

# TRANSPORTATION INVEST IN OUR FUTURE



# AMERICA'S FREIGHT CHALLENGE

AMERICAN ASSOCIATION OF  
STATE HIGHWAY AND  
TRANSPORTATION OFFICIALS

**AASHTO**  
THE VOICE OF TRANSPORTATION

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# INTRODUCTION



## America's New Barrier to Trade—The Tariff of Congestion

As trade barriers fall around the world, a new trade barrier is rising around the American continent.

Congestion at the nation's ports, on its highways, and along its railroads is becoming the new tariff of the 21st Century.

This congestion increases travel times, it disrupts tightly planned supply chains, and it raises the costs of doing business with America and in America.

The effect of rising congestion is like a tax—only it escalates every year without a vote of the people. This congestion tax can be repealed only if the United States adopts a new vision and new strategy for a global, 21st Century American transportation system.

The foundations of this congestion crisis are built upon the aging transportation network that serves the United States today:

**The Interstate Highway System** was the envy of the world—in 1967. Today it is overwhelmed with traffic and truck volumes that far surpass anything anticipated when it was constructed. The Interstate Highway System was planned in the 1950s for the traffic volumes of the 1980s. Today, truck and traffic congestion is a daily occurrence which will grow to staggering rates in the next 20 years.

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**America's rail network** is struggling to satisfy current demand. It was planned in the late 19th and early 20th Centuries to meet the needs of a newly emerging industrial nation. Today, despite record levels of investment by the railroad industry, more will be needed to meet the needs of the system, the Sun Belt regions, the nation's booming ports, and the agricultural and manufacturing industries.

**America's water ports** face a tsunami of foreign trade which is overwhelming their capacity. Estimates are that foreign trade will double nationally and triple at key ports over the next two decades. These ports and their landside connections struggle to handle today's volumes—much less those of the coming decades.



**Perhaps more serious than the problems in any one mode is the increasing need to improve connections between modes.** Foreign trade by its nature involves two or more modes. The connections between America's ports and its highways, between its ports and its railroads and between its highways and its railroads are inadequate for today's trade volumes—much less those of the next two decades.

This congested and antiquated network hinders the United States at a time of soaring international competition. The value of foreign trade to the U.S. economy will nearly triple from the equivalent of 13 percent of GDP in 1990 to 35 percent by 2020. Instead of reducing barriers to this trading boom, America is increasing them by trying to squeeze a greater amount of product through its increasingly congested logistical pipeline.

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**"Transportation—as an integrated system—is an essential component of America's global competitiveness, and, as such, it can no longer be relegated to the backbench of U.S. public policy."**

**—Thomas Donohue, President and CEO of the U.S. Chamber of Commerce**

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This prescient observation from the U.S. Chamber of Commerce reflects what is becoming a crisis of confidence in America's transportation system. To face this crisis and to compete effectively, America needs a new vision and a new strategy. It must build a 21st Century American transportation system that allows every corner of the country to have a modern logistics platform to compete in a new global economy. America's vaunted status as the most efficient and productive nation in the world is about to slip—unless the public and private sector can respond in time.

AASHTO produced this report for the National Surface Transportation Policy and Revenue Study Commission to warn national policy makers of this impending crisis. AASHTO also proposes a series of far-reaching policies that must be adopted if America is to retain its competitive advantage.



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## CHAPTER 1

# Driving Trends of Congestion



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“Congestion is one of the single largest threats to our economic prosperity and way of life. Whether it takes the form of trucks stalled in traffic, cargo stuck at overwhelmed seaports, or airplanes circling over crowded airports, congestion is costing America an estimated \$200 billion a year.

Each year, Americans lose 3.7 billion hours and 2.3 billion gallons of fuel sitting in traffic jams and waste \$9.4 billion as a result of airline delays. Worse, congestion is affecting the quality of Americans’ lives by robbing them of time that could be spent with families and friends.

Congestion is not a fact of life. It is not a scientific mystery, nor is it an uncontrollable force. Congestion results from poor policy choices and a failure to separate solutions that are effective from those that are not.”

—Norman Mineta, former U.S. Secretary of Transportation

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It is a surprising fact that traffic volumes and particularly freight volumes are growing much faster than the U.S. population, or even the U.S. Gross National Product. Several fundamental and powerful forces underlie this trend.

First, traffic volumes and freight movement rise with economic growth. As affluence increases, so does travel. Likewise, rising affluence means rising consumption. As the economy grows, more goods are consumed. Goods must move along complex supply chains that originate with raw commodities, move to various value-added manufacturing processes and ultimately to warehouses and stores and to the doorstep of the American consumer. As the economy grows, so does the volume of goods shipped.

Secondly, despite a decline in manufacturing *employment*, manufacturing *output* continues to grow. American manufacturing is increasingly relying on high-end, high-value products to differentiate itself from growing foreign manufacturers who focus upon high-volume

but lower-value products. America's high-end manufactured goods need to travel great distances just to reach consumers in our own country, much less the thousands of miles to reach export markets. The populations and economies of Asia represent the most significant source of American exporting growth. This growth means American manufacturers are relying on our highways, railroads, water ports, and airports to be their conduit to these foreign customers—as well as to the traditional domestic ones.

**Wal-Mart revolutionized retailing with its just-in-time inventories. Dell Computers eliminates stores by having consumers design computers on-line which are then delivered within hours.**

Third, shipments are growing because of the efficiency of America's just-in-time strategies. A significant portion of America's productivity gains in recent years have come from logistics. As producers learned to lower costs by reducing inventory, the need for high-value, time-sensitive shipments has grown geometrically. American producers and consumers now demand a precisely tuned and reliable logistics network to provide what they want, when they want it. This applies to fresh produce in a Minnesota supermarket during February as well as to auto parts for a Detroit assembly line at the start of a production shift. A just-in-time economy means there are more shipments, generally of lower weight but of higher value, than in the past.

The just-in-time logistics strategy has created some of the largest and most influential new American companies. Amazon could not exist without an instantaneous supply chain. Wal-Mart revolutionized retailing with its just-in-time inventories. Dell Computers eliminates stores by having consumers design computers on-line which are then delivered within hours. The profound influence of just-in-time practices created new economic models but also profoundly stressed America's transportation network.



Fourth, the growth of international trade stimulates ever-growing imports and exports. As mentioned above, the value of international trade is growing from the equivalent of 13 percent of the economy in 1990 to 35 percent in 2020 and 60 percent of the economy by 2035. The foreign and domestic demand means that tons shipped in the United States will rise from 16 billion today to 31.4 billion by 2035.

These trends are fundamental, they are inexorable, and they are escalating. These are the trends that create 21st Century challenges that were unheard of in the 1950s—the last time the United States set a new national transportation challenge. Then, the Interstate Highway Act envisioned a nation united with a new transcontinental highway network. Now, the U.S. needs to be united with a seamless and flexible system of modes to accommodate the frenetic and competitive global marketplace.



## CHAPTER 2

# The American Economy— Faster, Smarter and Leaner



**T**he changes at work in the American economy are profound. The agricultural and manufacturing economy of the 20th Century has evolved. Services are now the fastest-growing sector of the economy. Logistics and transportation sectors are second, which reflects the four underlying trends mentioned previously. Undeniably, manufacturing *employment* will continue to shrink, as it has for the past three decades. However, manufacturing *output* will continue to grow. Manufacturing employment is falling because of overseas outsourcing and also because of automation. Today's modern robotics-filled factory requires less labor than its predecessor, but its output is significantly higher.

**The manufacturing that remains in the United States will create high-end, high-value products, America's exports of the future.**

Importantly, productivity gains from investment in technology and improvements in manufacturing processes will increase manufacturing output and generate more—not less—demand for transportation. The overall value of industrial production will grow faster than the overall economy. The manufacturing that remains in the United States will create high-end, high-value products, America's exports of the future. Durable goods manufacturing, which includes automobiles, high-tech machinery and electronics, will see the greatest growth. These sectors will increase at a compound rate of 5.4 percent annually, compared to overall American economic growth of 2.8 percent. Traditional manufacturing will continue to grow at a respectable rate of 2.6 percent a year.

The increase in American manufacturing output will be the country's primary engine for exports. Such exports are sorely needed to combat America's significant trade imbalance and to expand the markets for America's best-paying employers.



Agricultural products will continue to be another critical product which America wants to export. American farmers have learned that processing raw commodities into higher value products is a prime means of increasing value and exports. Converting raw milk into yogurt, converting soybeans into processed cattle feed, and turning corn into corn syrup adds value beyond what the original raw commodity would provide.

**The American economy demands increasing volumes of trade if it is to continue to grow. The economic sectors that remain robust will require far more trade and travel per unit of output than was required 30 years ago.**

Exports are critical to increasing markets for American farmers. In many Midwestern states, agricultural products are the first or second largest share of products moving on the freight networks. Trucks, railcars and barges all contribute to a network that moves bulk grain to processors where it is converted into value-added exports.

The stereotype of the American economy is one of declining Rust Belt towns, booming service industries and stagnant rural farm communities. With such a stereotype, one may believe that overall travel and trade will grow slowly. To the contrary, the real American economy demands

increasing volumes of trade if it is to continue to grow. The economic sectors that remain robust will require far more trade and travel per unit of output than was required 30 years ago.

## The Global Economy—Bigger, Farther, Stronger

Also driving fundamental changes in shipping patterns is the rapidly transforming global economy. What is shipped, who ships it, where it is shipped from and where it is shipped to all are transforming dramatically.

Today, the United States is the world’s largest economy followed by Japan, Germany, the U.K., France, Italy, China, Brazil, and India. (Table 1.) The Western focus of that global economy is shifting daily. Instead of European countries and the United States dominating the world economy, Asia will dominate in the coming decades. Not only will Asia produce more exports which America will want to buy, but Asia also will have the world’s fastest-growing consumer population—which American producers will want to reach.

**Imports and exports are predicted to provide 35 percent of the country’s GDP by 2020 and 60 percent in 2030.**

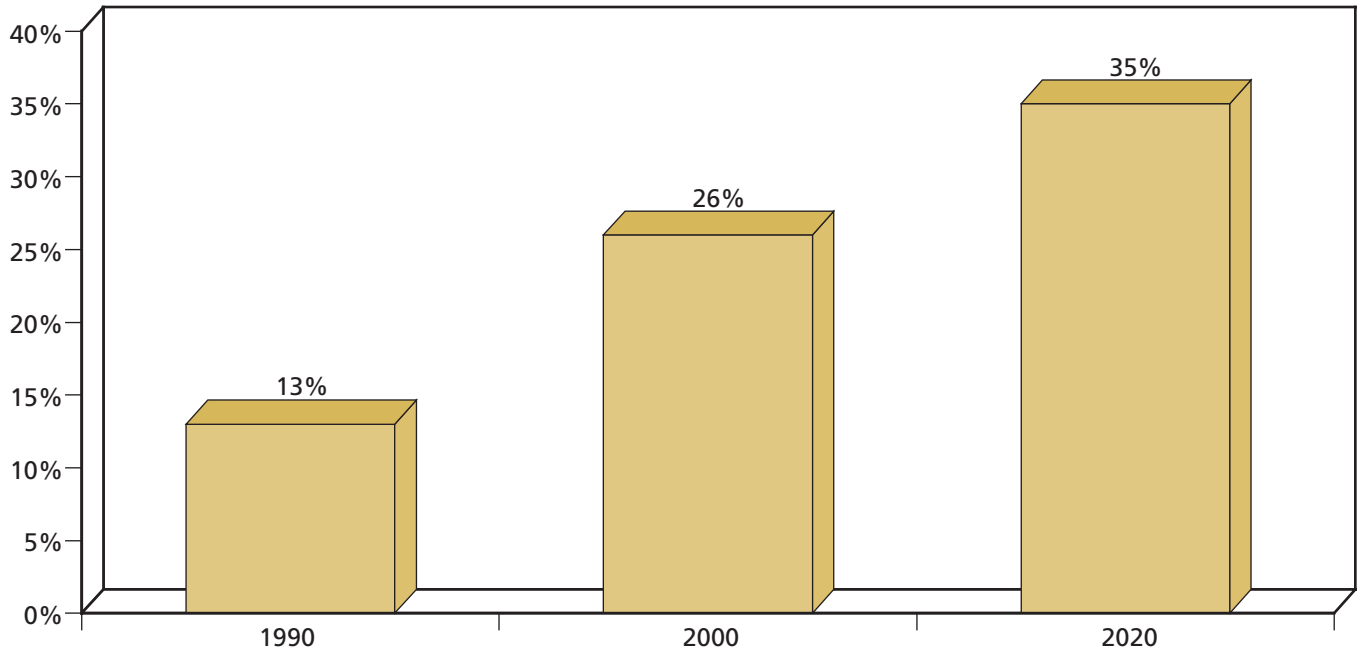
**Table 1. Rank of Nations’ GDP in Inflation-Adjusted Dollars**

2000	2010	2020	2030	2040	2050
US	US	US	US	US	China
Japan	Japan	China	China	China	US
Germany	Germany	Japan	Japan	India	India
U.K.	U.K.	Germany	India	Japan	Japan
France	China	U.K.	Russia	Russia	Brazil
Italy	France	India	U.K.	Brazil	Russia
China	Italy	France	Germany	U.K.	U.K.
Brazil	India	Russia	France	Germany	Germany
India	Russia	Italy	Brazil	France	France
Russia	Brazil	Brazil	Italy	Italy	Italy

China, which was the seventh largest economy in 2000, will be the second largest economy by 2020 and is predicted to overtake the United States by 2050 as the world’s largest economy. Some say it could happen sooner. Along with China’s 1.3 billion people, India’s 1 billion people will propel their economy from the ninth largest to the third largest by 2040. These economies will be huge, they will be modern. They will produce and consume tremendous amounts of goods that will dwarf today’s trading volumes.

The only way to get American products to those consumers and to get Asian imports to America is by ocean shipping. Water freight will continue its unabated growth and it

**Figure 1. International trade is growing as a percentage of the U.S. Gross Domestic Product.**



will continue to require increasing port capacity. Just as importantly, the highway and rail connections into those ports will be under increasing and unrelenting pressure.

The rapid increase in trade value and trade volume is expected to continue, with trade growing faster than the U.S. economy as a whole. In 1990, the combined value of U.S. imports and exports was the equivalent of 13 percent of the U.S. gross domestic product. That grew to 26 percent in 2000. Trade is predicted to be equivalent to 35 percent of the country's GDP by 2020. (Figure 1.)

Both domestic and foreign trade drive a steady and powerful growth in freight movement. The U.S. economy is predicted to grow at a compound annual rate of 2.8 percent



over the next 30 years. That growth will increase the national GDP by 130 percent. The growth in the economy alone will nearly double the amount of freight shipped.

Measured in tons, freight demand will grow from 16 billion tons today to 31.4 billion tons in 2035—an increase of 89 percent. Measured in ton-miles, freight demand will grow from today's 6 trillion ton-miles to 11 trillion by 2035—an increase of 92 percent.

Freight demand is not only growing, but the patterns of movement are changing. Disruptions in West coast ports send Asian trade directly to the East coast. Expansion of the Panama Canal will increase all-water shipments from Asia to the East coast. Port expansions in Canada and Mexico will send freight into the United States over the land borders rather than through U.S. ports. Major corporations are constantly adjusting their supply chains in response to changes in markets and the origins of products. The challenge of growth is compounded by the volatility in the paths that freight follows.



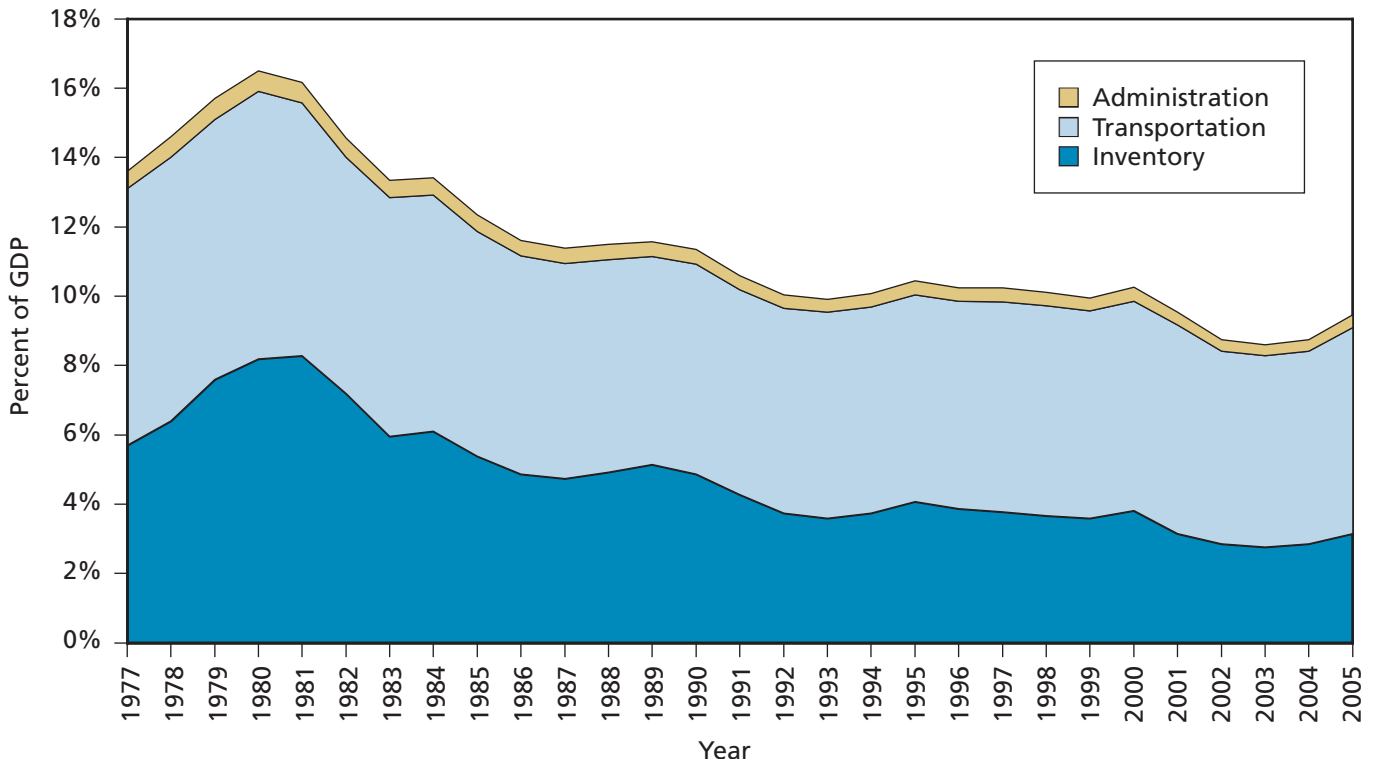
## CHAPTER 3

# America's Freight Transportation Network—Struggling to Keep Up



**A**s the world grows more competitive, America's freight network grows more congested. The investments in America's transportation network in the 1950s, 1960s, and 1970s led to significant increases in American productivity. Figure 2 illustrates how the costs of logistics steadily declined from the 1960s until today—when measured as a percentage of Gross Domestic Product.

**Figure 2. Logistics as Percent of GDP**



Source: Rosalyn A. Wilson, *State of Logistics Report*, Council of Logistics Management, 2006.

That trend is changing. Logistics costs are rising, both in absolute terms and in terms of their percentage of the America economy. In 2005, total logistics costs rose to 9.5 percent of GDP, compared to 8.6 percent in 2003. That was the largest rise in 30 years. It is estimated that only one-third of this higher cost is attributed to rising fuel prices. Another third was caused by delay and inefficiencies in the transportation system.

## **With staggering growth looming on America's network, America's shippers realize that the nation's transportation system cannot handle today's freight volumes, much less those forecast for the next three decades.**

With staggering growth looming on America's network, America's shippers realize that the nation's transportation system cannot handle today's freight volumes, much less those forecast for the next three decades.

Trucking is clearly the dominant mode of shipping and faces some of the largest problems. However, all the modes play a critically important role in the transportation system—and particularly for important market segments. Rail is essential for intermodal and bulk movements across the continent, particularly for items such as automobiles, coal, and ore. Domestic water shipment is irreplaceable for high-volume, low-cost movement of chemicals, grains, ore, aggregates, and salt, particularly on the Mississippi and Ohio River systems. Air carries a tiny fraction of all freight but is critical for high-value, time-sensitive cargo. Critical electronics parts, perishable gourmet foods, and even high-end clothing travel by air.

The following sections will look at the looming challenges facing each mode—as well as the critical problems facing the integration of the modes into a seamless 21st Century system.

### **Highways—Backing Up**

Although every road is important to someone, some roads are important to everyone. The Interstate Highway System comprises only 1 percent of the public road miles in the United States but it carries 41 percent of the large truck freight traffic in the country. This irreplaceable resource celebrated its 50th anniversary last year. On June 29th, 1956, President Dwight David Eisenhower signed the Federal-aid Highway Act that funded the Interstates. It marked the most significant milestone toward the dream of having a non-stop, transcontinental highway system.

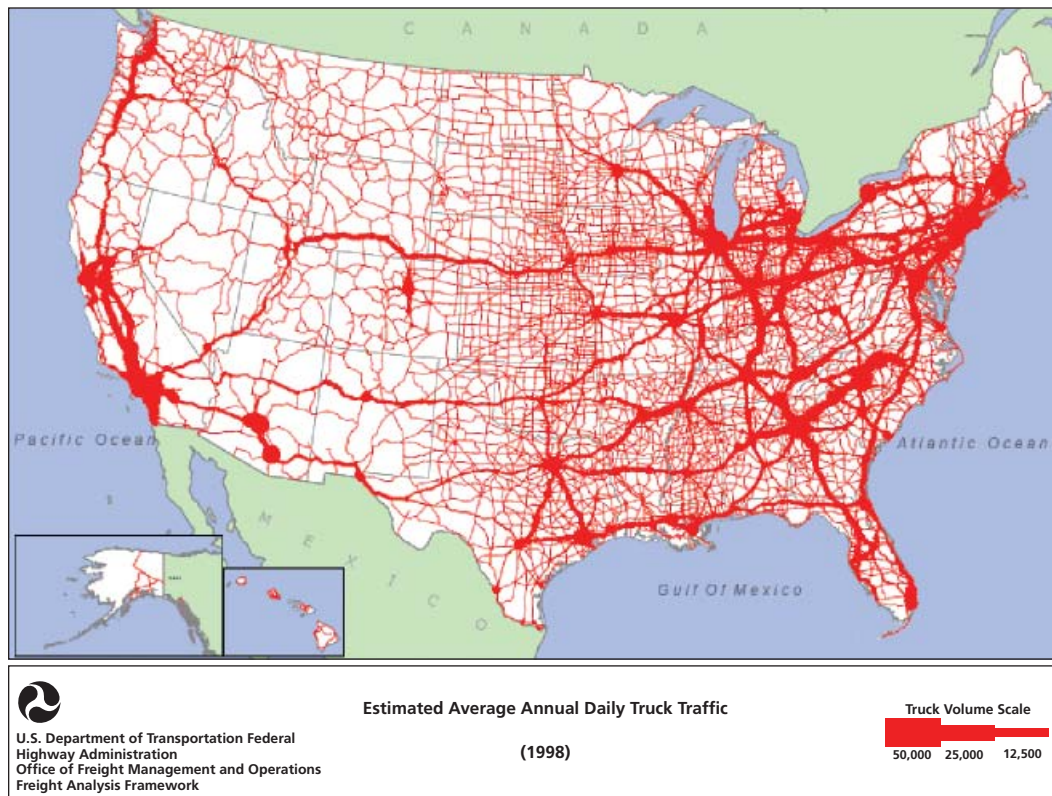
Fifty years later, that system is overworked. Segments of it have become so congested that it no longer is a non-stop coast-to-coast highway. Stop-and-go conditions predominate on hundreds of miles of Interstate highways during peak hours each day in major cities. In some states, rear-end crashes caused by stopped traffic are the fastest growing type of accident on the Interstate highway network.

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**Loaded trucks traveled 164 billion miles on the nation's roadways in 2004. Over the next 30 years, that will double.**

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**Figure 3. Currently highway volumes reflect the density and breadth of freight traffic.**



America's competitive position requires a Phase II of the New Interstate Highway System for the 21st Century designed to deal with the volumes, technology and intermodal connectivity demanded by today's economy. The Phase II of the New Interstate Highway System for the 21st Century will be preserved in a good condition, it will be enhanced with Intelligent Transportation Systems to provide real-time information to motorists and shippers, it will be greatly expanded and it will be complemented by a doubling of transit ridership to reduce traffic demand.

Highway engineers use a simple curve to illustrate congestion. On the Highway Capacity Curve low volumes of traffic can increase significantly without any effect upon travel times, up to a point. If volume increases from 1,000 vehicles per lane per hour to 1,500 vehicles per lane per hour, the motorist will notice the additional cars but traffic will not slow down. Another 300 cars can be added, and still there is no effect. This, in effect, is what happened on America's Interstates from 1970 until the late 1990s. Traffic grew steadily, but it had little effect upon travel times or reliability.

But then, the Highway Capacity Curve illustrates what happened in the past decade. Once volumes approach 2,000 vehicles per hour per lane, conditions start to deteriorate rapidly. At 2,200 vehicles per lane, traffic speeds become erratic. Something as minor as a police officer issuing a ticket can bring the traffic to a crawl. Then, congestion backs up as the capacity is reduced and the effect ripples for miles up the stream of traffic. Traffic engineers give these conditions a Level of Service rating of A through F.

**Figure 4. National Highway System Estimated Peak Period Congestion: 2035**



Today, most of America's urban Interstate highways are mired in Levels of Service E and F. That means that even the most minor incidents caused by accidents, weather, construction, or even law enforcement activities create highly unstable and unpredictable conditions. Rear-end crashes become very common under such conditions. Some states routinely reports sections of Interstate highway that measure 100 and even 200 crashes per mile per year in their cities.

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Since 1994, exports of manufactured products are up 43 percent, high technology exports are up 45 percent...and agricultural exports increased 31 percent. Some 3.8 million U.S. jobs now depend on the manufacture of exports...Jobs created by export pay 13 to 17 percent higher wages than non-trade jobs in the economy.

—American Association of Port Authorities

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This highway network is the backbone of America's freight system. In 2005, America's highways carried 77 percent of America's freight when measured by tons shipped and carried 92 percent of America's freight when measured by value. As noted, the Interstate Highway System carries most of this freight and is the pre-eminent component of the country's highway system.

**In 2005, America's highway network carried 77 percent of America's freight when measured by tons shipped and it carried 92 percent of America's freight when measured by value.**

Truck volumes are approaching staggering levels on the Interstate system (Figure 4.):

- Today only 30 miles of Interstate Highways carry more than 50,000 trucks a day. By 2035, that will grow to 2,500 miles carrying more than 50,000 trucks daily;
- Today, the average Interstate highway mile carries 10,500 trucks and that will rise to 22,700 by 2035;
- By 2035, more than a third of America's Interstate highways will carry more than 25,000 trucks per day. That means for a motorist changing a tire on the side of the Interstate, a truck will pass him or her every 3.5 seconds.

The Texas Transportation Institute's annual congestion analysis documents steady degradation in American travel times, particularly in large cities. Annual hours of delay per traveler have grown from 16 hours lost to congestion in 1982 to 47 lost hours in 2003, for Americans in the 85 largest urban areas. Highway congestion caused 3.7 billion hours of travel delay and 2.3 billion gallons of wasted fuel in 2005 for a total cost of \$63 billion. Incidents such as weather, accidents and construction are blamed for about 40 percent of the delays while a lack of capacity creates the remaining 60 percent.

Much of the nation's congestion occurs at bottlenecks on the Interstate system, mainly at outdated and over-capacity interchanges. A recent study indicated that 243 million hours of delay occur annually to freight trucks, causing \$7.8 billion in lost time. Interchanges accounted for 51 percent of the 243 million hours of annual truck delay at the top 277 bottlenecks. The top 10 bottlenecks average 1.5 million hours of truck delay each year. More than half of those total interchanges each generate more than 250,000 hours of truck delay per year.

### **Much of the nation's congestion occurs at bottlenecks on the Interstate system, mainly at outdated and over-capacity interchanges.**

Congestion threatens the very network which enabled a just-in-time economy. The stated performance standard for truck shipping typically is 95–98 percent on time—often calculated to within minutes of the customer's loading dock. The trucking industry's ability to meet this goal and the advent of computerized logistics networks led to the creation of just-in-time practices. Outfitted with mobile communications and product-identification technology, the truck became part of corporate America's computer systems as well as its delivery system. This allowed companies to move more product faster, farther and more reliably than ever.

A study of Ohio's Interstate highways indicates that up to 2,500 hours of truck delay occurred daily at its worst bottlenecks. Those locations affected travel times for more than \$226 billion worth of freight in 1998 dollars, rising to \$309 billion by 2010. Reconstructing the Columbus and Cincinnati bottlenecks would provide travel time savings of between \$1.7 billion and \$3.4 billion by 2030. The projects had benefit/cost ratios of between 10-to-1 and 16-to-1.

Such improvements are sorely needed but exceed the budgets of nearly all state departments of transportation. Meanwhile, delay at such locations costs shippers between \$25 and \$200 per hour, depending upon the product carried, according to FHWA. The largest delay for long-haul trucks was estimated at the following five locations:

1. I-24/I-440N in Chattanooga with 393,100 hours of delay affecting \$3.7 billion worth of freight;

2. U.S. 95/I-15 in Las Vegas with 299,800 hours affecting \$2.3 billion worth of freight
3. I-90/I-94 at I-290 in Chicago with 286,000 hours of delay affecting \$4.2 billion worth of freight;
4. I-94/I-90 in Chicago with 281,700 hour of delay affecting \$5 billion worth of freight;
5. I-75/I-74 interchange in Cincinnati with 255,000 hours of delay affecting \$3 billion worth of freight.

**The issue of congestion is only one of two major challenges facing the highway network. The other is the massive cost to rebuild the Interstate system.**

As America's urban areas crawl farther down the Highway Capacity Curve, the nation's freight network will become increasingly unreliable. Already the increase in congestion is growing greater each year. According to the Texas Transportation Institute's 2005 *Urban Mobility Report*, between 1982 and 2003:

- Annual hours of delay per peak traveler rose from 16 to 47;
- The number of urban areas with more than 20 hours of delay per traveler rose from 5 to 51;
- The total hours of delay rose from 700 million to 3.7 billion;
- The cost of congestion rose from \$12.5 billion annually to \$63.1 billion.

The costs to improve these trends are significant and far outstrip the revenues currently provided to departments of transportation. The issue of congestion is only one of two major challenges facing the highway network. The other is the massive cost to rebuild the 50-year-old pavements and bridges which are remnants from the original construction of the Interstate system.

**Unless America takes direct action soon to develop the New Interstate Highway System, the nation's freight highway network will experience greater unreliability, delay and congestion.**

Compounding the need has been the devastating effects of construction prices driven by a tripling in oil prices. Heavy highway construction is extremely energy intensive. Asphalt is an oil derivative and cement requires huge kilns heated to 1,700 degrees to create the chemical process for its manufacturing. Aggregate is mined, crushed, and hauled by diesel equipment. Diesel prices have tripled in about 30 months. Such inflation has eroded states' construction purchasing power by as much as 40 percent in the past three years. The last federal fuel tax increase was in 1993 and between then and 2015 construction prices will have risen 70 percent. To cover just the effect of inflation, federal highway spending would have to grow from \$43 billion in 2009 to \$73 billion by 2015. The 2007 cost to improve highways to add adequate capacity would cost \$155 billion.

Problems on America's highways affect not only trucking but all modes as well. Trucking is the typical link between the other modes. Exports often reach the port by truck. The truck brings imports back from the dock. Rail loads are broken down and delivered

to final destinations by truck. Trucking serves as a direct and an indirect link between all the freight modes.

Unless America takes direct action soon to develop the New Interstate Highway System, the nation's freight highway network will experience greater unreliability, delay, and congestion. Incremental changes will fall far short of the necessary investment needed to reverse these trends.

## **Rail—From the Golden Spike to the Global Economy**

America's first vision of a national rail policy reached its apex with the driving of the ceremonial Golden Spike on May 10, 1869, in Promontory, Utah, when the eastern and western railroads were joined. Today, the U.S. Rail system is stressed and unable to keep up with the demand of a modern global—not just transcontinental—economy.

### **America needs a new Transcontinental Railroad System, one which reflects the demands of the 21st Century, not the 19th.**

It is estimated that railroads are the most capital intensive industry in the country. Expansion of a rail line, a terminal, or an intermodal terminal represents a permanent, high-cost investment which will be stranded if business needs change. The high cost and risk of expansion limits the railroads' ability to "scale up" capacity to meet shifting demand. As a result, bottlenecks occur across the country, particularly in and out of ports, around cities, and near the intersections of different railroads.

The rail network today represents a consolidation of the most productive remnants of the much larger rail network of the 19th and 20th Centuries. Although the modern Class I railroads are operating at record capacity and efficiency, every region of the country is plagued by localized chokepoints or inadequate rail capacity. The railroads are left with massively complex needs to alleviate problems resulting from the 19th Century patterns of rail development. Generally, the railroads developed east–west and lack many of the modern north–south routes which are needed today. Chokepoints in Chicago, southern California, New Orleans, Texas, Cincinnati, and throughout the East Coast result in the country's inability to fully exploit the greater efficiencies that railroads offer.

America needs a new Transcontinental Railroad System, one which reflects the demands of the 21st Century, not the 19th. As with the New Interstate Highway System, the New Transcontinental Railroad System will expand capacity and eliminate the critical bottlenecks which plague the old system today. As with the 19th Century Transcontinental Railroad System, public sector assistance will be needed. New funds, new regulatory flexibility, and new planning systems will be required.

As the old Transcontinental Railroad stretched across America's 19th Century geographic frontiers, the New Transcontinental Railroad will stretch to the limits of America's new economic frontiers. It will reach directly to the port docks. It will span chokepoints in Chicago, Cincinnati, Seattle, Los Angeles, Texas and throughout the East Coast. It will haul cargo seamlessly from a dock in Long Beach and deliver it to Maine, if that is what customers need.

The old Transcontinental Railroad freed America from the tyranny of distance. Now, America faces challenges in the form of trade, energy, air quality, and climate change.

- The freight-rail system carries 14 percent of the nation's freight by tonnage, accounting for 29 percent of the total ton-miles and 5 percent of freight value. That translates into 102 million miles that trucks are not traveling on the highways;
- Freight rail provides shippers with cost-effective transportation, especially for heavy and bulky commodities;
- Freight rail, in partnership with the trucking industry, provides intermodal transportation that connects United States seaports with inland producers and consumers;
- Freight rail is fuel efficient and generates less air pollution per ton-mile compared to trucking;
- Rail offers separated rights-of-way for most corridors, and generally is preferred for the movement of hazardous chemicals;
- Rail is essential for the movement of goods in national emergencies, and is especially vital to military mobilization.

The demand for freight rail services is projected to increase 69 percent based on tons and 84 percent based on ton-miles by 2035. However, rail will decline as a percentage of all shipments falling slightly from 14 to 13 percent of all freight tonnage. The rail market is shrinking in part because of structural changes in the economy. The growth of services, the need for smaller, more high-value movements, and the declining importance of commodities within the larger economy all will slightly reduce rail's share of overall freight movements.

A lack of investment capital is a critical factor influencing railroads' inability to absorb a larger share of the growing freight market. The Association of American Railroads estimated that major freight railroads will invest \$8.3 billion in infrastructure improvements in 2006, nearly double the level from 10 years ago. Even so, the railroads continue to be unable to finance enough expansion from private sources to add the capacity needed. Railroads require up to 17 percent of their revenue for capital investment, compared to a national average of 3.5 percent for all industries. Railroads are profit-making companies, who have an obligation to shareholders to invest prominently for the company's best interest. New rail lines or yards cannot be moved once built and represent substantial risk for railroads to undertake. A rail line built to accommodate one industry could become stranded should that industry close or relocate.

**AASHTO's *Freight-Rail Bottom Line Report* found that the rail industry is stable, productive, and competitive. It has enough revenue to operate profitably, but not enough revenue to meet all necessary capital needs.**

To increase market share, railroads are more inclined to increase volume on existing lines. The industry is purposely operating near capacity because of its capital intensity. It also is using pricing to turn away less profitable business. Railroads are forced to

make decisions based on private financial return and not upon larger public concerns or desires—such as getting trucks off the highways or reducing emissions.

AASHTO's *Freight-Rail Bottom Line Report* found that the rail industry is stable, productive, and competitive. It has enough revenue to operate profitably, but not enough revenue to meet all necessary capital needs. The report found that for railroads to capture a proportional share of freight growth they would need to invest between \$175 and \$195 billion over the next 20 years. The railroads are likely to be able to raise up to \$142 billion of that but would need \$53 billion more over 20 years to provide adequate growth to capture more of the growing freight market. That translates into the need for \$2.65 billion in annual public sector capital assistance.

The AASHTO report notes that such investment would benefit the railroads but also would provide the public benefits in terms of less air pollution, fewer trucks on the road, increased energy efficiency and increased options for shippers. The expanded rail capacity analyzed by AASHTO would remove 450 million tons of freight and 15 billion truck vehicle miles. That service would save shippers \$162 billion and save highway users \$238 billion over 20 years and avoid \$10 billion in highway repair costs.

The lack of capital is forcing railroads to use operational efficiencies to increase capacity, often with negative consequences for some stakeholders. The railroads are dropping less profitable service and increasing capacity by dropping shorter hauls for longer trains and longer hauls. They also are using longer and heavier trains. This allows the railroad to operate much more efficiently, but may result in the lack of service for customers who desire smaller carload shipments.

## **The railroads are dropping less profitable service and increasing capacity by dropping shorter hauls for longer trains and longer hauls.**

The rail industry is far-flung but highly consolidated. Out of 558 common carriers, the seven Class I railroads account for 70 percent of system mileage, 89 percent of employees, and 93 percent of freight revenue. Their commodity flows also are concentrated. Nearly three-quarters of current rail tonnage and revenue come from four market groups: coal, farm and food products, chemicals and petroleum, and the intermodal business. Forty percent of the volume is coal alone but coal provides only 20 percent of revenue. Intermodal provides another 20 percent of revenue.

## **Intermodal has been the great success story for the Class I railroads.**

Intermodal shipments are the most rapidly growing railroad product. They are growing at 3.8 percent a year and are expected to triple in size to become the second-largest volume of rail business.

Intermodal has been the great success story for the Class I railroads. With international trade booming, this hybrid mode efficiently moves goods from the coasts and transports it quickly throughout the nation. Approximately 60 percent of the unit volume and the great majority of recent international growth involved marine containers, particularly bearing imported products from Asia.

## The great majority of recent international growth involved marine containers, particularly bearing imported products from Asia.

However, growth in one area of rail increasingly squeezes service from another market segment. Rail service falls into three categories: bulk, general merchandise, and intermodal. Because long coal and intermodal trains can be operated more efficiently they may squeeze out the smaller, more specialized general merchandise shipments. Those require more handling in yards to consolidate and to disperse. That raises the price and makes them less attractive to carriers.

Unlike with highways, there is no national planning process which allows the magnitude of rail congestion to be measured. Because “what gets measured, gets managed” there is no systematic national management of the nation’s rail congestion needs. The individual railroads run their companies efficiently and make investments that meet the criteria of their business plans but, from the perspective of the performance of the national freight transportation system, there is no baseline for service, no standards for operations, no true measure of what type of system and service the country needs. As a result, various states are struggling to deal with the national problem piecemeal, at their local or regional level.

In Washington State, the state government has purchased rail cars and made other investments to preserve rail service to its eastern agricultural producers. Washington State also is participating in ways to improve north–south rail service along the I-5 corridor, and to improve rail and trucking efficiency around the ports of Seattle and Tacoma through the Freight Action Strategy for Seattle and Tacoma (FAST).

In Chicago, the massive CREATE project through an initial public–private investment of \$330 million, is attempting to improve east–west connections in Chicago which have been missing since the original construction of the railroads in the 1800s.

The Heartland Corridor is a partnership between the Virginia Port Authority, the Norfolk Southern Railroad and the states of Virginia, West Virginia, and Ohio. It will create a double-stack container route from the fast-growing port of Norfolk, Virginia, to the Midwest, reducing the distance by 250 miles. The project will build new rail line where needed, raise tunnel and bridge heights to accommodate Norfolk Southern double-stack trains, and establish or expand intermodal terminals in Virginia, West Virginia, and Ohio. The total cost of the project will be \$260 million dollars. SAFETEA-LU authorized \$95 million for the Corridor and \$33 million for Intermodal Terminals.

The \$2.4 billion Alameda Corridor near Los Angeles serves as a prime example of rail investments to ease congestion into the giant ports at Los Angeles and Long Beach. It has been a tremendous success story but it stands out because it is rare. There are few similar examples of such success.

However, all these projects were either delayed, stalled for years, or are still unfunded because of a lack of needed capital, complex planning requirements and the inability to coordinate easily between modes. The glacial pace of many of these projects bodes poorly for America’s ability to ramp up for the railroad investment needed in today’s economy.

Such cases are prompting a re-examination of the federal role in the national rail policy. AASHTO has endorsed a series of measures intended to rationalize and modernize the nation’s approach to rail investment.

## Water—Awash in Trade

Water provided America's first mode of transportation and it now provides among the most modern and complex. The U.S. coastal ports are America's link to the vast, global trade network that ships more than 1.5 billion tons worth of product into and out of the nation each year, valued at \$1 trillion. Water transport handles 99 percent of the nation's overseas trade by tonnage. Strategically critical imports such as oil and minerals are imported almost exclusively by water. Critical exports such as machinery and agricultural products also depend almost solely upon water transport.

### **Today, America's ports face daunting challenges in an ever-expanding global shipping market. Trade volumes are soaring. Ships are getting larger.**

For much of its history, America was nearly self-reliant. It traded overseas but foreign trade was less than 10 percent of the economy until the mid-20th Century. Today, America's ports face daunting challenges in an ever-expanding global shipping market. Trade volumes are soaring. Ships are getting larger. Trade routes are shifting and intermodal connections are failing under the volume.

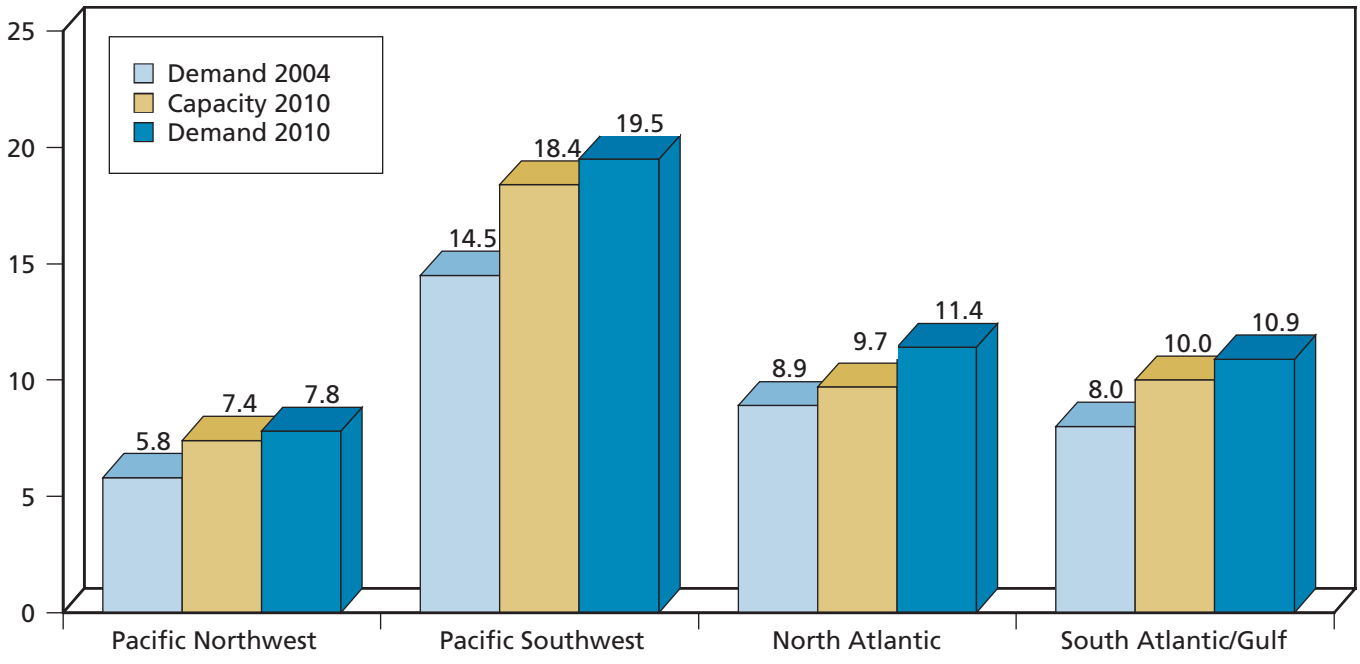
Now the country needs a new vision for a "Maritime America" that links the heartland to the new economic frontiers in China, India, Brazil, and even Russia. The prosperity of 19th Century Britain was determined by trade on the high seas. The same will be true for America throughout the 21st Century. However, the major challenges are not at sea, but at our ports, docks, railroads, and city streets which handle the massive surge of containers pouring off the new mega-freighters.

Waterborne trade reached record levels in 2004 and strong, continued growth is forecast. Through 2025, overall international waterborne tonnage is expected to grow to nearly 2.5 billion tons annually, or 1 billion tons more than in 2004. International container volumes are forecast to triple today's levels by 2025.

The ports face several daunting challenges including:

- Landside access to major ports from highway and rail already is inadequate in many locations, even without the higher trade volumes forecast for the future;
- The new generation of "mega-container" ships dwarf many existing ships and will create problems at harbors that are not deep enough and at ports that do not have the "surge" capacity to unload them quickly;
- Environmental and community constraints make port expansion difficult, if not impossible in some locations;
- Port volumes are unevenly distributed, with some ports facing capacity shortages while others have excess capacity, just not where the shippers want it;
- Inland rail and highway bottlenecks many miles from the port can be constraints;
- A lack of technological innovations at the ports restrains efficiencies through increased use of automation to record and dispatch shipments;
- Security has become a paramount consideration as the ports are expected to be a first line of defense against terrorists smuggling bombs or dangerous materials into the country.

**Figure 5. Port and Terminal—Forecast Capacity/Demand**  
(Millions of Twenty-Foot Equivalent Container Units)



Source: Modern Terminals Limited.

**Between the U.S. and international customers, water moved 1.5 billion tons worth nearly \$1 trillion dollars.**

The timing and degree of a waterborne freight crisis at America’s ports is debatable. Some see an imminent crisis while others predict a slow but steady erosion of service. However, no one is predicting that America’s existing port and waterway network is adequate for the wave of expected shipping. (Figure 5.)

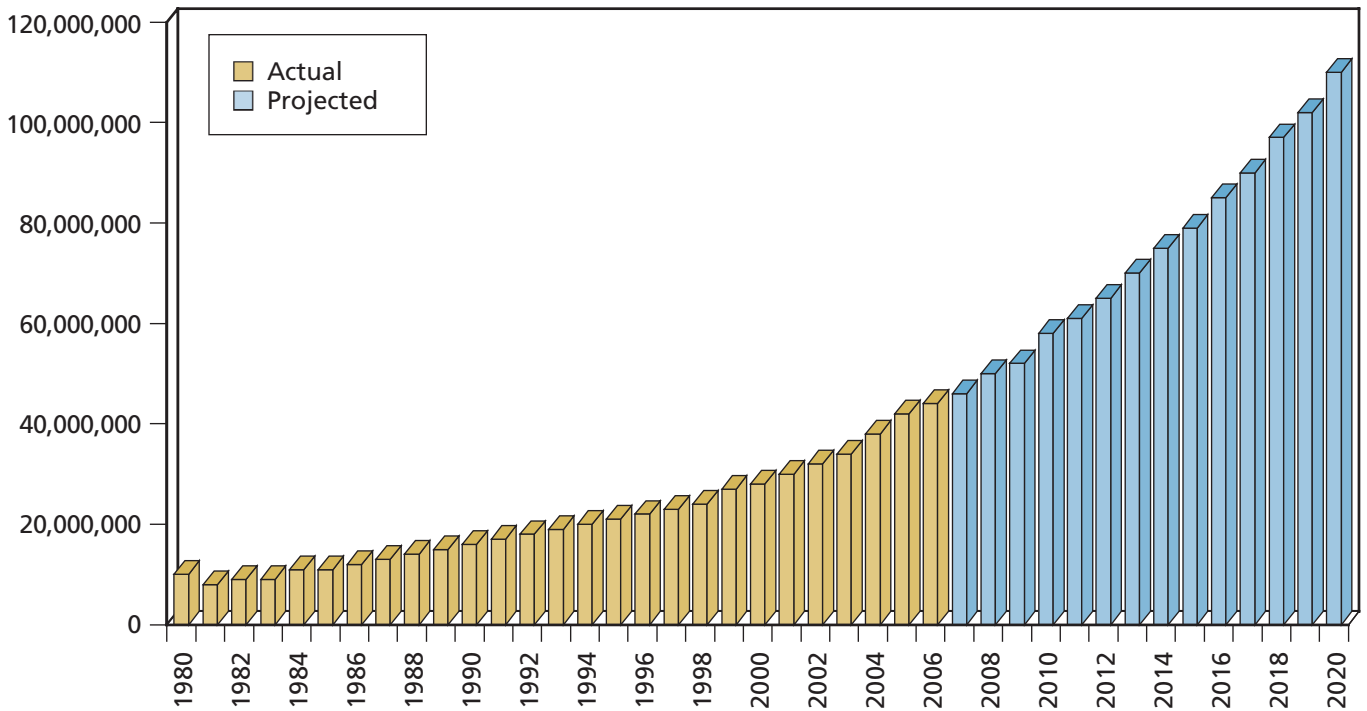
Between the United States and international customers, water moved 1.5 billion tons worth nearly \$1 trillion dollars. Although domestic water shipments are growing slowly or even declining slightly, international trade is steadily increasing.

International trade grew from 50 million tons annually in 1925 to 940 million tons by 2000. Nearly half of this growth occurred after 1980. Oil and other “mineral fuels” account for nearly 25 percent of U.S. waterborne imports by value and 68 percent by tonnage. Although imports outpace exports by nearly 3–1, exports are critically important to the U.S. economy. By value, the leading U.S. waterborne exports are heavy machinery, vehicles, chemicals, fuels, plastics, cereals, and electronic machinery and grains.

The changing nature of the international economy is the driving force behind the impending water freight crisis at America’s ports. World trade origins and destinations are shifting dramatically as noted above. The Western Hemisphere dominated international trade routes for more than two centuries. Now, the giant Asian economies are growing and with them the trade routes are shifting.

The fastest growing segment of shipping clearly will be containers. Since its invention 50 years ago, the shipping container has revolutionized intermodal shipping. The simple and

**Figure 6. Historic and Projected U.S. Container Traffic (TEUs)**



Source: Cambridge Systematics.

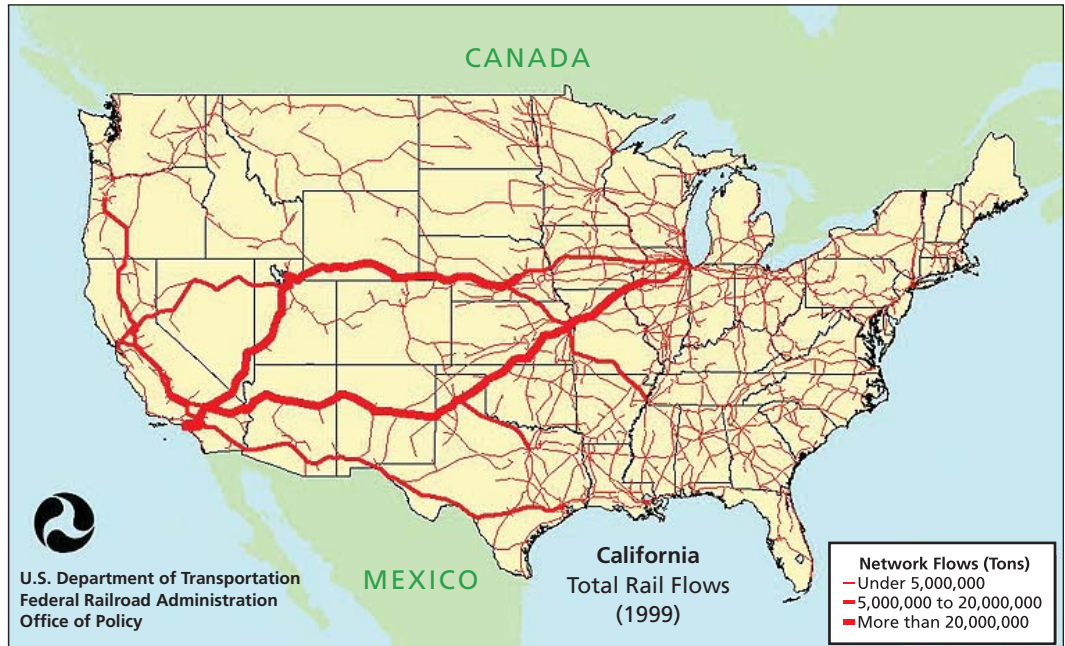
versatile container can be put on a truck or rail car, hoisted onto a ship, and then put back on a truck or rail car once delivered to its final destination. Between 1980 and 2005, container traffic through U.S. ports grew six-fold, at a compounded annual rate of 6.6 percent. In 2006, nearly 42 million containers were shipped. Projections show total volume could reach 110 million containers by 2020. (Figure 6.)

This traffic is, by its very nature, multi-modal. It depends on water, truck, and often rail to succeed. Chicago has become one of the nation's leading centers for international containers because it is an interchange point between western and eastern railroads. The New York/New Jersey metropolitan region receives about as many international containers through its rail yards from the West Coast as it does through its water ports.

Container traffic is clustered around key ports and on principal corridors. These will increasingly grow congested. California is by far the nation's leading gateway for container traffic, with nearly 17 million containers at its ports in 2005. California accounts for nearly 40 percent of all U.S. container moves, and it is port of entry for 64 percent of Asian container traffic. (Figure 7.) New York/New Jersey handles 5 million, while Washington State handles 4 million.

U.S. international container traffic is expected to triple in the next 20 years. With much of the increase coming from China, India, and other Asian countries the domestic freight connections will be strained. Now, freight delivered to West Coast ports typically is moved eastward across the continent by truck and rail. Some travels from the east through the Suez Canal, and some through the Panama Canal, which can no longer handle the largest ships. An expansion of the canal has been approved. When completed, it will further increase the volumes of traffic to already fast-growing southeast ports such as Savannah,

**Figure 7. California is the port of entry for most Asian imports.**



Charleston, and Norfolk as well as to ports on the Gulf Coast. These changes will be accompanied by the establishment of new distribution centers increasing the pressure on the highway and rail networks serving those ports.

At present, planning for these changing, global freight moves is not well coordinated. The ships are owned by private, international companies. The ports are publicly owned. The railroads serving the ports are private while the local streets reaching the ports are controlled by local municipal governments. Major routes at or near the ports generally are controlled by the state. No entity gathers comprehensive data about the ports, their connections, their bottlenecks, their needs or their plans. This vast, sprawling, critical supply network is managed by a collection of entities who do not share data, plans or needs assessments as often as should be the case.

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By the year 2020, even at moderate rates of economic growth, the total domestic tonnage of freight carried by all U.S. freight systems will increase by approximately 67 percent, while international trade will nearly double. In this same time interval, every major U.S. container port is projected to at least double the volume of cargo it is expected to handle, with select East Coast ports tripling in volume and some West Coast ports quadrupling in volume.

—U.S. Chamber of Commerce

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For the inland and intracoastal waterways, the planning is little better. Relatively speaking, the inland waterway system is an underutilized freight transportation mode. Waterborne traffic on the inland and intra-coastal waterway systems in 2004 handled 1 billion tons



**Intermodal shipments are the most rapidly increasing form of rail traffic.**

of domestic cargo, worth more than \$300 billion dollars. That equated to about 600 billion ton-miles, or about one-sixth of the nation's domestic ton-miles. Domestic waterborne freight is not expected to grow dramatically. Currently about 40 percent of the waterborne freight is domestic. Primarily it moves ore, chemicals and agricultural products. These commodities are critically important to many industries that rely on water to provide the low-cost, high-volume shipping for their massive volumes. However, most of these movements are to mature domestic industries that are not predicted to expand rapidly.

The domestic network also is plagued by a lack of capital for investment in dredging, lock expansion, channel maintenance and improved port facilities. It is not managed as a significant mode within the intermodal freight system. As a result, possibilities such as increased movements of containers on barges have not been realized.



## CHAPTER 4

# Intermodal Connections— The Missing Links



**A**s daunting as are the problems within each major mode of transportation, some of the largest problems facing the U.S. transportation system lie at the connections between modes. In the 1991 Surface Transportation Act, the federal government first expressed the national need to look at the transportation system as a whole. The connections between modes need to be seamless if each mode is to maximize the efficiencies of the global supply chains. Progress has been made in many areas. The National Highway System Intermodal Connectors have been identified and the problems with some have been addressed.

Among the problems that have been identified are:

- Direct rail service to the dock of major American water ports. Often containers are trucked on local streets to rail yards miles from the ports multiplying the number of truck trips;
- “Last mile” highway connections to ports and rail yards. Often the last mile is on a local city street with traffic signals, poor turning radii, inadequate overhead clearances and narrow bridges which restrict efficient movements;
- Freeway interchanges to ports. The freeways and ports were developed independently and the local road network is the linkage between the massive international port and the intercontinental highway system.

The problems on the highway connectors are mirrored at hundreds of locations across the country when connections between other modes are examined. The examples that follow demonstrate how determined public-private effort can create more efficient intermodal connections.

### What States Are Doing

State Departments of Transportation, local governments, and the freight transportation industry are collaborating on many important projects and programs to nudge the freight transportation system into the 21st century. Four of the most notable are CREATE, the FAST Corridor, the Alameda Corridor, and the I-95 Corridor Coalition.



**The last mile connector often is the most serious problem on the international supply chain.**

### Chicago's CREATE Program

The nation's Atlantic, Pacific, and Canadian railroads meet in Chicago—a development pattern that exists from the 1800s. Critical linkages between these railroads are missing which creates inefficient truck movements across Chicago to move cargo from one rail yard to another. The CREATE program seeks to modernize this network by connecting 27 major rail yards that perform 5.5 million lifts annually. More than 14,000 daily truck movements serve these lifts. An estimated \$350 billion a year in freight movements traverse Chicago, with more than 60 percent of it as high-value traffic such as intermodal and finished vehicles.

As critical as these rail yards are, they are not interconnected, requiring containerized cargo to be trucked between them. The State of Illinois, the City of Chicago, the seven Class 1 railroads, Amtrak, and Metra, the area's transit system, have committed to a program of \$1.5 billion in improvements. It will require state, local, industry, and federal financing proportioned to the estimated benefits of the project. In September 2006, federal, state, and local officials announced an agreement to supply \$330 million of that sum over three years.

The agreement includes \$100 million in SAFETEA-LU funds, \$100 million from the railroads, \$100 million from the state of Illinois, and \$30 million from the city of Chicago. Slated improvements include 15 new overpasses separate motor vehicles from train tracks, six new overpasses to separate freight-rail trains from passenger-rail trains, and extensive upgrades to tracks, switches, and signals.

### Washington State's FAST Corridor

In the Seattle–Tacoma Washington region, the FAST corridor network seeks to tie together overcrowded port, highway, and rail connections at the nation's third busiest international freight portal. The Puget Sound ports serve the entire nation with up to 75 percent of the con-

tainers entering its ports moving to rail with destinations outside of Washington State. More than \$60 billion in imports and \$12 billion in American exports used the Washington State ports in 2004. The Washington State DOT, the Puget Sound Regional Council, and the freight industry developed and are carrying out a multiyear, multimodal program of projects.

Since 1998, the public–private coalition has invested \$568 million of public and private funding for strategic freight mobility infrastructure improvements in the FAST Corridor. Another \$300 million is needed to complete the remaining 16 of the 25 priority Corridor projects.

## California's Alameda Corridor

The Alameda Corridor is the granddaddy of the intermodal connector projects. The ports of Long Beach and Los Angeles handle more than 64 percent of Asian container imports and nearly 25 percent of all U.S. imports. The Alameda Corridor project built a state-of-the-art rail access network to the ports. It consists of a 20-mile long rail expressway—basically a large-grade separation project—linking the Ports of Long Beach and Los Angeles to the nation's rail network near downtown Los Angeles. It consolidated four branch line railroads and eliminated more than 200 at-grade crossings. The financing for the \$2.4 billion project, which included a \$400 million federal loan, was backed by a fee on every container moved. Traffic exceeded the projections, making it possible to retire the original Federal loan 28 years early. Trains moving through Corridor in 2006 hauled about 5 million TEUs, up by 32 percent from 2005.

The success of the Alameda Corridor means that train traffic will increase as much as 160 percent to the East through the San Gabriel Valley by the year 2020. To deal with that growth the \$1.4 billion Alameda Corridor East Project is under development. It will improve safety and mobility at 39 crossings, construct grade separations at 20 crossings and eliminate several others. The result will be time savings for highway and rail traffic, improved safety and reduced air emissions.

## The Multi-State I-95 Corridor Coalition

The coalition of 16 Eastern Seaboard states and various other public and private transportation providers has banded together for more than a decade to bring integrated planning to the massive highway, rail, transit, and water networks that exist between Maine and Florida. The Coalition members are anxious to expand north–south rail service to alleviate the overwhelmed I-95 highway corridor. A major study for the Coalition found that the rail network was designed in the 19th century to service primarily east–west traffic. The study identified more than 71 needed projects to eliminate rail choke points in the Mid-Atlantic states alone that would cost more than \$6.1 billion. The freight traffic served is enormous, in a region that would be the world's third largest economy if it were a country. The states and their private sector partners are now confronting the challenges of implementing a massive multistate freight infrastructure investment program.

## States Move Forward on Planning, Investing

In addition to these well-known initiatives, many other states are actively involved in efforts to make the freight system more efficient and productive. They are planning, organizing, collaborating, and investing.

Planning—States such as Minnesota, Washington, Ohio, Oregon, California, New Jersey, Vermont, New Jersey, and Virginia have completed or initiated freight transportation plans as a basis for establishing investment priorities.

Organizing—A number of states have established a unit within their departments of transportation through which to develop and carry out a freight transportation program. They include Louisiana, Maryland, Maine, Pennsylvania, Minnesota, Washington, and Oregon.

Collaborating—Because freight transportation operations and much freight transportation infrastructure lie in the private sector states are initiating freight advisory committees to strengthen the link with government. They are well-established in Oregon, Colorado, and Minnesota and in the early stages in a number of other states.

Investing—Florida, New York, Virginia, Mississippi, Pennsylvania, Oregon, and California have recently created or expanded freight financing programs that either focus on rail or are available for investments in all freight modes.

- **ConnectOregon**—The State of Oregon developed the ConnectOregon program that provided approximately \$100 million investments not possible from the State's traditional revenue sources. Nearly 75 percent of the money went into non-highway freight projects at ports, railroads, airports and facilities which connected to them. The program was so successful that its Legislature is considering another round of projects.



**The Alameda Corridor Project built a rail access network to the ports of Long Beach and Los Angeles.**

- Florida's Strategic Intermodal System—Florida identified a strategic multi-modal network of highways, railroads, ports, airports, intra-coastal waterways and connectors which it calls its Strategic Intermodal System. It is making strategic investments of approximately \$100 million annually to improve this network.
- California Goods Movement Action Plan—A portion of the proceeds from a \$40 billion bond issue approved by the voters in 2006 will be devoted to projects identified in the state's Goods Movement Action, many of which will relieve congestion and increase the velocity of shipments to and from the state's major ports.

In other states creative financing arrangements involving government and business have made critical freight transportation investments possible where otherwise they would have been pushed into the distant future or into oblivion. One example is the Shelport Bridge in Delaware where the state provided the \$13 million in funding needed to restore a rail bridge connection to the Port of Wilmington, to be repaid by a "toll" on rail traffic over the bridge over 20 years, starting at \$35 per car and dropping with increased volume. Another example is the Kansas City Flyovers, two projects which totaled \$135 million, financed through the creation of Joint Transportation Corporations which issued bonds being repaid from railroad revenues. The flyovers will increase the velocity of train movement by eliminating rail intersections and highway-rail crossings.

These are just a few of dozens of major initiatives occurring across the United States. Each one represents a major effort to remove impediments to the free flow of freight within their region and collectively across the continent. However, each state and region is addressing these issues independently because there is no national framework or policy for freight mobility. More needs to be done at the national level.



## CHAPTER 5

# What Needs to Be Done



**T**he AASHTO Board of Directors has approved a bold array of strategies necessary if America is to retain its transportation competitiveness and to avoid the pending freight crisis. These strategies cut across all modes, all regions, and all sectors of the economy. AASHTO developed these recommendations specifically to assist the efforts of the National Surface Transportation Policy and Revenue Study Commission which has been created by Congress to address the future of the nation's transportation system.

The Board of Directors approved a series of recommendations directly addressing the freight challenge facing America.

**Recommendation 1.** Meeting America's surface transportation needs for the future will require a strategy which goes well beyond just "more of the same." It will require a multi-modal approach, which preserves what has been built to date, improves system performance, and adds substantial capacity in highways, transit, freight rail, intercity passenger rail, and better connections to ports, airports, and border crossings.

**Recommendation 2.** Surface transportation investment needs to be increased to the levels required to keep the U.S. competitive in the global economy and to meet America's 21st Century mobility needs. Highway and transit spending must be steadily grown to compensate for inflation and to reach the levels necessary to improve levels of condition and performance.

**Recommendation 3.** Congress should take a four-phase approach to increasing revenues to the levels needed. In Phase 1, a 3-cent increase or its equivalent in 2009 would be required to sustain the program at the level guaranteed in SAFETEA-LU and, in Phase 2, another 7-cent increase or its equivalent in 2010 would be required to restore the program's purchasing power. This would increase highway assistance from \$43 billion in 2010 to \$73 billion by 2015. In Phase 3, Congress should increase the program toward meeting the "cost-to-improve" goals estimated in U.S. DOT's *Conditions and Performance Report*. AASHTO's analysis shows that indexing fuel taxes or changing

to a sales tax on fuel could increase Highway Trust Fund revenues to between \$82 billion and \$95 billion by 2021. In Phase 4, federal fuel taxes should be supplemented or replaced with a vehicle miles traveled tax.

**Recommendation 4.** From resources outside the Highway Trust Fund, additional federal government financing should be provided for freight-related investments, including freight gateways, connectors, corridors, and border crossings. With state involvement, incentives for new investment in freight-rail infrastructure by rail companies through Federal investment tax credits and depreciation adjustments should be developed. Federal funding should be provided to states for participation in public-benefit rail improvements. Revenue measures such as dedicating 5 percent of customs fees to transportation freight projects and providing assistance financed through tax credit bonds should be enacted.

AASHTO's analysis shows that between Railroad Investment Tax Credits, container fees or a dedicated portion of customs revenues, and tax credit bonds, \$44 billion in additional federal assistance for freight improvements could be made available between 2010 and 2015.

**Recommendation 5.** Existing federal programs that increase capacity and efficiency in freight-rail transportation, such as the railroad rehabilitation and improvement financing program and the highway-rail crossing program, should be continued.



**Recommendation 6.** Establish a National Rail Transportation Policy. Intercity passenger and freight rail are critical components of the nation's surface transportation system. Current rail capacity is not sufficient to meet passenger or freight needs. It is imperative that a national rail policy be developed which addresses institutional roles, passenger and freight capacity, and new non-Highway Trust Fund funding and financing options.

**Recommendation 7.** The federal government should provide support to multi-state/regional investment banks to finance improvements to regionally and nationally significant freight projects, where costs are in a single state, but benefits accrue to several states.

**Recommendation 8.** The federal government should encourage the private sector to invest in operational and capacity improvements that can relieve freight bottlenecks and improve the flow of goods and services. The federal government should also provide support for state efforts to relieve critical freight chokepoints through investment in projects such as truck lanes and intermodal connectors. States, in collaboration with the freight transportation industry and the federal government, should investigate the feasibility of regional adjustments in truck size and weight in particular corridors that demonstrate important economic benefits and meet safety, pavement/bridge impact, and financing criteria.

**Recommendation 9.** Preserve today's 47,000-mile Interstate Highway System so that it lasts for the next 50 years.

**Recommendation 10.** Add nearly as much capacity to the Interstate Highway System over the next 50 years as was built over the last 50. Substantial capacity will have to be added to enable the Interstate System of the future to continue to play its role as a strategic national highway network with the ability to move traffic with acceptable speed and reliability. While much greater state-by-state analysis is needed, recent studies show that there is a need to add as many as 10,000 miles of new routes on new corridors, 20,000 miles of upgrades to National Highway System routes to Interstate standards, and 20,000 new lane-miles on existing Interstate routes. These could include exclusive truck lanes and value-priced lanes. System improvement would also include correcting bottlenecks, upgrading interchanges, and improving intermodal connections.

**Recommendation 11.** Resources available through the Inland Waterways Trust Fund and the Harbor Maintenance Trust Fund should be used for their legislated purposes. The federal government should provide additional resources and support state initiatives to integrate planning and investment for water transportation with surface transportation in order to address the landside demands generated by ports and the underutilized potential of the inland waterway system to relieve congestion on the roads.



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