THE FREIGHT STORY

A National Perspective
on Enhancing Freight Transportation

U.S. Department of Transportation
Federal Highway Administration

THE FREIGHT STORY:
A NATIONAL PERSPECTIVE ON ENHANCING FREIGHT TRANSPORTATION

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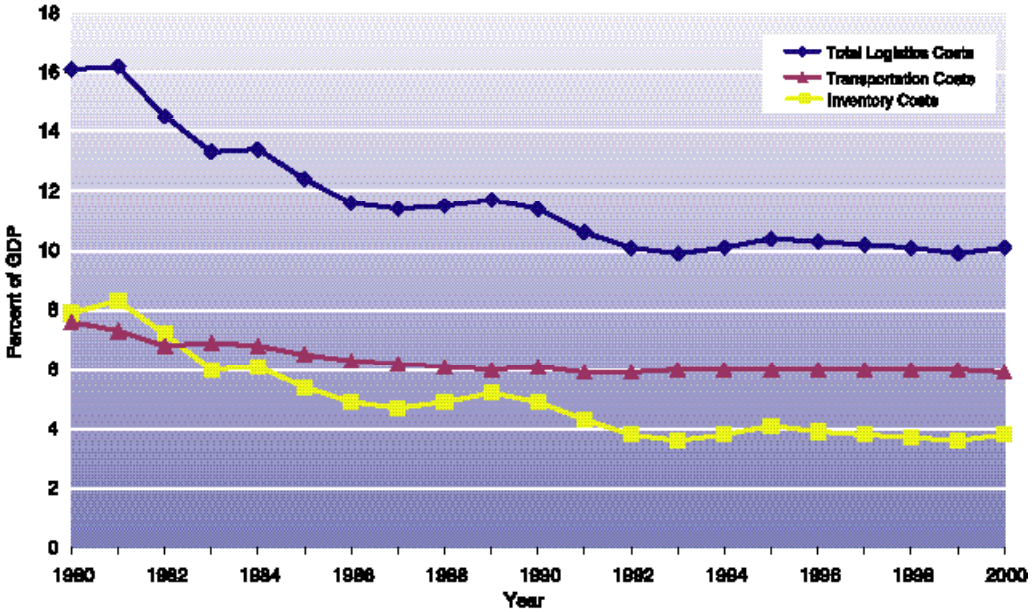
A National Perspective on Enhancing Freight T ransportation

Efficient, safe, and secure freight transportation helps form the foundation upon which our nation's economic strength rests. Improvements in the efficiency and reliability of freight transportation have been the engine of prosperity and competitive advantage. The cost of moving freight dropped from 16.1 percent of U.S. Gross Domestic Product (GDP) in 1980 to approximately 10.0 percent in 2000 (Figure 1) (Cass Information Systems and ProLogis). Business and consumers benefit from these savings. Every corporate dollar saved in logistics expenditures is available for plant and equipment upgrades, worker training to adapt to changing global markets, basic and applied research and development, and increased equity value. The *Journal of Commerce* estimates that American households, the ultimate beneficiaries of system improvements, have saved an average of $1,000 annually since 1980 because of reductions in freight logistics costs.

Although efforts to improve freight transportation efficiency and reliability have been successful, the U.S. transportation system is now facing challenges that, unless addressed, may jeopardize its reliability. Allowing transportation system reliability to erode would add additional pressure to U.S. companies operating in an increasingly competitive international market and place more burdens on communities seeking

Figure 1. Business Logistics Expenditures as a Percent of U.S. Gross Domestic Product (GDP)



Source: Prologis and Cass Information, Inc., *12th Annual State of Logistics Report*, June 4, 2001.

to sustain their economic base and quality of life. Improved logistics has thus far been able to address the corrosive effects of the loss of system reliability. Unfortunately, the ability of logistics to provide additional offsetting savings appears to be nearing its limit, as are the savings attributable to deregulation. Unless these challenges are addressed, more discretionary income will be devoted to moving materials and products, businesses will be constrained in their adoption of innovative strategies to maintain global competitiveness, quality of life—as measured by congestion—will suffer, and safety and security could be jeopardized.

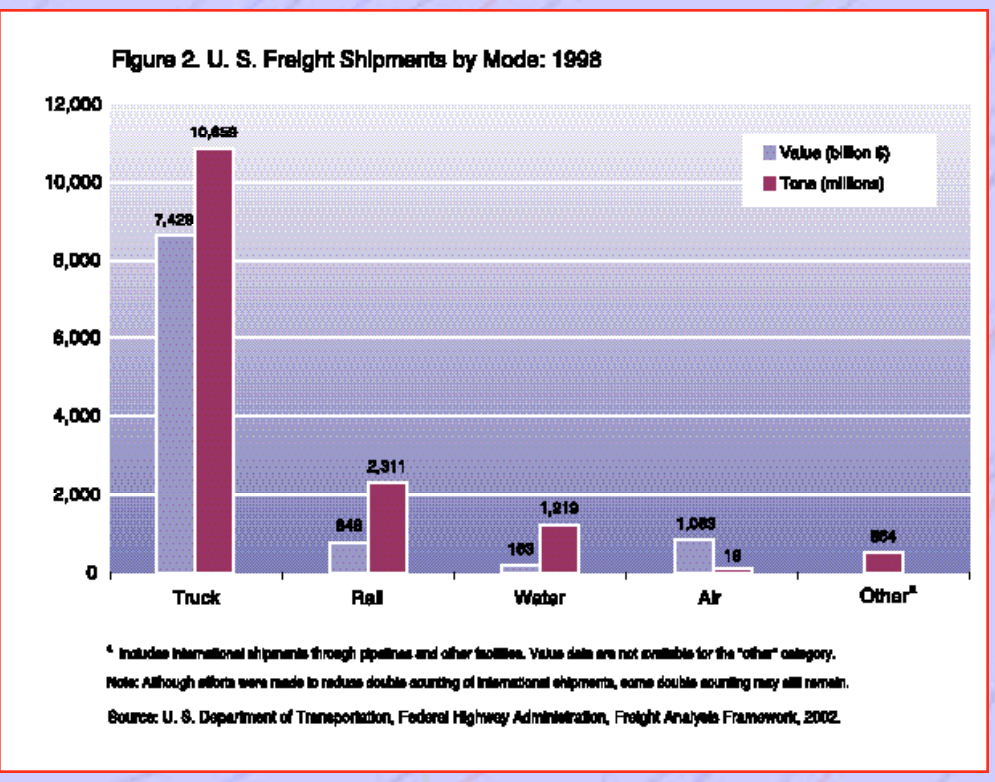
These outcomes are not inevitable. The U.S. system of governance, technical know-how, and ability to respond when national goals are threatened are strengths that can be mobilized to address a set of compelling, but manageable, problems.

This report summarizes three years of work conducted by the Federal Highway Administration (FHWA), in cooperation with the U.S. Department of Transportation's (USDOT's) other modal administrations, and the Secretary's Office of Intermodalism. This work involved the development of an integrated freight data and analytical system, called the Freight Analysis Framework (FAF), and extensive outreach to freight stakeholders aimed at improving the understanding of the nature of freight movement, identifying challenges to improving freight productivity and security, and developing strategies to increase freight productivity. This report is not a definitive federal document describing specific approaches to be undertaken or policies to be adopted. Rather, it is a point of departure for further examination of policies, programs, and initiatives that might be undertaken by decisionmakers at all levels of government, in cooperation with the private sector, to meet the challenge of sustaining system reliability and the promise it holds for the nation's future.

FREIGHT TRANSPORTATION TODAY

The U.S. freight transportation network moves a staggering volume of goods each year. Over 15 billion tons of goods, worth over $9 trillion, were moved in 1998 (USDOT FHWA 2002a). This translates into 310 pounds of freight moved daily for each U.S. resident. That's a lot of stuff.

The movement of bulk goods, such as grains, coal, and ores, still comprises a large share of the tonnage moved on the U.S. freight network. However, lighter and more valuable goods, such as computers and office equipment, now make up an increasing proportion of what is moved. Moreover, because of changes in the makeup of the U.S. economy



and the dramatic growth in international trade, goods are being transported over longer distances in contrast to a few decades ago. FAF estimates that trucks carried about 71 percent of all tonnage and 80 percent of the value of U.S. shipments in 1998 (USDOT FHWA 2002a). A breakdown of freight shipments by mode is shown in Figure 2.

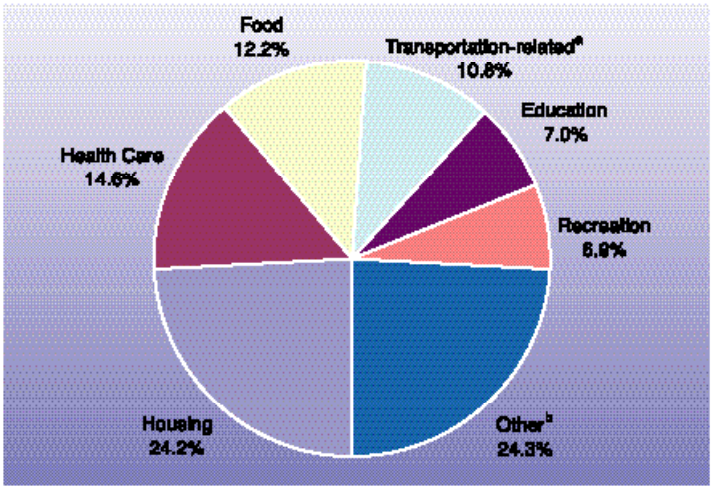
Commodities are moved on an extensive and complex transportation network. The U.S. road system alone extends 4 million miles, railroad operations cover another 100,000 miles, and the natural gas and liquid pipeline networks spread out over 1.4 million miles. There are over 19,000 airports in the United States, with approximately 540 serving commercial operations, and over 5,000 coastal, Great Lakes, and inland waterway facilities moving cargo.

Freight Transportation and the Economy

The benefits of freight transportation to the economy are enormous. Freight transportation increases the value of goods by moving them to locations where they worth more and encourages competition and production by extending the spatial boundaries of commodity and labor markets. Freight transportation also stimulates demand for goods and services and employs millions of people. Freight transportation infrastructure is a significant component of our nation's wealth and productive capacity.

From a macroeconomic perspective, transportation accounts for a significant share of the U.S. GDP. In 2000, purchases of transportation-related goods and services accounted for approximately 11 percent of GDP (USDOT BTS 2002). Only housing, health care, and food accounted for a greater share (Figure 3). For-hire transportation services, which include warehousing, contributed about 3.3 percent ($303 billion) to GDP.

Figure 3. Transportation's Importance to GDP: 2000



[a] Includes all consumer and government purchases of transportation-related goods (vehicles and fuel), services (for-hire transportation and auto insurance), and exports related to transportation. [b] Includes entertainment, personal care products and services, and payments to pension plans.

Source: U. S. Department of Transportation, Bureau of Transportation Statistics, *Pocket Guide to Transportation*, BTS-02-02, February 2002.

Many industries and businesses depend on their own transportation operations (primarily trucking) to move goods. These "in-house" transportation services contributed an additional $142 billion to the economy (USDOT BTS 2001b).

Freight transportation also contributes to the economy by providing jobs to millions of people—an important indicator of economic growth. In 2000, more than 10 million people were employed in transportation-related industries, including for-hire services, vehicle manufacturing, and parts suppliers. Of that total, for-hire transportation (including warehousing) employed more than 4.4 million workers, a majority of whom worked in freight-related jobs. Another 5.5 million people worked in transportation occupations in nontransportation industries, such as truck drivers for grocery stores (USDOT BTS 2001b). Truck drivers, alone, accounted for nearly 70 percent of the total number of transportation occupational workers (USDOT BTS 2002b).

Improvements in freight productivity help the United States maintain its competitive position in the world economy. The Bureau of Labor Statistics reports that productivity for the intercity trucking, railroad, air transport, and petroleum pipeline industries has improved over the last 20 years. The railroad industry has posted the most impressive gains, followed by the pipeline industry. Improvements in railroad productivity resulted primarily from deregulation, divestiture of uneconomic lines, reductions in labor force, and changes in technology and logistics. Productivity improvements in trucking resulted primarily from public investments in a high quality national road network and deregulation.

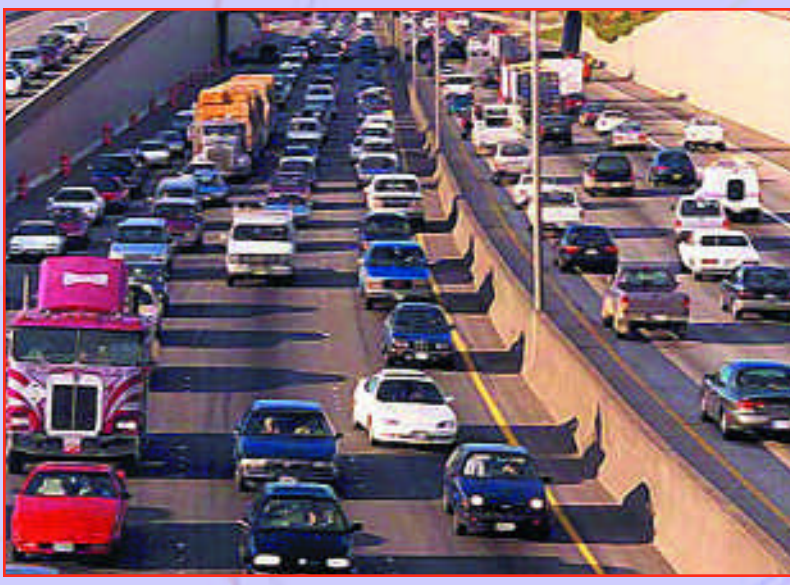
Transportation infrastructure is a significant part of the nation's wealth. With the exception of railroads and pipelines, transportation infrastructure relies heavily on public investment and joint partnerships between the public and private sectors. The Bureau of Economic Analysis estimated that public stock in highways and streets, alone, was worth $1.42 trillion in 2000 (USDOC BEA 2001). Not only are roads, airports, and railroads part of the national wealth, but the transportation system also stores or carries large volumes of the economy's inventory. At any given time, billions of dollars worth of inventory are either moved via truck, train, ship, or barge, or held in a yard for transport or distribution.

The Bottom Line for Business

Freight is big business. It is a necessity, not a luxury. When transportation system performance decreases, freight-related businesses and their customers are affected in two ways. First, freight assets become less productive. Second, more freight transportation must be consumed to meet the needs of a thriving and expanding economy. Thus, when freight transportation under-performs, the economy pays the price.

Reliable, predictable travel times are especially important in an economy where many goods are expensive and are needed in tightly scheduled manufacturing and distribution systems. Late arrivals can have significant economic costs for factories waiting for parts to assemble and for carriers who are missing guaranteed delivery times.

Congestion is a serious problem for freight transportation. It contributes to making transit times longer and more unpredictable. Unpredictability can hamper just-in-time inventory management and hinder some production processes. As a result, shippers and carriers assign a value to increases in travel time, ranging from $25 to almost $200 per hour, depending on the product carried. The value of reliability (i.e., the cost of unexpected delay) for trucks is another 50 percent to 250 percent higher (USDOT FHWA 2001b). Hence, congestion increases the cost of freight and therefore has an effect on the U.S. economy.



Growing traffic congestion affects the U.S. economy and our quality of life. Source: Washington State Department of Transportation

FREIGHT TRANSPORTATION IN A CHANGING BUSINESS ENVIRONMENT

A host of economic and political forces here and abroad have reshaped our nation's economy and its freight transportation services. After World War II, the United States began to transition from a mass-production and consumption society to a post-industrial, or information, society with an expanding service sector. Economic deregulation and globalization of production and trade are salient features of the post-industrial United States. These shifts are characterized by subtle, but significant, changes in production, distribution, and logistics requirements.

The Shift from Manufacturing to Services

The shift from a manufacturing to a service economy is neither a new nor a short-term phenomenon. Productivity improvements in agriculture, manufacturing, and communications—aided by continuous technological gains—have allowed a large-scale shift in resources toward a broad range of services in health care, education, travel, legal, entertainment, and other areas. This shift has various direct and indirect implications for transportation:

- Customers demand more flexible, reliable, timely service.
- Traffic growth is greatest for smaller shipments.
- Demand for traditional, high-volume transportation services will continue to grow but will account for a smaller portion of the industry's revenues and volume.

Deregulation

Economic deregulation has led to a wave of carrier and network restructuring, new market entrants, mergers and consolidations, greater efficiencies in the use of labor and equipment, and price reductions for shippers. Deregulation has also facilitated the growth of multimodal solutions to improve freight mobility.

Deregulation has been particularly important in the railroad industry. The Staggers Act of 1980 allowed railroads to negotiate directly with shippers for services, more readily set rates, and more freedom to enter and exit markets. As a result, the volume hauled has increased, average rail rates have decreased dramatically, and labor productivity has increased four-fold since 1980.

Deregulation of trucking prompted an explosion in the number of interstate motor carriers, increasing from 216,000 in 1990 to over

500,600 in 2000 (USDOT FMCSA 2002). Existing carriers developed new services and routes. Reliance on in-house trucking declined, as shippers decided to rely on the more efficient services offered by for-hire carriers. Moreover, deregulation reduced the number of empty back-hauls, improving productivity and reducing prices.

Likewise, the ocean carrier industry has undergone several major changes over the past few decades. These include building new alliances, abandoning less profitable routes and ports, contracting with motor carriers for feeder and distribution services, and focusing on more profitable, high-volume, international routes. Rationalizing services permitted carriers to take advantage of the benefits of larger container ships that reduce costs, thus allowing smaller shippers and nonvessel-owning common carriers to operate under the same rules as ocean carriers.

Deregulation in the air transportation industry resulted in lower shipping costs, growth in air freight, and improved labor productivity. It also has spurred dedicated air-freight carriers, like passenger airlines, to develop hub and spoke operations. Furthermore, carrier investments in technologies for tracking time-sensitive shipments have enabled growth in overnight air delivery of documents and small packages.

From Push to Pull Logistics

Businesses are in the midst of an evolutionary shift from inventory-based "manufacture-to-supply" logistics ("push" logistics) to replenishment-based "manufacture-to-order" logistics ("pull" logistics). The latter relies less on expensive inventory and more on accurate information and timely transportation to match supply and demand. Overall, the result has been a move to coordinated logistics—the integration of distinct logistics activities such as cross-modal coordination or the bundling of transportation and inventory control. Coordinated logistics has been made possible by cross-modal mergers and acquisitions, cross-modal service alliances, web-based carrier exchanges, and the development of coordinators and integrators (third and fourth-party logistics companies). The amount of money being invested in supply-chain management tools is an indication of the increasing importance of supply-chain logistics and freight operations.

Logistics are now more efficient, but in some ways more fragile than in the past. Economic deregulation over the past twenty-five years has allowed carriers to optimize the transportation system, resulting in higher productivity but little or no excess capacity or redundancy. For example, the lack of excess capac-

ity in many parts of the rail network has caused operations to be more susceptible to even minor disruptions. The lack of redundancy limits options available to shippers, decreases competition, and contributes to price volatility. These factors place tremendous strains on the transportation system in terms of demand and reliability.

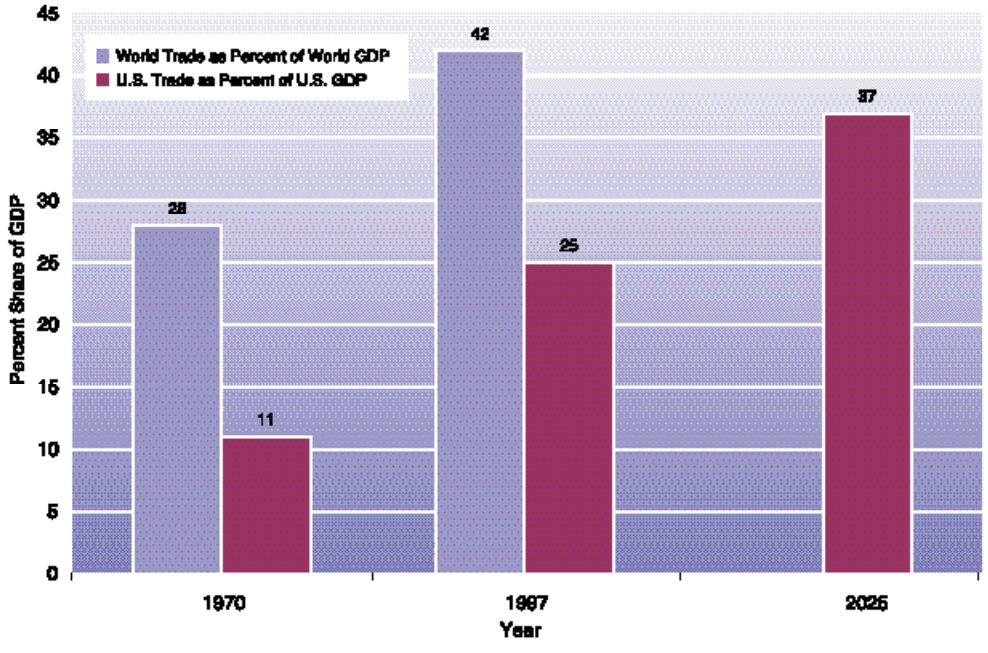
Another trend in logistics over the past few years is the increasing integration of defense logistics with commercial logistics systems. Underlying this trend is the drive to improve efficiency, particularly by using new information and telecommunications technologies that affect all supply-chain processes.

GLOBALIZATION

Companies and consumers in the United States and around the world increasingly rely on international trade to satisfy their demand for goods and services. Several factors have spurred this growth, including the liberalization of trade policies such as the North American Free Trade Agreement (NAFTA), the internationalization of supply chains, and changes in transportation and information technologies that make possible global production and consumption.. As a share of GDP, U.S. merchandise trade has grown from 11 percent in 1970 to 25 percent in 1997. U.S. merchandise trade is forecast to reach 37 percent of GDP by 2025 (Figure 4) (DRI-WEFA 2000). Much of that trade is with NAFTA partners, followed by Japan, China, Germany, and the United Kingdom.

The growth of international trade has also influenced the location and development of air and marine cargo facilities, land border crossings, intermodal connectors, and the need for improvements to existing infrastructure. Likewise, increasing reliance on containerized transport in international trade has spurred demand for larger and more special-

Figure 4. World and U.S. Merchandise Trade



Source: World Bank, *World Development Indicators 1999* and DRI-WEFA, *Long-Term Forecast*, 2000.

ized container facilities and ships and for more intermodal capacity to handle increased landside traffic.

KEY FREIGHT TRANSPORTATION CHALLENGES

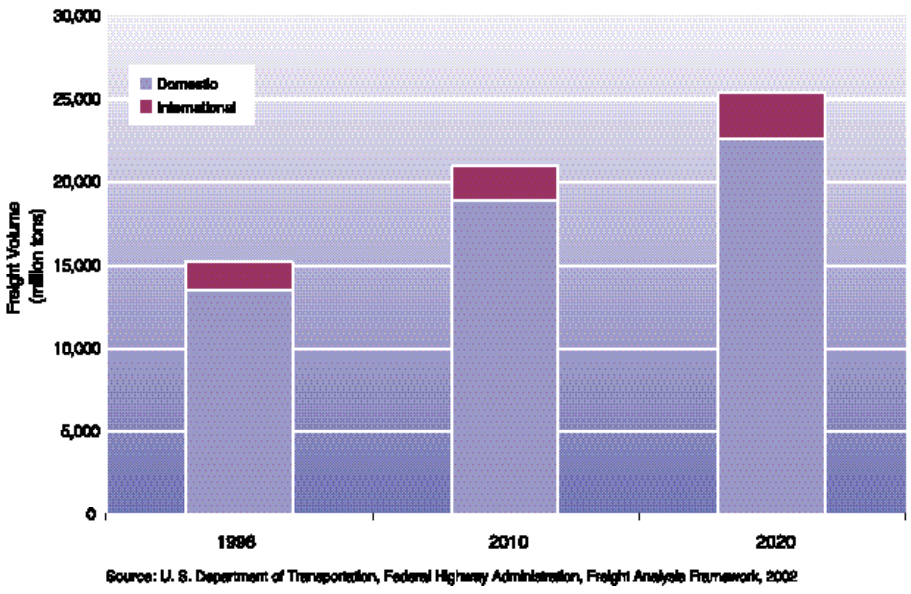
The volume of freight moved on the U.S. transportation system has grown dramatically over the past few decades and is projected to increase by nearly 70 percent by 2020 (Figure 5). General cargo tonnage is projected to more than double, and some gateways expect a tripling in freight volumes over the 1998 to 2020 period. As demand for freight service grows, concerns intensify about capacity shortfalls, congestion, safety, security, and the environment. Consequently, understanding and improving freight flows are becoming higher priority issues among decisionmakers at all levels of government and in the private sector. FAF, a comprehensive national database of county-to-county freight flows, captures these flows to enable decisionmakers to identify areas in need of capacity improvements.

KEY FREIGHT TRANSPORTATION CHALLENGES

- CONGESTION
- OPERATIONS
- PLANNING
- FINANCE
- SAFETY
- NATIONAL SECURITY
- ENVIRONMENT
- PROFESSIONAL CAPACITY

As an extension of FAF and in cooperation with public and private sector partners, FHWA has identified several key challenges facing the freight transportation industry, many of which are interrelated. They include: (1) congestion and expanding capacity, (2) improving systems operations, (3) planning and financing freight projects, (4) safety, (5) national security, (6) the environmental effects of freight transport, and (7) building freight professional capacity.

Figure 5. Freight Activity: 1998, 2010, and 2020



Source: U. S. Department of Transportation, Federal Highway Administration, Freight Analysis Framework, 2002

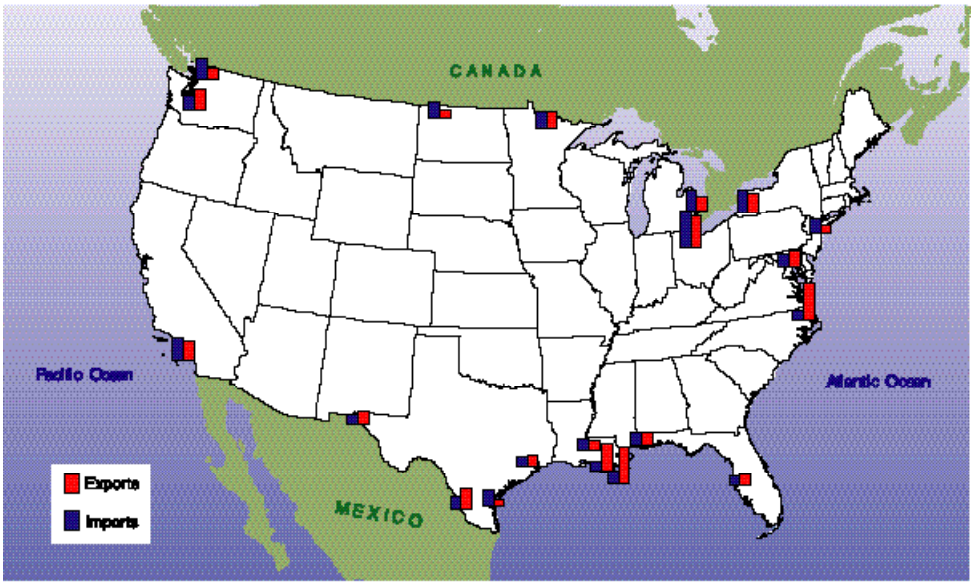
Congestion and Capacity

Increases in the volume of freight have strained the transportation network in some locations and exacerbated conflicts between the traveling public and freight carriers. Recent growth in international trade has placed greater pressure on gateways, ports, airports, and border crossings—nodes in the system that are potential bottlenecks for the movement of freight (Figure 6). Between 1990 and 2000, U.S. international trade more than doubled (in inflation-adjusted terms), rising from about $900 billion to $2.2 trillion. Nearly one-third of U.S. merchandise trade in 2000 was with Canada and Mexico (USDOT BTS 2001a). Many gateways now suffer from congestion, which is expected to intensify as a result of increased demand and enhanced security measures.

Growing international trade has also changed the geography of freight movements within the United States, creating high-growth trade routes and with it the need for improvements. Historically, domestic freight corridors developed with an east-west orientation, reflecting the westward development of the nation. As Pacific Rim trade increased over the last 30 years, east-west corridors linking major West Coast gateways with the rest of the United States experienced dramatic growth in traffic. Many of these corridors are experiencing increased congestion as international trade competes with domestic traffic for use of transportation infrastructure.

Additionally, the creation of NAFTA has fostered north-south traffic, placing more demands on the domestic freight transportation system. Since NAFTA went into effect in 1994, U.S. trade with Canada and Mexico has risen by about 90 percent (Figure 7) (USDOT BTS 2001a). As a result, the nation's highway

Figure 6. Top 20 International Freight Gateways: 1998 (Tons)



Source: U.S. Department of Transportation, Federal Highway Administration, Freight Analysis Framework, 2002.

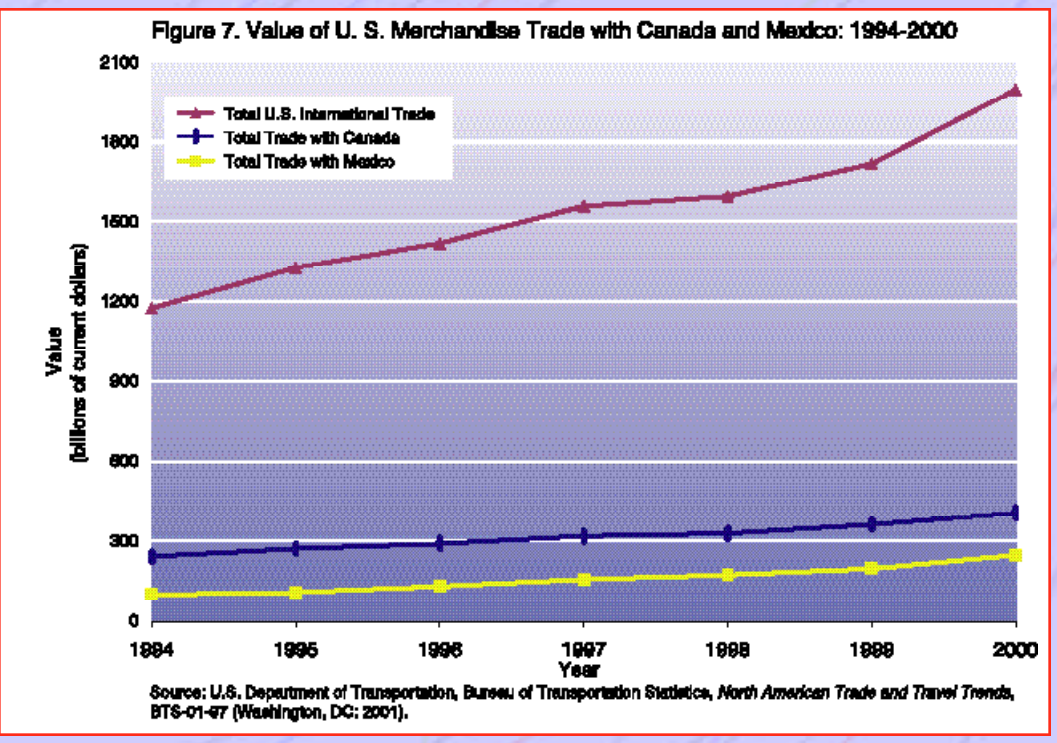


Figure 7. Value of U. S. Merchandise Trade with Canada and Mexico: 1994-2000

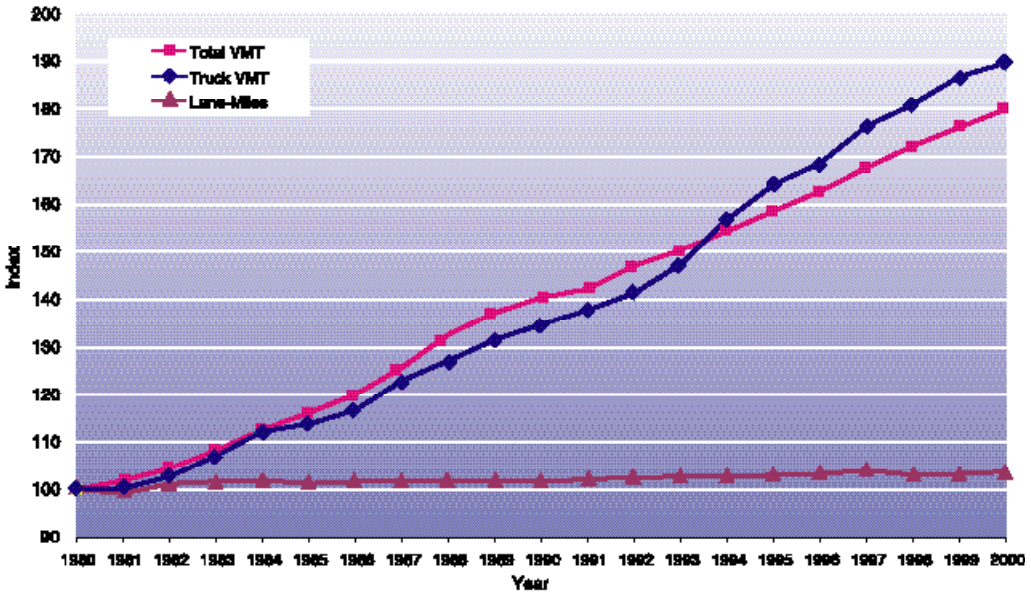
Source: U.S. Department of Transportation, Bureau of Transportation Statistics, *North American Trade and Travel Trends*, BTS-01-07 (Washington, DC: 2001).

and rail networks—initially developed for the traditional east-west trade—are now strained, especially at border crossings. In the future, trade with NAFTA and Latin American countries is expected to grow along both north-south corridors and east-west corridors running through the northern and southern border regions. The anticipated growth in trade and changes in the character of freight flows present many challenges to the U.S. transportation system and highlights the importance of international gateways to the U.S. economy and national security.

To exacerbate the situation, the transportation network has not increased at a rate commensurate with growth in travel and commerce. In the highway sector, for example, vehicle-miles traveled (VMT) increased by 80 percent while lane-miles of public roads increased by only 4 percent between 1980 and 2000. Growth in truck-miles traveled was even more dramatic, exceeding the growth in passenger VMT over the last few years (Figure 8) (USDOT FHWA Various years). Clearly, more traffic is moving over essentially the same highway infrastructure. Other surface transportation networks are witnessing a similar overburdening of their systems as well.

When demand outstrips supply, the resulting congestion can have a devastating effect on speed and reliability. The Texas Transportation Institute (TTI) estimated that 3.6 billion person-hours of highway delay occurred in 75 urban areas in 2000. About 54 percent of the delay was caused by incidents such as crashes and breakdowns (TTI 2002). Using different methods, the Oak Ridge National Laboratory estimated that 2.3 billion vehicle-hours of delay were caused by crashes, inclement weather, work zones, poor signal timing, and vehicle breakdowns. Total

Figure 8. Vehicle-Miles Traveled (VMT) and Lane-Miles: 1998-2000



Source: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics* (Washington, DC: Various years).

will either be approaching or exceeding capacity during peak periods in 2020, compared with 28 percent in 1998. In terms of functional class, urban Interstates are and will continue to be the most traveled segments of the highway system, with an estimated 90 percent either approaching or exceeding capacity in 2020.[1]

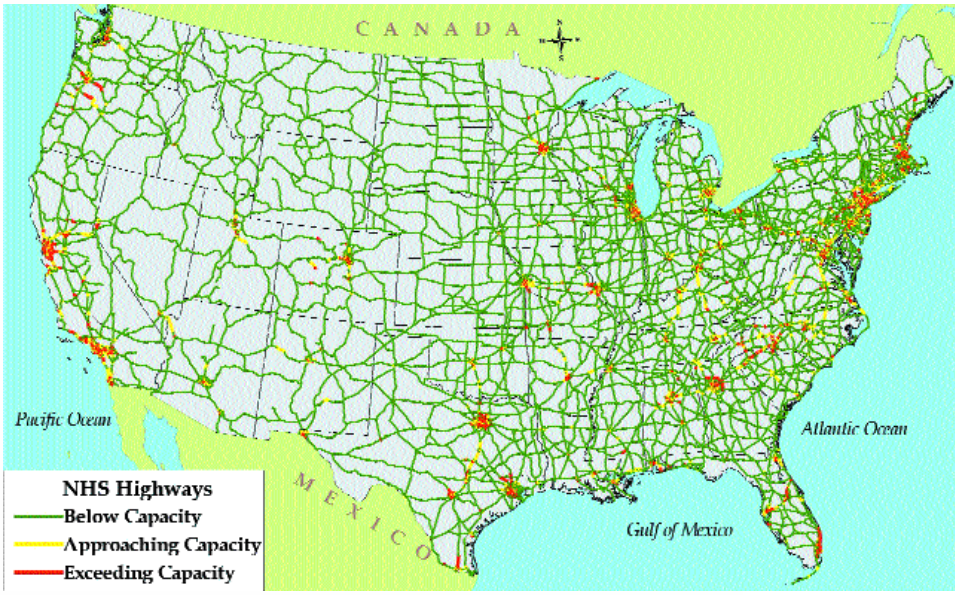
delay is likely to be higher because neither of these estimates covers the entire highway network.

No slowdown in travel and freight transport is in sight. Between 1998 and 2020, total VMT is expected to increase, on average, by more than 2.5 percent annually. Truck VMT is expected to grow by more than 3 percent annually over the same period (DRI-WEFA 2000). This nearly doubling in truck VMT and increases in passenger travel mean that more roadways will be congested in the future. FAF estimates that about 46 percent of the urban National Highway System (NHS) High-volume truck traffic along major corridors is also a concern. FAF estimates that 69 percent of urban Interstates will carry more than 10,000 trucks, on an average daily basis, in 2020 compared with 27 percent in 1998. It is important to note, however, that these dramatic increases are not limited to urban areas, as both congestion and truck volumes are expected to increase on rural Interstate segments and along corridors linking metropolitan areas as well.

Given these forecasts, congestion is likely to be a long-term condition requiring additional investments in freight improvements to alleviate

[1] To estimate current congestion, FAF uses traffic count data from individual NHS segments in accordance with the Highway Capacity Manual's volume-to-capacity ratio. (NHS segments include only those sections built and operational.) To estimate future congestion, FAF uses forecasted vehicle-miles of travel and trucking activity data, which are then applied to NHS segments using the methodology noted above. Estimating future congestion is difficult given the uncertainties related to operational gains from future improvements or other changes, such as driver habits. Thus, several caveats regarding FAF forecasts are required. FAF assumes the network in place in 1998 will remain unchanged in 2020, but traffic volumes will increase. This may contribute to higher forecasts of system capacity constraints than if changes in capacity or other factors were incorporated into the analysis. However, given the limited growth in total lane-miles over the past twenty years, the FAF forecast still provides useful insights into future traffic patterns related to freight movements

Figure 9. National Highway System Estimated Peak Period Congestion: 1998

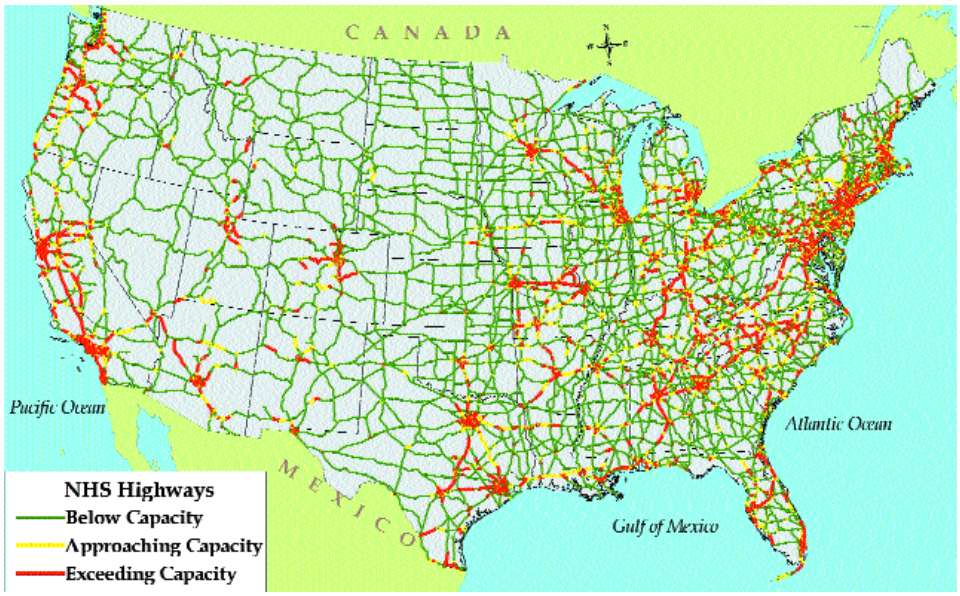


Source: U.S. Department of Transportation, Federal Highway Administration, Freight Analysis Framework, 2002.

anticipated pressure on the nation's transportation network. An annual expenditure of $75.9 billion (2000 dollars) will be needed for the 2001-2020 period just to maintain the physical highway infrastructure, as it existed in 2000. The cost to improve highways and bridges is projected to reach $106.9 billion (2000 dollars) annually over the same period. (USDOT FHWA 2002b). One of the nation's biggest challenges, and a critical focus of USDOT, is closing the gap between the demand for transportation services and infrastructure capacity.

Reducing highway congestion won't be easy.

Figure 10. National Highway System Estimated Peak Period Congestion: 2020



Source: U.S. Department of Transportation, Federal Highway Administration, Freight Analysis Framework, 2002.

Solutions will likely involve a mix of investments to add new capacity, preserve existing infrastructure, and improve operations. In some locations, adding new capacity may be the right choice to accommodate increasing demand for freight services. In other cases, improving operations may be the most effective way to alleviate congestion and optimize freight movements. Regardless of the approach, the environment, safety, and security of the freight transportation network are likely to also benefit from projects to reduce congestion.

Congestion and capacity issues are emerging in other freight modes as well. Air cargo capacity, for example, is constrained by the limited availability of new slots at major commercial airports and by opposition to airport noise and longer operating hours. This situation is exacerbated by the increasing reliance of shippers on air cargo services to meet just-in-time deliveries and to maintain lower inventories.

In the rail industry, aging infrastructure and limited capital to invest in new or improved capacity are major challenges. The Mid-Atlantic Rail Study identified $6 billion of needed improvements to meet capacity requirements over the next 20 years. Many of the improvements identified in the study will benefit both freight and passenger traffic. The maritime industry is also experiencing congestion. Many U.S. ports are struggling to handle larger containerized vessels and increases in international traffic arriving at their terminals. Adding new and improving existing terminal capacity, dredging to deepen harbors and channels, and upgrading intermodal connectors are critical to providing timely and reliable service and ensuring a port's long-term success. The U.S. Chamber of Commerce is now studying capacity constraints at U.S. container ports.

Operations

Freight operations are the practical work of moving goods from a shipper to a receiver, a subset of activities that constitute logistics (or supply chain) management. In the United States, the private sector is responsible for most freight operations. The public sector also has a role through its ownership and management of the nation's highway system, ports, and inland waterways, and its regulation and taxation of freight movement.

The pressure on carriers to improve operations comes not only from the growth in freight movement but also from the need for new logistical arrangements and the demand for smaller, more frequent shipments for which reliability is particularly important. In the near term, capacity shortfalls and congestion might not shut down the nation's freight network, but they can degrade the predictability and reliability of freight service—a

shipper's most important criteria for freight transportation in an era of tightly integrated operations, limited inventory, and just-in-time manufacturing and retailing.

Over the past two decades, freight operations have expanded and improved across all modes as a result of several factors, including deregulation, increased vehicle capacity, economic globalization, and collaborative logistics. Since the late 1970s, economic deregulation has resulted in a massive restructuring and reorganization of the freight services industry and huge gains in productivity. Today, however, the freight services industry is experiencing diminishing returns from deregulation and few remaining opportunities exist for further deregulation. Still, some productivity improvements are expected from the development of new alliances and pooling arrangements. The industry will probably not experience similar vehicle size and capacity increases in the next decade, except perhaps in mega-containerships.

As a result, emphasis is now being placed on better management of public facilities and the use of intelligent transportation system (ITS) technologies. These will be particularly important in the new environment of increased emphasis on security and safety and the push for increased information and visibility in the transportation process. In highway and trucking operations, for example, ITS technologies are used to monitor traffic and provide information to travelers about work zones and incidents. The first incident management programs focused on metropolitan facilities (e.g., beltways), but FHWA and state DOTs have expanded the program to include intercity corridors. Many states and metropolitan areas have also introduced electronic tolling at bridges and tunnels, increasing speeds and reducing congestion in the process. To better manage the urban transportation system, many metropolitan areas have established traffic operations centers.

To help reduce traffic congestion, five transportation agencies in DE, NJ, and NY use the E-Z Pass technology to collect tolls electronically. Source: I-95 Coalition

FHWA is working to enhance the operational efficiency and safety of highway work zones for all road users and workers. Source: FHWA, Office of Transportation Operations

In the railroad industry, new technologies, such as positive train control, have shown promise in improving rail operations. To increase the efficient utilization of assets, railroads are also pursuing equipment-sharing agreements and pooling arrangements. In the maritime industry, operational improvements have come from the introduction of technologies, such as terminal management systems that can locate all terminal equipment and containers. An example of this is the Port of New York/New Jersey's web-based Freight Information Real-Time System for Transport. The system will consolidate various sources of cargo and carrier information, including cargo availability and gate and shipment status.

Although many successes have been realized, some challenges to improving operations remain. The world of intermodal freight, for example, is fragmented by the presence of numerous stakeholders who have different priorities. These differences can create "islands of information" that result in barriers to data exchange. The lack of accurate and timely information about shipment location, vehicle and equipment availability, gate queues, and highway congestion increases costs and undermines reliability and productivity across the intermodal system. Hence, the flow of accurate and timely information through the freight system is just as important today as the movement of freight. Indeed, information provides the thread that binds individual operations into an efficient intermodal system and, therefore, is an important area of focus for both the public and private sectors.

Unfortunately, optimization of the transportation system over the past 25 years has resulted in little or no excess capacity or redundancy. Vastly more freight is being moved by rail with fewer miles of railroad and fewer rail cars and locomotives. The lack of redundancy reduces the number of options available to shippers, decreases competition, and makes prices more volatile. As a result, operations have become more vulnerable when breakdowns or other unforeseen events occur. Operations have become even more vulnerable with the development of coordinated logistics systems that are cost effective for shippers and receivers but place tremendous strains on the transportation system in terms of demand and reliability.

Clearly, more efficient operations are essential to optimizing national freight performance, expanding system capacity, and mitigating freight transportation's effects on natural resources, neighborhoods, and people. However, operations improvements cannot obviate the need for investment in new capacity in some locations. Even so, more efficient operations is a key cost-effective element in strategies to improve freight productivity and security.

PLANNING

Both public and private sectors execute planning for freight transportation infrastructure and operations improvements. Planning for publicly funded improvements follows a structured process with lengthy timelines and prescribed involvement by a broad array of stakeholders, including state and local governments, transit authorities, and the public, among others. In contrast, private sector planning is based on market trends, largely without external involvement, and requires a timely response, sometimes within three to six months. Not surprisingly, these differences in approaches to planning can make it difficult to develop private-public partnerships to move freight projects forward.

The degree to which freight is considered in the public transportation planning and programming process ranges from being fully integrated with substantial freight transportation projects prioritized and funded to being minimally considered, if at all. Typically, freight in the public arena is a minor constituency relative to passenger and other transportation interests. The challenge is to change this behavior so that both freight and passenger mobility are considered in a balanced way. Education, improved freight data, and the use of quantitative planning tools to assess the needs for and benefits of freight improvements are important mechanisms for fully integrating freight into the planning process.

In today's global economic environment, many freight movements encompass interstate and international travel. Yet, public decision-making affecting these moves tends to occur at the state and metropolitan planning organization (MPO) levels. For several reasons, MPOs tend to give less attention to freight investments than might be warranted. These include: (1) limited resources, (2) a frequent lack of communication with freight interests on shipper and carrier needs, (3) the perception that freight projects have limited benefit for the MPO population as a whole, (4) costs borne locally, but benefits accruing more widely, and (5) the perceived priority needs of passenger-related projects (Gayle 2001). Local planning processes tend to focus on commuter and livability issues rather than on freight congestion relief and economic improvement (USDOT FHWA 1999).

Several states and MPOs have elevated freight needs in their overall discussion of, and planning for, infrastructure investments, but “most others continue to struggle” (USDOT FHWA 2000a). States that have been very successful in promoting freight transportation improvements, such as Maine, Washington, and Florida, have had legislature and gubernatorial backing. MPOs that are most successful at engaging the private sectors are those that

plan and program needed improvements quickly, especially those projects that are in the low to moderate cost range and greatly enhance system performance.

In recent years, multijurisdictional coalitions have emerged as effective partners in dealing with regional, corridor, and binational trade-transport development issues that cannot be easily dealt with using traditional planning approaches. The I-95 Corridor Coalition and the Latin American Trade and Transportation Study group are two examples of multijurisdictional alliances that have been successful in addressing freight issues. Pooled resources, improved understanding of partners' concerns, and enhanced communications are important benefits of these alliances.

Given the importance of freight to the economy and the projected growth in freight traffic, a dynamic and responsive transportation planning process is needed to address deficiencies in the freight transportation system. Likewise, reconciling the vastly different timeframes used in planning by the public and private sectors, encouraging private sector involvement in state and MPO processes, and facilitating multijurisdictional cooperation and coordination are critical to ensuring that freight perspectives are included in planning and programming major transportation improvements.

Financing

In the past, investments in Interstate highways, Class I railroads, port terminals, and other transportation facilities have more than adequately met the needs of moving freight. Now, neither the public sector nor the private sector alone has the resources to invest in improvements to meet projected future growth. Both sectors must now look for opportunities for joint financing.

But it is not just a matter of more money. Funding needs to be directed to the right types of investments in the right places if transportation productivity is to be maximized. These two elements of freight financing—funding level and project type/location—must be carefully considered in order to ensure the efficiency and reliability of the freight transportation system in the early years of the 21st Century.

The type or mix of options used to finance freight improvements varies among modes. Highways, for example, are usually built using public money from federal and state sources. Ports are funded with public and private funds. Railroad improvements are usually funded privately, although public money has been used to improve safety at highway-rail grade crossings and for smaller railroads, especially when there is a risk of a railroad being abandoned. Passenger fees and the jet-fuel

tax typically support airport facilities, although public-private partnerships between airport authorities and airfreight integrators have allowed for the issuance of revenue bonds to improve cargo facilities.

Public funding for freight infrastructure may be difficult to secure if projects are thought to have only private benefits limited to local jurisdictions. Not surprisingly, objections are often raised about public financing of projects when one company or one mode is perceived to benefit disproportionately. Moreover, with respect to highway and rail, passenger projects tend to be given a higher priority over freight projects in the state and local decisionmaking processes. Under current federal law, funding decisions are made at these levels of government, and freight interests are often not included in the planning process.

Air cargo was the fastest growing segment of the freight industry in the 1990s. Source: American Trucking Associations Foundation

In some circumstances, private financing may also be difficult or expensive to arrange. Freight improvements must compete for bank loans with other types of projects, such as building warehouses and office buildings. Railroads and trucking companies have had difficulty finding lenders to finance improvements, or they are offered unfavorable rates over periods too short to cover the needs for long-lived assets, such as railroad track. This situation is compounded by the marginal economic health of some smaller railroads that may need grants, not loans, to maintain important parts of the rail system (USDOT FHWA 2000a).

The increasingly intermodal nature of freight transportation has complicated funding as well. When a freight project is intermodal, such as a road connecting a marine terminal with the Interstate system, it is often unclear who should initiate and fund the project. These issues become even more problematic when a project involves freight infrastructure on the borders with Canada and Mexico.

The Transportation Equity Act of the 21st Century (TEA-21) formally recognized the need to link intermodal freight needs to infrastructure investments and advocated new investment schemes. The Transportation Infrastructure Finance and Innovation Act (TIFIA), which was launched by TEA-21, provides a new source of financing underwritten

by a dedicated user revenue stream. However, TIFIA limits state and local discretion in the types of projects that may receive federal funding. For example, current eligibility requirements do not allow public funds to be used for private facility improvements or railroad projects that are not connected to highways. Moreover, the minimum $100 million threshold for projects makes it more difficult to fund improvements of intermodal connectors, which are generally in worse condition that the National Highway System as a whole (USDOT FHWA 2000b). Freight stakeholders suggest that selective modifications to TIFIA could enhance its use for freight projects.

Similarly, the Railroad Rehabilitation and Improvement Financing (RRIF) credit program was created under TEA-21 to help finance railroad capital improvements, particularly those that assist smaller short line and regional railroads. Unfortunately, RRIF implementation, to date, has been hampered by the lack of federal funding, limited awards, and strict applicant requirements, including mandated documentation that RRIF is indeed the funding source of "last resort" for the applying railroad.

One of the most flexible programs, the Congestion Mitigation and Air Quality Improvement Program (CMAQ), which was established under the Intermodal Surface Transportation Efficiency Act, has been most successful in funding a variety of freight transportation projects, some of which are privately owned. CMAQ funding, however, has limitations, as it must be built around the requirement of reducing the release of harmful emissions from transportation. Projects are also limited to nonattainment areas. Freight stakeholders have suggested greater flexibility in other Federal-aid programs, such as the Surface Transportation Program, to fund intermodal and public-private projects.

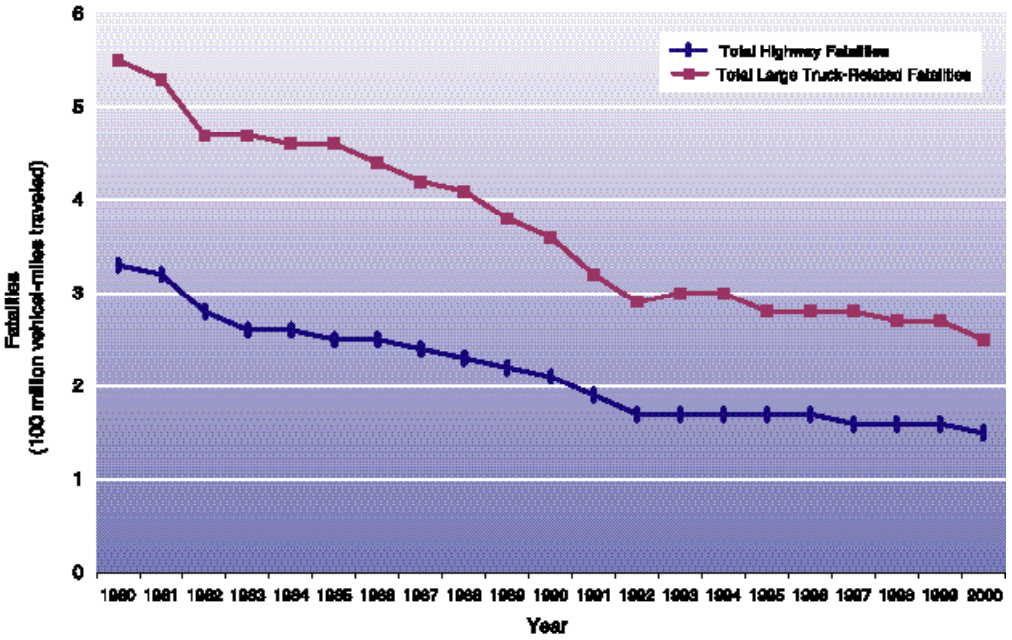
Intermodal connectors are critical components of the Nation's freight system, tying modes together and facilitating distribution of products to users. This connector in the Chicago area is showing signs of wear and tear. Source: FHWA

Many states, local jurisdictions, and port authorities are initiating new financing efforts to advance freight projects. The Alameda Corridor, the FAST Corridor in Washington

State, rail improvements in Chicago, the Mid-Atlantic Rail Study, and others reflect the widely held view that freight transportation is growing in importance with policymakers.

Given expectations of future demand, however, current funding for freight infrastructure is clearly inadequate, especially for intermodal connectors, rail facilities, ports, multistate projects, and international gateways. Identifying ways to finance needed projects is critical to maintaining U.S. competitiveness in the global marketplace.

Figure 11. Large-Truck Fatality Rates: 1980-2000



Source: U. S. Department of Transportation, Federal Motor Carrier Safety Administration, *Large Truck Crash Facts 2000*, FMCSA-RI-02-003 (Washington, DC: 2002).

SAFETY

Safety is the top priority of the U.S. Department of Transportation and a major goal in every public and private sector transportation program. Many safety initiatives undertaken by the department and in cooperation with the private sector have resulted in improvements in transportation's safety record. Still, there is room for improvement. In 2000, more than 41,800 people were killed and over 3 million people were injured on our nation's highways. About 12 percent of all highway fatalities involved large trucks (Figure 11) (USDOT FMCSA 2002).

In recent years, increasing volumes of freight moved on all modes have heightened concerns about safety. One concern relates to the mix of freight and passenger vehicles competing for use of the transportation system. Today's fast-paced global economy requires just-in-time operations, bringing a greater number of vehicles into close proximity, especially, along highways, but also in the air and on rail lines. Current trends indicate that passenger travel and freight movements will grow substantially in the future.

Although actions to separate passenger and freight services have been suggested, such as truck-only lanes and dedicated high-speed passenger rail lines, it is likely that most passenger travel and freight movements will continue along shared rights-of-way in the foreseeable future.

Likewise, growth in recreational boating and cargo traffic, particularly barges, plying shared waters presents safety risks to both boaters and mariners. About 35 percent of the 7,740 recreational boating accidents in 2000 involved collisions with other vessels (USDOT USCG 2002). The U.S. Coast Guard expects the number of recreational boaters to increase by 65 percent to 130 million annually by 2025. Approximately 75 percent of all domestic trade (800 million short tons) is moved on barges that are either towed or pushed by tugs through coastal and inland waters where recreational boaters are found (Loy 1999).

Another safety concern relates to the growing number of new carriers in the freight industry. Transportation deregulation in the past two decades has removed entrance barriers, commodity restrictions, and preapproved route assignments, prompting a major increase in the number of carriers, especially in the highway mode. Similarly, rail deregulation has allowed large Class I railroads to downsize their systems, spinning off low-volume lines, which have often been converted to new short line and regional railroads with lower operating costs.

Because of increased competition among carriers, the number of new businesses has grown dramatically and many of them move into and out of the marketplace more frequently. Increased competition among a larger pool of carriers has brought lower transportation costs to consumers, but it has also meant that many carriers have marginal profit margins. Where competition is fierce, and profits are slim or nonexistent, concerns intensify that spending on safety will be the first line item reduced.

Thus, a major challenge for the department and private industry is to reduce fatalities and injuries in the face of increasing freight and passenger traffic. The Federal Motor Carrier Administration (FMCSA), for example, has set a goal of reducing truck-related fatalities by 50 percent by 2010. Other modes are also committed to reducing fatalities and injuries in transportation.

National Security

For the most part, the freight transportation system has been designed with productivity in mind. Concerns about security generally focused on controlling theft and reducing contraband. Recent events changed that. The focus is now on preventing attacks and

enhancing security while keeping commerce moving.

Security involves protecting transportation assets—facilities, vehicles, and supporting infrastructure (communications structures and power stations)—from a host of potential threats. Security also involves protecting transportation assets from being used as instruments in carrying out attacks on civilian, industrial, or military targets. The use of commercial aircraft in the attacks of September 11th and the use of a rental truck to bomb the federal building in Oklahoma City are two painful examples.

Because of its accessibility, extent, and diversity, the commercial transportation system presents opportunities for breaches in security both from within and outside the United States. In particular, the freight sector's increasing dependence on the use of containers, intermodal transport, and global supply chains poses multiple security risks. In 2001, an estimated 19 million containers moved through the country's water and land ports. Few containers are tracked as they are transported to their final destinations, and the routes used are often in close proximity to some of the most populated cities.

Given these risks, several freight security priorities have emerged. A top priority is general cargo shipped in containers in international trade. Domestically, a major focus is on hazardous materials transport, which relates primarily to highway and railroad operations. Other top priorities include air cargo, domestic general commodity movements, and exports.

The Port of Oakland is one of the top 10 container ports in the United States. Source: U.S. Army Corps of Engineers

Information about the ownership and integrity of containers as they move from origin to destination is crucial to improving the security of the freight transportation network and related infrastructure. A system of tracking containers and identifying custodians of the cargo is now being developed. Smart cards that contain biometric identifiers and cargo information connected to an electronic manifest can be used to establish a chain of custody. Other technologies that offer the potential to enhance security and supply chain efficiency include supply chain software that can accommodate security applications, electronic cargo seals, wireless vehicle-to-

roadside data communications devices, and wide-area communications combined with global positioning systems or other global location technologies. These technologies can also be useful in tracking hazardous materials shipments, cargo shipped into and out of ports, and freight transported across our international borders.

The freight transportation network may also be affected by responses to threats and other incidents, such as hazardous materials transport incidents. Shutting down the U.S. aviation system for a few days after September 11 is an example of a response to terrorism. Another example is the closing of the Howard Street Tunnel in Baltimore for several days after a train carrying hazardous materials derailed. Other responses, or countermeasures, may have longer-term repercussions. Continuing security delays in processing air cargo is just one example.

Intertwined with the increased focus on freight security is the need to keep commerce moving and further boost productivity and reliability. In recent years, freight transportation and logistics systems have become tightly coupled, resulting in efficient global supply chains. In this environment, predictability and reliability are critical to shippers and carriers. Enhanced freight security can have both good and bad repercussions. It has the potential to adversely affect reliability and timeliness of deliveries by disrupting well-tuned supply chain operations. Enhanced freight security measures may also provide opportunities for increasing efficiency and productivity.

To ensure cargo security, tracking technologies like this one are being field tested by the International Mobility and Trade Corridor partnership in the Pacific Northwest. Source: Transcor

Clearly, the extensive and readily accessible U.S. freight transportation network is a security concern. Thus, a major challenge for transportation decisionmakers is to balance security needs with freight productivity. Neither is mutually exclusive. If designed and implemented well, security measures have the potential to improve efficiency and customer service and reduce losses from theft and other threats.

Environment

Growing concerns about public health, air and water quality, land use and development patterns, plus an improved understanding of environmental science, have resulted in a greater emphasis on freight transportation projects that are both environmentally sound and economically sustainable.

The National Environmental Policy Act of 1969 and subsequent laws established requirements for environmental impact assessments for major transportation projects, giving special attention to air pollution, wetlands preservation, and coastal protection. Today, environmental considerations are critical in planning and designing freight projects. The environmental review process, however, can be complicated and time-consuming, involving several public agencies and private sector interests. Federal and state resource agencies are responsible for conducting environmental reviews of projects funded by federal and/or state monies. In recent years, efforts to streamline the review process have included the involvement of review agencies earlier in the process. This approach has proven successful in a number of cases.

Obviously, environmental resources can affect and be affected by all aspects of freight transportation, including the location of facilities, goods movement, vehicle performance, and energy use. For example, increases in urban truck traffic can reduce air quality and increase noise. Conversely, improved access to intermodal freight terminals and the timing of traffic lights to reduce truck idling can decrease air pollution and noise. More efficient marine transportation facilities and operations also could result in congestion relief on highways in some locations.

Some of the key environmental issues facing the freight industry today include air pollution, dredging, the introduction of nonindigenous species, and noise. Much progress has been made in addressing these and other environmental concerns, but there is always room for improvement.

Diesel engines in heavy-duty trucks, locomotives, and commercial vessels continue to be major producers of nitrogen oxides (NO_X), which contribute to ground-level ozone (smog) and regional haze. Although reductions in NO_X emissions have been made in recent years, continued public health and environmental concerns have prompted the U.S. Environmental Protection Agency (USEPA) to move forward with a rule to reduce the sulfur content of highway diesel fuel beginning in 2007. A reduction in sulfur content will enable the use of pollution control technologies similar to those used in passenger cars. When this rule is fully imple-

mented, USEPA expects NO_X emissions to decline by 2.6 million tons a year.

Dredging of ports and harbors and disposing of dredged materials, particularly those contaminated with heavy metals and other toxic pollutants, are major port industry concerns. Because many U.S. ports were built near the mouths of rivers, the accumulation of silt is a common problem. Many ports and harbors must be dredged to create deeper and broader channels to accommodate ships. The Port of New York and New Jersey, which is naturally shallow, is one of the most heavily dredged areas in the United States. According to USEPA, about 10 percent of sediment underlying the nation's surface waters has been contaminated and requires special handling and disposal methods, such as confinement in upland disposal sites (USEPA 1998).

In fiscal year 2000, the U.S. Army Corps of Engineers dredged 285 million cubic yards of materials at a cost of $821.7 million (USACE 2002). In 2000, ports spent nearly $120 million on dredging for new construction and the modernization of facilities (USDOT MARAD 2001).

Another environmental issue facing the freight industry is the introduction of non-indigenous plant and animal species into the United States. These species arrive by air and water transportation from all over the world and by surface modes from Canada and Mexico. In the 1980s and early 1990s, more than 205 known non-native species were either introduced or first detected. An example of non-native species is the zebra mussel, which entered the United States in the 1980s when ship ballast water was discharged from European freighters in the Great Lakes. The zebra mussel has now spread to 20 states, causing damage to water intake pipes, filtration equipment, and electric power generating plants. According to USEPA, more than 21 billion gallons of ballast water are discharged into U.S. waters each year (USEPA 2001). The federal government and transportation industries, and communities have instituted monitoring and treatment programs to deal with this environmental threat. EPA is also investigating what options are available under the Clean Water Act and other laws to control the introduction of non-native species from ballast water.

Like other ports and harbors, Boston Harbor is dredged periodically to maintain adequate depths for ships. Source: Great Lakes Dredge and Dock Company

With projected growth in freight volumes and increases in usage of the highway and air modes, noise reduction will continue to be a major challenge for the transportation community. Millions of people who live or work near highways, airports, and rail yards are exposed to annoying levels of noise. Although this rarely leads to hearing impairment, transportation-related noise can result in loss of sleep and related health problems. Efforts to reduce noise include the use of quieter aircraft, the installation of noise barriers along roadways, and improved mufflers in motor vehicles.

In an era of heightened awareness of the damaging effects of pollution, noise, and other problems, reducing these unintended consequences, particularly on those most affected, might well be as important for the future success of the freight transportation system as building new infrastructure and implementing new operational strategies.

Professional Capacity Building

The efficient movement of goods is dependent on the people who build the network and operate the system, and on those who use it. Educating and training a skilled and knowledgeable workforce are crucial to building and maintaining a productive and competitive freight transportation system. Yet, public sector transportation planners often do not have the necessary information and tools to make informed decisions about freight transportation needs and improvements. Furthermore, transportation professionals in the private sector have little or no understanding of the public planning process, which may affect their decisions.

At the same time, skill levels and educational requirements of transportation jobs are shifting in response to changes in the organizational structure of transportation. These include a shift from building to managing and operating systems and more interaction with other systems, such as the environment. Other factors that influence skill level and educational requirements include the introduction of advanced technologies and globalization of the economy.

Developing professional capacity will require both immediate and longer-term efforts. Activities that will help in the short run are mechanisms for information exchange, such as sponsoring forums and other outreach events and publishing technical reports to foster ongoing learning. To further develop capacity, training courses focusing on policy, the costs and benefits of transportation investments, and forecasting growth will provide much needed information for states, MPOs, and the private sector. The development of freight-specific curricula at universities and

other academic institutions is another way to build professional capacity. Many universities are initiating and expanding business, logistics, and transportation curricula to address freight concerns. These curricula must be linked to maximize their utility, extended to embrace NAFTA, and enriched to address broader policy issues associated with freight movement, trade development, and the relationships between freight and other social objectives.

Education and training are the responsibilities of both the public and private sectors. Partnerships between government and business and educational institutions are important components of building professional capacity. For example, an employee exchange program between government offices responsible for transportation and employees of freight businesses could provide valuable new and flexible learning opportunities. Likewise, nontraditional methods of educating, such as distance learning, provide additional opportunities for improving skills and learning.

STRATEGIES TO ENHANCE NORTH AMERICAN FREIGHT PRODUCTIVITY AND SECURITY

The preceding sections suggest a compelling public policy challenge in meeting the nation's needs for enhanced freight productivity and security, as agencies at all levels of government are called upon to address and balance numerous and often seemingly conflicting public policy goals. As has been noted, freight and trade transport have been fundamental to the growth and development of the United States. The necessity of freight movement has created a landscape of major urbanized areas, connected to farming and manufacturing regions and to each other by multimodal transportation corridors. This domestic linkage has been extended by the dramatic growth in international trade with Canada and Mexico, our NAFTA partners. The result is an extensive, accessible, and highly reliable network of highways, railroads, inland waterways, coastal ports, and air-freight hubs, connecting all of North America and sustaining economic growth and trade.

To meet this public policy challenge, several strategies have been developed and are now being discussed widely among freight stake-

holders. As defined by FAF and confirmed by discussions with multiple freight interests, the strategies are organized around the geography of freight and include international gateways, state and local transportation programs, and multijurisdictional corridors and regions. Within these geographic areas, two types of strategies are specified: (1) the creation of an institutional environment that supports the identification and advancement of freight concerns within the transportation development process and (2) the establishment of comprehensive and sustainable funding sources to support the implementation of selected freight-related programs and projects.

The strategies discussed here are elements of a comprehensive national freight mobility and productivity program, not specific legislative initiatives. Over the course of the next year, debate and discussion will continue as legislative development is advanced for the reauthorization of the federal surface transportation program and other modal legislative initiatives affecting air and marine interests. Information on the nature of impending freight mobility and productivity problems, the geography and scope of the problems, and reasonable options to pursue to achieve the desired outcomes will add value and enrich future discussions.

International Freight Gateways

The growth in international trade expected through 2020 will place a continuing burden on international gateways and gateway communities. Gateways create a "free rider" transportation problem. The costs and congestion associated with trade are borne locally, while the benefits are distributed broadly throughout the county. Moreover, as population continues gravitating to coastal and border regions (particularly the southern border) through demographic shifts and immigration, public agencies, port authorities, and the private sector will face stiff competition for land and access to advance freight efficiency improvements. Concerns about national security within the freight transport system will also focus on gateways, as the United States and its NAFTA trade partners seek protection against terrorism through the international trade system. These concerns suggest that the major objectives of any initiative to enhance international gateways should be to: (1) improve gateway throughput, (2) ensure national security, and (3) mitigate congestion and community impacts. Gateway projects are likely to combine existing or modified federal-aid programs and public-private partnerships through an innovative finance program underpinned by user fees, as was done with the recently opened Alameda Corridor.

The Alameda Corridor, the predecessor and model for TIFIA, brought together several funding sources from federal, state, and port programs, along with a user fee applied to shipments either using, or capable of using the corridor. The Corridor relies substantially on grade separations to promote safety and to improve the operational characteristics of rail, to minimize truck drayage and traffic conflicts in and around the ports, and to minimize the community impacts of freight improvements. In addition, during construction of the Corridor a broad employment development program was established for surrounding neighborhoods with significant minority and disadvantaged populations, to provide long-term economic opportunities within communities affected by transport systems. The Corridor is a model for public-private cooperation in addressing multiple social, economic, and environmental goals. It clearly illustrates how a systemic approach to multimodal development, involving multiple jurisdictions and combined funding sources, can be brought together to address a problem of regional and national interest.

Port gateway projects under development include the I-710 Freeway serving the Ports of Long Beach and Los Angeles, the Portway and Port Inland Distribution Network serving the Port of New York and New Jersey, and the FAST Corridor serving the Ports of Seattle and Tacoma. These gateway projects generally exceed $500 million in cost, and some go much higher. Other surface transportation projects are being considered to improve NAFTA land gateways, such as the Michigan/Ontario frontier, and to facilitate rail movements in Chicago that serve national and international trade. In concert with an international gateways initiative, stakeholders have suggested that some sustained private sector interaction with government needs to be established to facilitate public-private decisions on freight and trade transportation

The Redondo Junction project separates passenger rail from freight rail by elevating Amtrak and Metrolink railroad lines over the Alameda Corridor in Los Angeles. Source: Alameda Corridor Transportation Authority

issues of national and regional importance, including gateways.

State and Local Transportation Programs

The 3-C (continuing, cooperative, comprehensive) transportation planning process was established by federal law in the 1960s to support statewide and metropolitan planning. Although freight movement is implicit in transportation planning, it has only been explicitly called for since the 1990s. Both ISTEA and TEA-21 defined freight as an element that must be considered and included in each of these planning processes. As noted earlier, many states have initiated efforts to incorporate freight in both state and metropolitan planning, partly in response to these two federal legislative initiatives. These efforts have been significant and useful in many states and localities, but they have not been adopted completely throughout the nation. As a result, the consideration of freight and trade transport issues has been inconsistent, with strong consideration in some areas and far less in others. Several regional coalitions have emerged, focusing primarily on development of specific corridors. Others have formed to address regional freight issues. Most recently, in response to growing trade with Canada and Mexico and the terrorist attacks of September 11, with their implications for international trade security, freight planning has been advanced through the creation of binational planning arrangements that include the involvement of U.S. Customs and other Federal Inspection Services with responsibility for international trade transport.

To improve state and metropolitan consideration of freight and to secure continued private interest and involvement in planning, new institutional means are needed to simplify the involvement process and to shorten the delivery time of measurable system improvements. A “one-stop shopping” model for freight involvement has been established in some states, and other states are experimenting with similar models to engage freight interests more effectively. These models address three major objectives of strengthened public-private cooperation in freight; (1) improve reliability of freight movement; (2) support state and local economic development, and (3) coordinate freight transportation investment, economic development, and trade initiatives. However, these models do not replace or replicate existing state and local planning functions. Rather, they provide a single point-of-contact for freight interests to simplify the involvement process for the private sector, while providing a point-of-accountability and access to public programs.

State DOTs and MPOs are faced with a large and complex set of issues to be addressed;

freight is often viewed as simply one issue among many. Identifying a collaborative mechanism or a suitable point-of-contact for freight issues could substantially improve the consideration of freight within statewide and metropolitan programs. Governor-directed efforts in Florida and Washington State, for example, have enabled these states to focus additional attention on freight and trade transport issues without constraining other interests and to provide the executive level authority and guidance needed to help local freight advisory groups to function more effectively.

Process improvements within state and local transportation programs should enable a more effective focus on freight investment needs within these geographic areas, particularly regarding intermodal development. Traditionally, transportation systems have been developed modally and independently, with highway planning conducted within the public arena, and rail and port planning conducted either fully within the private sector, or as a shared responsibility. The result has been an orientation to modal specific networks, without full regard for intermodal connections and development opportunities. In response to this, TEA-21 required USDOT to analyze and report on the adequacy and needs of NHS freight connectors. The NHS Intermodal Freight Connectors report, submitted to Congress in December 2000, documented the condition of and issues associated with connectors, often referred to as "the last mile."

While these relatively short highway sections represent less than 1 percent of NHS mileage, they are critical to enhancing intermodal opportunities for shippers and improving asset management of the nation's freight infrastructure system. Additional attention must be given to these vital sections, especially within congested metropolitan areas, to help realize the full potential of the nation's intermodal system. Almost 50 percent of NHS intermodal connectors are partially or entirely owned by local governments, as opposed to the remainder of the NHS, which is almost entirely owned and operated by states. Because of funding constraints or other priorities, connectors are often not given priority by local governments.

Both ISTEA and TEA-21 emphasized simplifying and improving the flexibility of existing programs over the creation of new ones. In keeping with this approach, solutions to connector and other intermodal freight problems are likely to require an increased state and local focus in planning and innovative financing and greater cooperation with private sector freight interests. These approaches will ensure that an appropriate level of condition and serviceability is defined for critical connectors and other important freight projects,

with federal-aid eligibility assured to enable necessary funding for improvements. Additionally, these approaches would allow maximum state and local flexibility, while ensuring a public sector response appropriate to the specific needs of the freight community.

Multistate Trade Areas and Corridors

The Freight Analysis Framework, viewing freight movement from a national and continental perspective, graphically illustrates the importance of long-distance trade corridors and regional trade transport networks to the efficient and effective flow of commerce. State and local agencies may consider freight movement external to their borders in their planning processes, but programs are generally developed in accordance with the needs and priorities of the state or local government in question, not its surrounding jurisdictions. An ISTEA-required study on the adequacy of North American borders and corridors to accommodate trade helped generate national interest in multijurisdictional approaches to regional and corridor transport development. Corridor coalitions—spurred by the potential development of a multistate corridor, binational coalitions emphasizing cross border trade efficiency, and regional coalitions focusing on identification of regionally significant multimodal subnetworks—have formed and continue to form to raise the awareness and

Trucks queue up to enter a maritime port terminal in southern California. Source: Tom Pavia

interest in multijurisdictional approaches to transportation issues. Institutionally, groups are using pooled funding mechanisms and congressional assistance to support multijurisdictional planning efforts. The challenge has been twofold: (1) the institutionalization of these efforts, with appropriate links to the authorized state and local planning processes and (2) the identification of funding for the implementation of agreed upon activities and projects, without jeopardizing other state and local transportation priorities.

TEA-21 includes a Borders and Corridors program to support multijurisdictional planning, including regional, corridor, and binational

approaches. The program is discretionary, with project solicitations reviewed for innovation and breadth of support. This program, while heavily oversubscribed, has been considered a catalyst for multijurisdictional approaches toward corridor, border, and regional trade transport development. Originally envisioned to support coordinated planning, environmental assessment, and other preconstruction activities, the Borders and Corridors program is being used increasingly as an additional funding source for conventional construction activities. This expansion in eligibility has constrained its use in advancing multijurisdictional institutional approaches to transport development and in emphasizing the need for border initiatives to improve the efficiency, safety, and national security of border crossings. States and MPOs are currently able to build coalitions and engage in coordinated multijurisdictional planning, but implementation issues are often a challenge. Although agreement on general principles is relatively easily obtained, agreement on multiyear program strategies and sequencing of investments across jurisdictions has proven difficult.

Borders and Corridors programs have become models for encouraging multistate and multijurisdictional approaches. A strengthening of objectives and a directive for coordinated implementation strategies, in addition to planning, could enable jurisdictions to accommodate corridor and region-wide freight concerns more effectively. New institutional arrangements such as interstate compacts have been suggested to more effectively manage multistate corridor and regional projects.

In addition to the need for institutional innovations in support of multijurisdictional approaches, financing is also a major concern. Coalitions, such as the Latin American Trade Transportation Study, the I-95 Corridor Coalition, and the International Mobility and Trade Corridor have addressed issues of funding across state lines, modal interests, and international boundaries. The funding problems identified suggest programmatic and legislative improvements that can remove some of the barriers and facilitate the leveraging of public and private capital investment to make the necessary freight improvements while maintaining the integrity of the broader transport network. Innovative finance solutions need to be further explored. Multistate mechanisms for TIFIA, State Infrastructure Banks, and enhanced bonding mechanisms need to be considered.

National Initiatives for Freight Productivity and Security

Initiatives that address institutional and funding concerns in gateways, regions, and corridors, and support state and metropolitan transportation planning, will enhance the ability of these geographic areas to meet the challenges of improving freight productivity. However, broader objectives such as ensuring security and improving overall freight system performance call for other, more nationally oriented strategies. The application of freight technologies to support freight transport security efforts and strengthen the integrity of global supply chains will require leadership in testing and deploying new technologies and agreement on international standards and protocols. Information sharing among government agencies and industries must also be continued and strengthened. Furthermore, the United States and its trading partners must continue to work together to accelerate the adoption of international data and technology standards. Work on the adoption of standards has been initiated with the International Standards Organization and is continuing with other international entities, such as the World Customs Organization, the International Electrotechnical Commission, the United Nations Economic Commission, and the International Telecommunications Union. The adoption of standards will allow global interoperability of security sensors, for example, and help reduce information islands that now exist throughout the freight transportation network.

To improve national freight capabilities, emphasis should be given to developing freight data/tools and building professional capacity. A comprehensive data and analytical system, building on the success of the Freight Analysis Framework, will enable decisionmakers to better understand trends, make informed investment decisions, and support safe and reliable transportation operations. Specifically, new models need to be developed to measure the effects of growing volumes of freight on congestion and the environment and evaluate the effects of economic growth on freight demand. Historically, transportation demand forecasting models have tended to focus on passenger travel.

Likewise, national programs are needed to develop freight-specific educational and training opportunities to close a serious gap in knowledge of freight transportation's unique characteristics and needs. Professional capacity building programs will require both immediate and long-term efforts focusing on such topics as emerging freight trends, data needs, benefits and costs of investments, forecasting growth, and planning and financing improvements. These programs will provide much needed information to states, MPOs, and the

private sector in planning for future growth in freight transportation.

CONCLUSION

The development of an extensive and efficient transportation system has allowed our nation to bridge vast landscapes, connect expanding metropolitan areas, link urban and rural areas and interests, and respond to changing economic opportunities created by new technologies and advances in manufacturing and distribution. As international trade increases and the global economy becomes more integrated, transportation will take on an even more prom- inent role in the U.S. economy and society.

Throughout the last half of the 20th Century, U.S. transportation policy has been governed primarily by concerns for passenger interests. Efficient freight movement, viewed primarily as the responsibility of the private sector, has often been ignored by transportation agencies, under the assumption that any transportation improvement will benefit all users equally. Many state and local governments, particularly in areas that have traditionally recognized freight movement as the lifeblood of their community, have taken steps to understand and consider freight needs more effectively in their plans and programs. They have done this out of an appreciation of freight as a major stakeholder in its own right and out of a growing sense that freight improvements also enhance economic health and the overall quality of life. This recognition of freight's importance needs to be inculcated in all areas of public policy and institutionalized within the framework of national, state, local, and international transportation decisionmaking.

This report, based on extensive review, analysis, and consultation, provides a general overview of the challenges facing freight transportation. It provides a useful starting point for public and private sector discussions on an array of issues associated with freight planning, finance, operations, and security. Embracing freight more directly in the federal surface transportation program alone will not resolve all of these issues. However, a concerted effort by those with interests in freight at the federal, state, and local levels and a strengthened partnership with the private sector will enable the development of a comprehensive set of strategies to address freight issues more effectively. Through this greater understanding and willingness to balance competing interests, national goals for mobility, productivity, safety, security, and quality of life will be realized.

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16. Abstract

Although efforts to improve freight transportation efficiency and reliability have been successful, the U.S. transportation system is now facing challenges that, unless addressed, may jeopardize its reliability. Allowing transportation system reliability to erode would add additional pressure to U.S. companies operating in an increasingly competitive international market and place more burdens on communities seeking to sustain their economic base and quality of life. Improved logistics has thus far been able to address the corrosive effects of loss of system reliability. Unfortunately, the ability of logistics to provide additional offsetting savings appears to be nearing its limit, as are the savings attributable to deregulation. Unless these challenges are addressed, more discretionary income will be devoted to moving materials and products, businesses will be constrained in their adoption of innovative strategies to maintain global competitiveness, quality of life—as measured by congestion—will suffer, and safety and security could be jeopardized.

This report summarizes two years of work conducted by the Federal Highway Administration, in cooperation with the U.S. Department of Transportation's other modal administrations, and the Secretary's Office of Intermodalism. It involved the development of an integrated freight data and analytical tool, called the Freight Analysis Framework, and extensive outreach to freight stakeholders. Through these efforts, FHWA identified several key issues facing freight transportation. These key issues, which are discussed in this report, include (1) congestion and expanding capacity, (2) improving systems operations, (3) planning and financing freight project, (4) safety, (5) national security, (6) the environmental effects of freight transport, and (7) building professional capacity in the freight sector. The report also discusses several strategies to meet these challenges. The strategies are organized around the geography of freight and include international gateways, state and local transportation programs, and multijurisdictional corridors and regions.

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