer recovery times (p. 12).
What are the multimodal considerations?	Contrary to some perceptions, port-related truck trips are not a very significant percentage of overall regional Heavy Duty Truck (HDT) trips, constituting only about 4 percent of HDT trips generated at the ports of Los Angeles and Long Beach (p. 50).
Cost Analysis:	Not addressed in this document.
Economic Analysis:	Not addressed in this document.
Performance Measures:	Not addressed in this document.

Source Document:	**Subregional Freight Movement Truck Access Study, Southern California Association of Governments (SCAG) and Sand Bernardino Associated Governments (SBAG), 2004.**
Data Collection:	Local and regional data sources were used, including: vehicle classification counts along the three major interchanges in the sub-region; truck-related accident data; SCAG Regional Model rates, efforts by the City of Fontana, the Ports of Los Angeles, and Long Beach, and the Ontario Airport (pp. 4, 5).
Intelligent Transportation Systems Technologies:	Not addressed in this document.

State DOTs and Regional Organizations: Tennessee Department of Transportation

Source Document: Tennessee Long-Range Transportation Plan: Goals, Objectives, and Policies, Draft Report, 2005.	
Why designate freight corridors?	Not addressed in this document.
Analysis framework for the designation of freight corridors:	Creating a consistent statewide approach and establishing goals, objectives, and policies should relate to the state's long-term transportation challenges and opportunities (p. 1).
What is the effect of border trade on freight corridors?	Not addressed in this document.
How well integrated are freight corridors into the overall plan?	In the plan's guiding principle of supporting the state's economic development, the goal was stated, "make transportation investments to support economic growth, competitiveness, and tourism in Tennessee." Objectives of that goal include: provide aviation, highway, public transportation, rail, and waterway capacity to meet interstate and intrastate passenger and freight traffic needs; ensure infrastructure and transportation services are available to increase access to employment opportunities; and through partnerships of communities and regions, make transportation investments that support economic development by linking commercial/retail areas, tourist destinations, and other activity centers (p. ES, iv).
What are the public safety concerns?	Safety and security objectives include: reducing injuries, fatalities, and property damage in all modes of transportation; minimizing security risks at airports, water ports, rail stations, rest areas, roadways, bikeways, and public transportation facilities throughout the state; improving disaster, emergency, and incident response preparedness and recovery; minimizing construction-related safety impacts; and assessing security vulnerabilities (p. ES, iv).
What are the multimodal considerations?	TDOT has five modal plans including: the Tennessee Airport System Plan, the Intelligent Transportation System Strategic Plan, the Tennessee Rail System Plan, the Strategic Plan for Highway Incident Management in Tennessee, and the Tennessee Transit Tomorrow Plan. The five separate plans merge into a set of statewide overarching goals and objectives (p. 12).
Cost Analysis:	Not addressed in this document.
Economic Analysis:	Trends that are relevant to Tennessee's transportation needs include: population growth in Tennessee and surrounding states continues to grow, placing higher

Source Document:	**Tennessee Long-Range Transportation Plan: Goals, Objectives, and Policies, Draft Report, 2005.**
	demands on the state's transportation system; population growth in suburban and rural areas requires long travel distances to meet daily needs; and Tennessee's population is aging, and needs for other than automobile transportation are growing (p. 6). Tennessee continues to serve as conduit for interstate and international freight and goods movement and the role of heavy trucks is expected to increase. The state's freight system is becoming more intermodal, increasing the need for efficient connections between modes. There is growth in rail freight and "just-in-time inventory practices involving air freight (p. 8).
Performance Measures:	The goals of the state's performance measures implementation plan are to: rate system performance against established benchmarks that define expected performance standards; identify system problems or deficiencies and opportunities for improvement; guide allocation of resources; and assess success of resource allocation (p. 22).
Data Collection:	This goals and objectives report was based on: federal and state guidance, TDOT Guiding Principles, Tennessee trends and transportation challenges, operating and investment policies, and modal options (p. ES, ii).
Intelligent Transportation Systems Technologies:	It is acknowledged in the study that high-tech solutions will continue to evolve. Challenges raised by the study are to: implement ITS systems and traffic incident management infrastructure to facilitate more efficient operations of major transportation investments; improve voice and data communication for use in emergency situations; improve integration of transportation systems and emergency management operations; involve emergency management and law enforcement agencies in all stages of transportation planning, design, construction, operations, and maintenance; and to define the role and responsibility of technology in handling freight (p. 8).

State DOTs and Regional Organizations: Texas Department of Transportation

Source Document:	**Texas Department of Transportation: Effect of the North American Free Trade Agreement on the Texas Highway System, 1998.**
Why designate freight corridors?	Thirteen highway corridors in Texas carry almost 90% of NAFTA truck traffic (p. 18).
Analysis framework for the designation of freight corridors:	Trade corridor legislation (1990s). High priority corridor feasibility to study for increasing the infrastructure on specific highway segments that carry heavy loads of NAFTA traffic (p. 9).
What is the effect of border trade on freight corridors?	NAFTA trade is hampered by choke points at the border. Problems include infrastructure problems, border clearance through numerous state and federal agencies, paperwork, staffing issues, and institutional and cultural issues (p. 2). In 1996 it was estimated that 90% of NAFTA traffic traveled to or through Texas (p. 18).
How well integrated are freight corridors into the overall plan?	**Transportation Needs Revenue Assessment**—depicts four 10-year scenarios—Losing Ground, Holding the Line, Gaining Ground, and Meeting Optimum Needs—focuses on TxDOT's areas of responsibility for highways, bridges, public transit, general aviation, and the Gulf Intracoastal Waterway for the period 1997-2006 (p. 32).
What are the public safety concerns?	Air pollution, congestion, accidents, wear and tear on roadways, noise pollution, and fuel consumption. Additionally the study proposes to add substantially to safe use of highways, such as widening highway lanes or shoulders to help avoid accidents (pp. 24-26).
What are the multimodal considerations?	Not addressed in this document.
Cost Analysis:	Social costs—congestion, accidents, air pollution, and noise pollution. Capital costs—preservation, mobility, and safety. 1996 total cost estimate for NAFTA travel in Texas: $510.8M (pp. 4-6).
Economic Analysis:	Not addressed in this document.
Performance Measures:	Purpose: to provide a snapshot estimate of NAFTA-related truck traffic in 1996; developing estimates of impacts of NAFTA truck traffic on Texas citizens and the costs of highway improvements that help mitigate the impact (p. 8).
Data Collection:	**Origin-Destination Survey**; **Statewide Analysis Model**; Programming of specific projects (p. 8). **US-Mexico Binational Transportation Planning and**

Source Document:	**Texas Department of Transportation: Effect of the North American Free Trade Agreement on the Texas Highway System, 1998.**
	Programming Study (Binational Study)—to establish a continuous US-Mexico binational transportation planning and programming process (p. 31). **Texas Highway Freight Commodity Flow Project 1104**—to develop information indicating types and volumes of commodities moving over the highway system for truck mode only (p. 31). **Transportation Needs Revenue Assessment (p. 32)** **1997 Federal Highway Cost Allocation Study (FHCAS)**—analyzes highway-related costs attributable to different types of vehicles in order to establish federal highway user charges (p. 32). **Transportation Research Board Special Report 246**—reviews available data for evaluating the impacts of freight transportation (p. 32).
Intelligent Transportation Systems Technologies:	Not addressed in this document.

State DOTs and Regional Organizations: Virginia Transportation Research Council

Source Document:	**Application of a Statewide Intermodal Freight Planning Methodology, 2001**
Why designate freight corridors?	The purpose of the project was to implement a system inventory to provide a foundation for identifying problems in Virginia's freight transportation system, establishing performance measures, and developing and evaluating alternatives for improving the efficient flow of freight within Virginia. (p. 1)
Analysis framework for the designation of freight corridors:	Anticipating the need for Virginia to comply with freight planning guidelines outlined by the Intermodal Surface Transportation Efficiency Act (ISTEA) and TEA-21, the Virginia Transportation Research Council developed s a Statewide Intermodal Freight Transportation Planning Methodology. (p. 1)
What is the effect of border trade on freight corridors?	Not addressed in this document.
How well integrated are freight corridors into the overall plan?	When fully implemented, the methodology can be used by the Virginia Department of Transportation's (VDOT) Transportation Planning Division (TPD) and the Virginia Department of Rail and Public Transportation (VDRPT) to identify and evaluate infrastructure improvements. (p. 1)
What are the public safety concerns?	Not addressed in this document.
What are the multimodal considerations?	During this study Virginia's first Freight Advisory Committee (FAC) was established, and present at their inaugural meeting were: the VDOT, the VDRPT, the Virginia Transportation Research Council, the Virginia Port Authority, the Virginia Economic Development Partnership, Norfolk Southern Railroad, Virginia Rail Association, Wyatt Transfer, Inc. (a private drayage company), Virginia Trucking Association, and the Federal Aviation Administration. (pp. 8-11)
Cost Analysis:	Not addressed in this document.
Economic Analysis:	A freight forecasting model was developed for analyzing freight generation, freight attraction, trip distribution, mode choice analysis, and traffic assignment. (pp. 21-32)

Source Document:	**Application of a Statewide Intermodal Freight Planning Methodology, 2001**
Performance Measures:	The project resulted in the development of the FAC, contributions to the freight transportation Geographic Information System (GIS) database, key commodity flow data, and freight generation and attraction relationships, all of which can be used in the development of performance measures in the implementation phase. (p. 33)
Data Collection:	Several data types from public and private sources were collected and analyzed during the project, including transportation infrastructure data, commodity flow data (employing the U. S. Bureau of Transportation Statistics Commodity Flow Survey, the TRANSEACRH Database, and Virginia Port Authority Import/Export Statistics), as well as socioeconomic data (including population data, employment data, and geographical data). (pp. 10-16)
Intelligent Transportation Systems Technologies:	A recommendation of the study is that VDOT use the spatial analysis functions of the freight transportation GIS database as a freight planning tool. The tool can display key commodity flows moving along Virginia's freight transportation network, allows identification of current and projected bottlenecks, and could help VDOT determine where to locate intermodal facilities to take advantage of freight flows. Additionally, the land use, population, and employment information included in the database could be used to determine the safest route for shipping hazardous material. (p. 34)

State DOTs and Regional Organizations: Washington State Department of Transportation

Source Document:	**Measuring Performance in Difficult-to-Measure Areas: Freight Systems, 2004**
Why designate freight corridors?	Not addressed in this document.
Analysis framework for the designation of freight corridors:	Logistics in the freight planning process plan, implement, and control the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet customers' requirements (p. 17).
What is the effect of border trade on freight corridors?	Washington State freight customers include: International and national trade through Washington gateways; Washington State's own producers and manufacturers, and distribution, wholesale, and retail (p. 5). Eighty-five percent of wheat produced in southeast Washington is shipped to international markets (p. 9).
How well integrated are freight corridors into the overall plan?	Washington's regions have built distinct economies based on industry and agriculture. Major transportation issues include: Columbia/Snake River channel and lock maintenance and preservation; I-90 Snoqualmie Pass improvements to avoid winter weather closures; year-round freight corridor on county-state road system; and adequate grain storage at the right locations (pp. 7, 12).
What are the public safety concerns?	Not addressed in this document.
What are the multimodal considerations?	92% of South East Washington wheat is shipped to Columbia River ports; 51% by truck/barge; 19% by bulk rail; 30% truck to storage or non-bulk rail. Modal choices are at risk in the following ways: barge due to environmental issues and federal policies; truck due to weight restrictions on local roads during spring thaw; rail branch lines and short line rail that ship low volumes cannot recoup capital costs and may be short lined or abandoned (p. 12).
Cost Analysis:	Compares Commercial Vehicle Information and System Networking (CVISN) and WIM approaches in Bypass Events, Dollars Saved, and Hours Saved (p. 3).
Economic Analysis:	Determination of highest priority of the freight system for Washington State Distribution Sector (WSDS): On-time? Price? Reliable trip time? (p. 15)

Source Document:	**Measuring Performance in Difficult-to-Measure Areas: Freight Systems, 2004**
Performance Measures:	Development of strategies for improving performance. Identify key performance drivers and gather baseline data about the problem. Freight problems require supply chain analysis. Analyze the data to determine patterns. Ask customers and process operators for insights. Gather additional data as suggested. Determine root causes of gap (p. 19).
Data Collection:	Proposes to design a performance measures plan based on: documentation of customer requirements of the freight system; measurement of current freight system performance in terms relating to customer requirements; and to write a problem statement—based on facts and data—showing gaps between actual and expected performance (p. 8).
Intelligent Transportation Systems Technologies:	Not addressed in this document.

APPENDIX B: US DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION

Source Document: FHWA Freight Transportation Planning Workshop, 2002.	
Why designate freight corridors?	The purpose of this workshop was to identify/begin development of workable approaches that can help assist states/ MPOs to further integrate freight interests and considerations in the transportation planning process (summary, slide 2).
Analysis framework for the designation of freight corridors:	Specific tasks of the workshop were to: examine the current transportation planning process; improve understanding of the current transportation planning process; assess the ability of the planning process to respond to freight issues; identify opportunities for improvements that will enhance freight planning; and to define changes necessary to make opportunities work (summary, slide 2).
What is the effect of border trade on freight corridors?	Not addressed in this document.
How well integrated are freight corridors into the overall plan?	The process looked at multiple perspectives represented through: states, MPOs, federal, private sector, planners, engineers, business, and administrators (summary, slide 3). A weakness pointed out in the workshop is that there currently is lack of participation on the part of the trucking and rail industries in the freight planning process (summary, slide 8).
What are the public safety concerns?	Not addressed in this document.
What are the multimodal considerations?	An outcome was that stakeholders need to think in terms of "freight" and "transportation" rather than modes (summary, slide 4).
Cost Analysis:	Difficulties in dealing with costs of integrating transportation systems have to do with: the length of time required to get major investments approved; financial constraints limit vision; inadequate emphasis on private sector perspectives; incompatible timeframes between public and private sector; insufficient prioritization is done; and a constantly changing political landscape (summary, slide 13). Financial plans should be developed that co-mingle funds and cross jurisdictions (summary, slide 17).
Economic Analysis:	Not addressed in this document.
Performance Measures:	There needs to be freight-specific performance measures (summary, slide 4). Deficiencies exist in: resources to conduct a freight needs analysis; the process is too

Source Document: FHWA Freight Transportation Planning Workshop, 2002.	
	technical for decision-makers; needs tend to focus on passenger versus freight; corridor-specific needs identification is critical, but requires more resources; the private sector is not adequately consulted; lack of consensus in dealing with private freight infrastructure in public processes; and, freight issues are difficult to quantify (summary, slide 11). The consensus of the workshop was that freight should have a higher priority, and that the perspective should be switched to one of moving people and commodities rather than modes of transportation. A tool should be developed to get freight perspective into transportation planning. Evaluation tools for all modes need to be improved (summary, slide 18).
Data Collection:	Although data is available and collected, it is not effectively used; there is a general lack of awareness of what data are available; much data collected is not timely; data tend to be stratified by mode, and not linked to economic development data; lack of trust in data collection resulting in duplication of effort; and intermodal data are not currently available (summary, slide 9). Suggested solutions include: creating a freight data architecture; develop best practices for using, analyzing and presenting what is relevant to decision makers. USDOT should coordinate strategy for data/decision needs and obtaining data, and data collection methods need to assure an intermodal/freight perspective (summary, slide 17).
Intelligent Transportation Systems Technologies:	Not addressed in this document.

US Department of Transportation, Federal Highway Administration

Source Document:	**Freight Provisions in SAFETEA-LU, FHWA, US Department of Transportation, 2005**
Why designate freight corridors?	The National Corridor Infrastructure Improvement Program (1302) makes provisions to: connect existing highway system segments; facilitate regional mobility; serve increasing freight volume; serve international freight volume; reduce congestion and travel time; serve high-value cargo; and use innovative financing (p. 9 [slide 17]).
Analysis framework for the designation of freight corridors:	In the National Corridor Infrastructure Improvement Program (1302) the secretary works toward FHWA establishing a program for receiving grant applications and develops criteria for selection for states, and for projects in corridors of national significance to promote economic growth and international or interregional trade (p. 9 [slide 17]).
What is the effect of border trade on freight corridors?	In the Coordinated Border Infrastructure Program (1303) the secretary works to establish a formula distribution program for Border States; designates program funds to be used to construct transportation and supporting infrastructure, make operational improvements, modify regulatory procedures, and coordinate international planning and operations within the border region (within 200 miles of the border); and designates $833 million over 5 years (2005-2009) (p. 10 [slide 19]).
How well integrated are freight corridors into the overall plan?	The Act designates the *National Surface Transportation Policy and Revenue Study Commission (1909)* and the *National Surface Transportation Infrastructure Financing Commission (11-1142)* (p. 10 [slide 20]).
What are the public safety concerns?	Not addressed in this document.
What are the multimodal considerations?	The National Intermodal System Improvement Plan: will include emerging trends that could impact the national system, recommended intermodal research and development, policy, transportation decision-making, financing, etc., and will house the Office of Intermodolism (p. 11 [slide 22]).
Cost Analysis:	The SAFETEA-LU builds on the strong foundation of ISTEA and TEA-21. This is demonstrated through: funding increases to an average of $49 billion per year from the average of $33 billion per year in TEA-21. The Act contains many programs aimed at improving global connectivity, freight mobility and economic productivity; and encourages creativity and finding new ways to solve existing problems (p. 1 [slide 1]). Included in funding by

Source Document: Freight Provisions in SAFETEA-LU, FHWA, US Department of Transportation, 2005	
	the Act are Programmatic Freight Provisions including: the Freight Intermodal Distribution Pilot Grant Program; Truck Parking Facilities; Training and Education; and the National Cooperative Freight Transportation Research Program. Financial Freight Provisions include: the Transportation Infrastructure Finance and Innovation Act; state infrastructure banks; tax-exempt financing of highway projects and rail truck transfer facilities; capital grants for rail line relocation projects; and rehabilitation and improvement financing (p. 2 [slide 4]).
Economic Analysis:	The Freight Planning and Capacity Building Program is an initiative to support enhancements to freight planning to better target investment and to strengthen decision-making capacity of State and local agencies; eligible activities under the program include research, training and education in best practices, peer exchange, data and analysis, agency reorganization, public-private relationship building (p. 5 [slide 10]).
Performance Measures:	Not addressed in this document.
Data Collection:	Studies involved in the development of the Act include: the Study of Rail Transportation and Regulation (9007); the Motor Carrier Efficiency Study (5503); the Community Enhancement Study (1925); and the National Intermodal System Improvement Plan (4149) (p. 11 [slide 22]).
Intelligent Transportation Systems Technologies:	Among the ITS technologies included in the Act, as part of the Motor Carrier Efficiency Study, wireless technologies will be evaluated to reduce identified deficiencies (p. 11 [slide 21]). Another area of development in ITS is the establishment of a Real-Time Systems Management Information Program that establishes the capability in all states to provide real time monitoring of traffic conditions and sharing of information. The purpose of the program is to ease congestion, improve response to severe weather, accidents, and other incidents, as well as to provide enhanced security (p. 13 [slide 25]).

US Department of Transportation Region 5, Federal Highway Administration and the Ohio Department of Transportation

Source Document: Upper Midwest Freight Corridor Study, 2005	
Why designate freight corridors?	The Upper Midwest states are the economic and geographic crossroads of the nation: US and Canadian railroads converge in Chicago; major interstate roadways link the states to each other; ports on the Great Lakes and major rivers carry goods around the nation and to the world; and the Upper Midwest region is influenced by a strong and growing economy in Ontario (p. E. S. 1).
Analysis framework for the designation of freight corridors:	Issues pertaining to the critical need for focusing on the freight corridors of the Upper Midwest Region are that: the free and efficient movement of freight is critical to the economy of the region; the states of the region are very important in their mutual economies; congestion in all modes is significant; the region could benefit from greater cooperation in implementing performance measures, from greater efforts to collect freight-related data; and from a cooperative approach to addressing the challenges of freight. In creating a no-action scenario based on projections of increased usage of freight corridors, the outlook is dire (pp. E.S. 1, 2).
What is the effect of border trade on freight corridors?	The North American International Trade Corridor (I-35) is an example of private and public sector organizations that have worked together to form a high-tech transportation corridor in the center of the U.S. A not-for-profit corporation named North America's Supercorridor Coalition, Inc. (NASCO) represents several major companies and jurisdictions along the corridor, including: banks, industrial and retail shippers, and transportation associations. This cooperative arrangement links the corridor along the way from Canada to Mexico (p. 37).
How well integrated are freight corridors into the overall plan?	The Upper Midwest Region recognizes that regional cooperation is essential to the continued transportation planning and enhancements in the region. Areas for consideration include: funding, organizational structure, decision-making process, identification of catalysts and private sector involvement (p. E.S. 6).

Source Document: Upper Midwest Freight Corridor Study, 2005	
What are the public safety concerns?	Measures of safety are integrated into the performance measures plan of the Upper Midwest Freight Corridor Study (UMFCS), including employee safety, vehicle safety, and road-worthiness. The measures relating to these factors respectively are personal injuries per mile of travel, severity of crashes, and out-of-service citations (p. 57).
What are the multimodal considerations?	Freight transport by rail, water, air, and highways can be managed by either the private or public sector, and are subject to a wide range of administrative issues. Rail is managed by the private sector and operates in an exclusive right-of-way. Freight that is transported by water is mostly private sector, but regulated by public actions. The Federal Aviation Administration (FAA) heavily regulates air freight, and federal regulations govern freight that is transported on federally funded roads. State and local agencies may impose or exempt size and weight regulations on state roads (p. 76).
Cost Analysis:	A number of measures have been developed from different sources that can be used to compute costs related to transporting freight cargo. Among those are: cost of highway freight per ton-mile; cargo insurance rates; point-to-point travel times on selected freight-significant highways; hours of delay per 1,000 vehicle miles on selected freight-significant highways; crossing times at international borders; condition of connectors between intermodal terminals; customer satisfaction; emission factors; energy consumption rates; acres of sensitive habitat removed; processing facility hours of delay; cost per ton; delay costs; and public costs (p. 62).

Source Document: Upper Midwest Freight Corridor Study, 2005	
Economic Analysis:	In the Upper Midwest region, trade from one state to another is an important part of every state's economy. A multi-state regional approach to freight planning has been recommended, using a multi-jurisdictional approach (pp. 33, 34). The region accounts for roughly one-third of total freight activities in the U.S. In terms of tonnage, freight activity in the region is dominated by intrastate truck shipments, however low-value shipments such as gravel and non-metallic minerals account for about 30% of all the intrastate truck freight movements, indicating negligible economic significance. In terms of rail shipments, roughly 70% of shipments in the study region are either coal, metallic ores, or cereal grains. Also rail freight is significant for the region's automobile-related industries. Intermodal freight systems are most often used on long-distance shipments of high-value commodities, but a high percentage of the shipments are outbound. The waterway system in the region generally transports low-value, time-sensitive freight, but the advantage is in the tonnage of freight, which is over 50% by value. For air freight, approximately 60 to 70% of the total value can be attributed to precision machinery such as electronic equipment, suggesting a narrow market niche for the air freight industry (pp. 194-196).
Performance Measures:	The research team posed the following five questions: (1) What is the current state of the art in performance measurement? (2) Which aspects of freight movement are most important for the success of the region? (3) What opinions are held in the freight stakeholder community on measurement? (4) What is the experience of transportation organizations in performance measurement related to freight? (5) What sources of data might be found to support performance measures? (p. 18)
Data Collection:	Data were collected for Ontario, Ohio, Manitoba, Iowa, Michigan, Wisconsin, and MPOs. The types of data collected included: roadside survey of carriers; truck counts; commodity flow data; link volume data; crash records; Transearch data; port studies and plans; turnpike gate-to-gate flows; major shippers survey; border crossing data; weight data; railroad waybill data; and economic value of freight (p. 25).

Source Document: Upper Midwest Freight Corridor Study, 2005	
Intelligent Transportation Systems Technologies:	CVISN refers to the collection of information systems and communications networks that support commercial vehicle operations (CVO). CVISN aims to provide end-to-end automation of the credentialing process, including: registering operators, registering and titling vehicles, checking insurance, collecting and distributing fuel taxes, issuing oversize/overweight (OS/OW) permits, licensing and permitting of the transport of hazardous materials, and collecting federal heavy-vehicle use tax. Features of the program include: end-to-end electronic application and processing of credentials; use of PC-based and web-based software to submit applications for credentials; printing of permanent or temporary credentials in carrier offices; and interface with International Registration Plan (IRP) and International Fuel Tax Agreement (IFTA) clearinghouses (pp. 88, 89).

APPENDIX C: PROFESSIONAL ORGANIZATIONS

Professional Organizations: AASHTO

Source Document:	**Transportation: Invest in America—Freight Rail Bottom Line Report, American Association of State Highway and Transportation Officials**
Why designate freight corridors?	This report addresses concerns about the capacity of the nation's freight transportation system, especially the freight-rail system, to keep pace with the expected growth of the economy over the next 20 years. The report finds that relatively small public investments in the nation's freight railroads can be leveraged into relatively large public benefits for the nation's highway infrastructure, highway users, and freight shippers (p. 1).
Analysis framework for the designation of freight corridors:	Trucks move most of the nation's freight and will continue to do so, but freight rail is critical to the freight transportation system, the competitiveness of many industries, and the economies of most states (p. 1).
What is the effect of border trade on freight corridors?	Freight rail, in partnership with the trucking industry, provides intermodal transportation connecting US seaports with inland producers and consumers. Freight rail carries 16 percent of the nation's cross-border NAFTA trade. Intermodal freight-rail service is crucial to the global competitiveness of US industries (p. 1).
How well integrated are freight corridors into the overall plan?	Public participation in rail system investments has historically addressed the bottom of the system: grade crossings, branch lines, and commuter rail service. This report recommends a greater focus on public-private partnerships for the management of the freight rail system. In forming this partnership, there needs to be clear articulation of national policy for improving freight system productivity, expanding opportunities for states to invest in the rail system, and extending these partnerships beyond state boundaries (p. 5).
What are the public safety concerns?	Freight rail is fuel-efficient and generates less air pollution per ton-mile than trucking. Rail also is a preferred mode for hazardous materials shipments because of its positive safety record (p. 2).

Source Document:	Transportation: Invest in America—Freight Rail Bottom Line Report, American Association of State Highway and Transportation Officials
What are the multimodal considerations?	Rail is critical to the competitiveness of many industries and the economies of many states: it provides the long-distance, line-haul component of truck-rail intermodal moves; it serves the nation's seaports and facilitates international trade; it strengthens national security by permitting rapid military mobilization; and rail provides system redundancy when highway or aviation services are disrupted (p. 7).
Cost Analysis:	The freight-rail system carries 16 percent of the nation's freight by tonnage, accounting for 28 percent of total tone-miles, 40 percent of inter-city ton miles, and six percent of freight value. If all freight-rail were shifted to trucks, it would add 92 billion truck vehicle-miles-of-travel (VMT) to the highway system and cost federal, state, and local transportation agencies an additional $64 billion for highway improvements over the next 20 years (p. 1).
Economic Analysis:	Freight rail provides shippers with cost-effective transportation, especially for heavy and bulky commodities, and can be a critical factor in retaining and attracting industries that are central to state and regional economies. If all freight-rail were shifted to trucks, it would cost current rail shippers an additional $69 billion this year, and over $1.4 trillion over the next 20 years (p. 1).
Performance Measures:	In terms of productivity and service, measurable outcomes include: ton-miles handled per railroad employee; operational savings resulting from railroad improvements, such as the introduction of double-stack trains, improved track and network rationalization, investment in computers and communications equipment, reduction in crews, and improved fuel efficiency; costs, and shipment visibility, meaning the ability to use advanced tracking technologies and web-based services to track shipments by real time, and reroute as needed; and reliability (pp. 34, 35).
Data Collection:	Data used for this study were pulled from TRANSEARCH year 2000 database, Eno Foundation, "Transportation in America" series, and the USDOT Freight Analysis Framework Project (pp. 13, 14).

Source Document:	Transportation: Invest in America—Freight Rail Bottom Line Report, American Association of State Highway and Transportation Officials
Intelligent Transportation Systems Technologies:	Recent advancements in freight rail service revolve around containerization, which efficiently links shipping, trucks, and double stack trains, communication technologies that make possible the management of global freight flows, and reduction to trade barriers such as NAFTA, the collapse of the communist bloc, and the formation of the European Union (p. 10).

Professional Organizations: American Transportation Research Institute

Source Document: Measuring Travel Time in Freight Significant Corridors, American Transportation Research Institute (ATRI), 2005.	
Why designate freight corridors?	The US freight distribution system is the largest and most complex in the world, moving several billion tons of goods to domestic and international markets; all sectors of the freight industry are experiencing regular growth rates of 5% or more—meaning freight movement could double in a twenty-year time frame (p. 1).
Analysis framework for the designation of freight corridors:	In response to this economic growth, the FHWA contracted with the ATRI to develop and test a national system for monitoring freight performance measures (FPM) on key interstate corridors (p. 1).
What is the effect of border trade on freight corridors?	It is proposed that FPM be developed and monitored at border crossings, but additional data types and data collection tools may be needed (p. 2).
How well integrated are freight corridors into the overall plan?	Not addressed in this document.
What are the public safety concerns?	Not addressed in this document.
What are the multimodal considerations?	Not addressed in this document.
Cost Analysis:	Not addressed in this document.
Economic Analysis:	Not addressed in this document.
Performance Measures:	When average travel rates are determined for thousands of trucks over a period of time, stable measures develop that identify freight movement inefficiencies due to traffic conditions, infrastructure conditions, or other factors (p. 2).
Data Collection:	Using satellite data from a technology vendor, ATRI measured average travel rates for five freight-significant corridors (I-5, I-10, I-70, I-45, and I-65). The data were used to derive average travel rates and two additional measures, a Travel Time Index (TTI) and a Buffer Index (BI). Data is electronically cleansed to ensure anonymity and is then processed through a series of customized software programs to generate measures, and plotted along a US corridor map (p. 1).
Intelligent Transportation Systems Technologies:	The FPM initiative employs advanced vehicle tracking technologies, advanced data processing software and algorithms, and diverse mapping capabilities (p. 1).

Professional Organizations: American Transportation Research Institute and the University of Minnesota

Source Document:	**Homeland Security and the Trucking Industry, University of Minnesota, American Transportation Research Institute, 2005.**
Why designate freight corridors?	Not addressed in this document.
Analysis framework for the designation of freight corridors:	Homeland Security and the trucking industry focuses on three broad categories in terms of developing a more secure trucking industry, those being cargo, assets/conveyance/ facilities, and personnel (p. 6).
What is the effect of border trade on freight corridors?	Many agencies have direct or indirect oversight of the trucking industry; one analysis concluded that there are more than 25 different jurisdictions charged with managing US-Canadian cross-border freight movements (p. 7).
How well integrated are freight corridors into the overall plan?	There are new congressionally-mandated agencies and programs with a focus on motor carrier security. There are also new programs—both voluntary and mandatory—which have been created by pre-9/11 jurisdictions, and there are new entities still being considered (p. 7).
What are the public safety concerns?	Historical references to security in the trucking industry have almost always related to some variation of crime, cargo theft, trucking safety or personal protection for drivers. Prior to September 11, 2001, trucks were not a typical target—or conduit—for terrorism. Here in the US there have only been one or two isolated cases where large trucks were used as weapons, and in those instances it was not part of an organized campaign but a disturbed individual. However, it is acknowledged that the trucking industry possesses some important attributes associated with terrorism including access, sizeable volumes, adequate kinetic energy, and an open operational environment. Therefore, there has been considerable attention paid to the trucking industry by politicians, law enforcement personnel, and national security analysts (p. 5).
What are the multimodal considerations?	Not addressed in this document.
Cost Analysis:	Not addressed in this document.

Source Document:	**Homeland Security and the Trucking Industry, University of Minnesota, American Transportation Research Institute, 2005.**
Economic Analysis:	Seventy-two percent of communities in the US are served exclusively by truck. The trucking industry's ability to respond rapidly to changes in economic supply and demand has made it the largest single freight mode in the world in terms of both tonnage moved and freight revenue. The industry suffers from severe competition, low operating margins, critical driver shortages, and a growing gap in size, sophistication, and resources between small and large carriers. The criticality and complexity of the trucking industry may increase its security vulnerabilities and threats (p. 7).
Performance Measures:	Not addressed in this document.
Data Collection:	Motor carriers have worked with security stakeholders to research, analyze, develop, and sometimes invest in a host of programs, strategies, and technologies that directly or indirectly address security concerns. Until appropriate risk assessments are performed, solutions cannot be applied. Unfortunately, it is nearly impossible to identify and institute valid solutions without comprehensive risk and threat assessments (p. 6).
Intelligent Transportation Systems Technologies:	New and emerging technologies have been identified and/or reviewed for industry applications; these include electronic seals (for cargo management) and biometric identification systems (for personnel management). It is acknowledged by the report that the trucking industry security technology field was developed in response to the events of 9/11/2001, and is less than four years old at this writing. A common technology error is extrapolating and inferring security benefits from one industry sector or application to another (pp. 6, 7).

Professional Organizations: Western Transportation Trade Network

Source Document: Western Transportation Trade Network, Phase II, 1999	
Why designate freight corridors?	The purpose of the Western Transportation Trade Network (WTTN) is to promote economic growth and to maximize regional trade opportunities among Canada, the United States, and Mexico by defining and implementing a multimodal transportation network (p. 1-1). Thirteen Western states participated in the study, and the states defined the characteristics of a trade corridor as follows. A trade corridor should: be multi-state in nature; connect significant end points; be a wide, multimodal corridor; not be highway-or rail line-specific; carry regionally significant freight; serve intermodal facilities; serve international border crossings; serve important economic centers; include selected NHS highways; include selected railroad main lines; reflect future trade expectations; connect with out-of-region corridors; and comprise all movement directions (Ch. 1, pp. 5, 6).
Analysis framework for the designation of freight corridors:	The objectives of the WTTN were to: develop a coalition of state DOTs; collect an adequate level of information on trade in order to forecast and address network deficiencies and needs; develop a standardized database of information to support network investment decisions; and to define performance objectives of the multimodal transportation and trade network and identify performance measures descriptive of the network (Ch. 1, p. 2).
What is the effect of border trade on freight corridors?	Recommendations for improvement suggested by the Highway Analysis portion of the study involve several international borders, those being: **Corridor 7, Mexico-Canada**—pavement condition improvements and future capacity improvements, specifically in correcting urban congestion deficiencies in Los Angeles, San Francisco, Portland, and Seattle; **Corridor 9, Boise-Canada**—The three two-lane highways in this corridor have the most extensive menu of solutions, and is the corridor most in need of improvement; **Corridor 10, Mexico-Canada (Canamex)**—This corridor includes a variety of solutions menu items, primarily improve roadway geometrics, reconstruct roadways without adding lanes as well as both exiting and future capacity improvements; **Corridor 12, Montana-Canada—** Increasing shoulder widths is the primary solution item noted; **Corridor 13, Canada-Minneapolis-Chicago**—Isolated pavement condition improvements

Source Document: Western Transportation Trade Network, Phase II, 1999	
	suggested; **Corridor 15, Mexico-Arizona**—no significant solutions items recommended; **Corridor 16, Mexico-I-90**—Improving pavement conditions is the most recurrent menu item for this corridor, also some roadway geometrics and roadway reconstruction; **Corridor 17, Mexico-Canada/Midwest**—Improving capacity deficiencies, both existing and future, along with improving pavement conditions; **Corridor 20, Montana-Canada**—Increase shoulder widths (Ch. 3, pp. 63-66). The border states have experienced a great deal of trade growth since the introduction of NAFTA, and trade through the states of Arizona, California, and New Mexico is expected to grow by a factor of almost five times by 2020 (Ch. 6, p. 3). NAFTA has led to the development of a North American trade and industrial complex. The growth of NAFTA-related freight densities is helping to improve transportation service levels, and NAFTA trade is characteristically high value, and just-in- time (JIT), which places pressure on more efficient modes of delivery (Ch.6, p. 4).
How well integrated are freight corridors into the overall plan?	The WTTN study has facilitated conversations among state DOTs to: recognize the importance of properly incorporating freight issues and needs into their transportation planning programs; increase interest in trade corridors, border crossings, the relationship between transportation and economic development, and freight transportation in general; recognize the need to place each "trade corridor in proper perspective; and that trade and freight transportation needs seem to be increasing in importance (Ch. 6, p. 1).
What are the public safety concerns?	Roadway conditions are continually monitored for such issues as pavement condition, speed limit, weighted design speed, and possible roadway operational deficiencies. Conditions are given ratings ranging from A—free flow (low volumes and high speeds) to F—forced flow (volumes exceed capacity, slow speeds, frequent stoppages) (Ch. 3, pp. 7-13).

Source Document: Western Transportation Trade Network, Phase II, 1999	
What are the multimodal considerations?	According to the WTTN plan, multimodalism refers to modal *choices* in the same corridor, whereas an *intermodal* transportation system is an operationally-based transportation network (consisting of public and private infrastructure) for moving people and goods *using combinations of transportation modes* for the same trip (Ch. 5, p. 1). While trucking will continue to play an important role, modal optimization is a key to gaining benefits from NAFTA trade (Ch. 6, p. 6).
Cost Analysis:	With increasing trade many transportation deficiencies have been identified, including: infrastructure deficiencies in urban and rural settings; geometrics/surface conditions and capacity/congestion deficiencies; and rail line deficiencies. There are insufficient funds available in states, and federal and local agencies to effectively deal with this magnitude of infrastructure deficiencies, therefore, priorities and prioritization processes are needed—within corridors, between corridors, within and between modes, between projects, and within and between participating WTTN states (Ch. 6, p. 14).
Economic Analysis:	The study examines cost benefits in terms of a multimodal approach. For example, double tracking a congested single-track railway may provide for more reliable transit times. The resulting transit time improvements may, in turn, allow shippers to maintain lower inventories thereby reducing carrying costs. Consequently, to the extent that truckloads are drawn off congested highways and onto reliable railroads, there will be less congestion on highways for the trucks and cars that remain. Less congestion will result in faster transit time and less delay resulting in wasted fuel. Further, as shippers divert their truckloads to railroads more capable of moving trains reliably, highway maintenance costs will be reduced, resulting in savings in public taxes (Ch. 4, pp. 31-32).
Performance Measures:	For the highway analysis portion of the study, a performance analysis process was developed based on the ability to quantify the following four indicators of truck performance: operating cost, operating speed, safety, and reliability (Ch. 3, p. 1). In terms of rail, performance measures were established concerning reliable transit times, car availability, cost of rail transport services, speed of shipments, and damage-free service (Ch. 4, p. 3).

Source Document: Western Transportation Trade Network, Phase II, 1999	
Data Collection:	The FHWA Highway Performance Monitoring System (HPMS), the nation's highway database, is supported by a suite of computer software that uses HPMS data to calculate performance characteristics, estimate capital needs by functional classification and category, model traffic growth and pavement deterioration, calculate capacity and congestion, and other factors over time. Information produced by HPMS is used by transportation agencies, the FHWA, and other agencies, and also is used to compute the apportionment of some federal highway funding (Ch. 3, p. 4).
Intelligent Transportation Systems Technologies:	The study does not state an overall plan for the integration of ITS technologies. Aspects of ITS are evident within the individual modes, including technology improvements for rail such as surveillance cameras to identify traffic congestions areas, variable message signs on major routes, and improved communication between ports and trucks to better manage truck arrivals and departures (Ch. 5, p. 66).

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