The Strategic Multimodal Analysis

TASK 3: CHICAGO-NEW YORK CITY CORRIDOR ANALYSIS

FINAL REPORT

Prepared for:

U.S. Department of Transportation
Federal Highway Administration
Office of Transportation Policy Studies, HPTS-1
400 Seventh Street, SW, Room 3324
Washington, D.C. 20590

April, 2006

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

Page

List of Tables

TABLE OF CONTENTS (CONTINUED)

Page

List of Tables (Continued)

TABLE OF CONTENTS (CONTINUED)

Page

List of Figures

This Page Intentionally Left Blank

LIST OF ACRONYMS

AADT	Average Annual Daily Traffic
AADTT	Average Annual Daily Truck Traffic
AASHTO	American Association of State Highway Transportation Officials
BNSF	Burlington Northern & Santa Fe Railroad
CMSA	Consolidated Metropolitan Statistical Area
CN	Canadian National Railway
CPR	Canadian Pacific Railway
CSX	CSX Transportation
DOT	Department of Transportation
DWCPA	Detroit/Wayne County Port Authority
FAF	Freight Analysis Framework
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railway Administration
FTZ	Foreign Trade Zones
GIS	Geographic Information System
GTC	Grand Trunk Corporation
GVW	Gross Vehicle Weight
HM	Hazardous Materials
HPMS	Highway Performance Monitoring System
ISS	Interline Settlement System
ITS	Intelligent Transportation System
KCSR	Kansas City Southern Railway Company
MCMIS	Motor Carrier Management Information System
MGT	Million Gross Tons
MPO	Metropolitan Planning Organization
MRUTC	Midwest Regional University Transportation Center
MSA	Metropolitan Statistical Area
NAFTA	North American Free Trade Agreement

LIST OF ACRONYMS (CONTINUED)

NHPN	National Highway Planning Network
NHS	National Highway System
NHTS	National Household Transportation Survey
NHTSA	National Highway Traffic Safety Administration
NS	Norfolk Southern
ODOT	Ohio Department of Transportation
OS	Oversize
OW	Overweight
PANYNJ	Port Authority of New York and New Jersey
PIDN	Port Inland Distribution Network
SMA	Strategic Multimodal Analysis
SOO	Soo Line Railroad Company
TEU	Twenty-foot Equivalent Units
TOPS	Thruway Oversize Permitting System
TSW	Truck Size and Weight
UPR	Union Pacific Railroad
U.S. DOT	United States Department of Transportation
VMT	Vehicle Miles Traveled

CHAPTER 1.0 INTRODUCTION

1.1 Strategic Multimodal Analysis Framework

The freight movements between and within urban areas are one of the fastest growing components of travel. Forecasters predict freight volumes will increase 70 percent by 2020 relative to 1998. That growth will occur across a multi-modal transportation system that is already experiencing congestion and reduced mobility.

The Strategic Multimodal Analysis (SMA) project applies a multimodal approach to assessing and analyzing deficiencies in the freight transportation system and measuring the benefits of potential options for addressing them. The SMA project will improve the understanding of the impacts of freight bottlenecks to Interstate commerce and will develop a framework for estimating the impacts of improvements to the nation's multimodal transportation system. The SMA project will focus on highway, rail and water options for freight movement.

While many look to the railroads to carry additional traffic in congested highway corridors, previous studies have indicated that rail is a viable option for only a limited portion of truck traffic. The amount and type of traffic that might shift to rail would vary depending on cost and service differences between rail and truck. Factors motivating private railroads to lower cost and improve service, however, are different than factors motivating the public sector to invest in transportation capacity and service improvements. The private sector is motivated primarily by return on investment and will not make improvements unless they are certain of getting an acceptable rate of return. Railroads, thus, do not always have strong incentives to try to attract additional traffic if the additional traffic would require an investment in equipment and/or capacity and profit margins on that traffic are low. Margins on intermodal traffic generally are lower than margins on other traffic, and if accommodating additional intermodal traffic adversely affected service for the higher-margin traffic, railroads might not invest to attract the additional intermodal traffic. Public agencies, of course, also are concerned that benefits of their projects exceed the costs, but they may consider factors that a private firm would not, such as regional economic development, reduction of air pollution, and other non-market factors.

Also, there is increasing recognition of the expanded role that water transportation may play in meeting certain freight transportation requirements, especially containerized shipments. Import and export containers through East Coast and West Coast ports are among the largest and fastest growing segments of freight transportation, but highways and rail facilities along each coast are among the most congested in the country. One possible solution is the use of short-sea shipping to transport freight by water from large ports to smaller ports closer to the freight's ultimate destination. Such short-sea shipping would by-pass congested highway and rail corridors up and down the coasts. Only a limited analysis has been done on the potential market for such movements, but they clearly need to be considered when examining options for meeting our increasing freight transportation demands.

While rail and water may be able to handle increasing shares of freight traffic in certain corridors, highways will continue to be the backbone of the freight transportation system. Operational improvements may be able to meet some of the increasing demand for truck transportation, but new highway capacity may also be necessary in some corridors.

The SMA modeling framework will be developed, calibrated and tested on a sample corridor. The purpose of this paper is to summarize the data available for the candidate corridor. The corridor chosen is the New York to Chicago corridor. This corridor encompasses large freight activity for all the land transportation modes; truck, rail and water.

1.2 Federal Role

The federal interest in interstate freight movements comes directly from the United States Constitution Article 1, Section 8. The Constitution establishes the power of Congress "to regulate commerce with foreign nations, and among the several states, and with the Indian tribes." The Eisenhower Interstate Highway system was created 50 years ago and one of its goals was to facilitate interstate commerce. In the 1980's when the country realized that state price regulations were impinging upon the free movement of trade across the United States, Congress de-regulated the industry.

Today most large cities and several whole corridors experience reduced mobility due to congestion on the Interstate system. As part of the mobility measurement the SMA project researched methods to measure the freight congestion. That research is published as *An Initial Assessment of Freight Bottlenecks on Highways.* The identified bottlenecks are estimated to cause 243,000,000 hours of delay. These bottlenecks impact interstate, regional and local interstate commerce. The SMA analysis focuses on the impacts of national policy changes with a goal to diminish freight bottlenecks.

1.3 Corridor Fact Gathering Task Objective

The primary objectives of this task are to define the corridor and gather and analyze the data necessary for modal analysis, including the characteristics of the transportation modal infrastructure and the freight movement along the corridor. Additionally, this task creates the "data library" or "source data" for the later tasks analyzing the benefits and costs of proposed transportation infrastructure investments. The corridor data include:

- Geography of the defined area's modal facilities
- Primary modes of freight transportation
- Current freight movements by highway, rail, and waterway[1]
- Safety issues including traffic crashes and truck-related crashes
- Principal generators and attractors of traffic

---

[1] Passenger movements are not independently modeled but only examined as they impact freight movements.

- Location, nature, and extent of capacity problems
  - Break-out of freight by local and Interstate
  - Break-out of freight by commodities and their values
  - Identification of time-of-day factors in the corridor's freight movements
  - Identification of the major modal operators in the corridor(s)
- Inventory of the current ability to move freight by mode
- Constraints to capacity expansion
- Summary of previous studies of the corridor(s)
- Summary of any existing transportation deployments currently being built or planned in the next 20 years.

1.4 Organization of Report

The infrastructure, freight movements, and operations within the corridor are organized and presented as follows:

- Chapter 2 presents the characteristics of the freight transportation system in the corridor. This includes descriptions of the highway, rail, and water modes of freight transportation in the corridor.

- Chapter 3 presents the transportation potential that includes freight traffic generators and attractors along the corridor. This includes freight movements along the corridor.

- Chapter 4 describes the traffic and operational conditions by different modes along the corridor. This includes traffic and truck volumes at various sections of the corridor and measures of capacity.

- Appendix A lists ongoing and planned improvements in the corridor.

- Appendix B presents a summary of other corridor studies.

This Page Intentionally Left Blank

CHAPTER 2.0 FREIGHT TRANSPORTATION INFRASTRUCTURE

2.1 Study Area Definition

The corridor includes the freight shipments utilizing the highway and rail networks between Chicago, Illinois and New York, New York. The corridor includes the seven States connecting Illinois to New York: Indiana; Michigan; Ohio; Pennsylvania; and New Jersey. This is primarily an east-west corridor served by I-80 and I-90 Interstate highways and includes major parallel highways as well as north-south Interstates within the corridor. This corridor represents the major link between the East Coast and the Midwest, between the largest port on the East Coast with the industrial heartland, and the nation's business capital with the agricultural and manufacturing center of the country. Figure 2-1 shows the corridor and major highway systems that constitute the main east-west roadway links between Chicago and New York City. The figure also shows major cities along these Interstates. The corridor spans approximately 800 miles.

Figure 2-1. I-80/I-90 Interstates and NHS Highways

Source: National Highway Planning Network (NHPN) GIS Database, 2000.

Traffic- and freight-generating activities in the corridor include some of the nation's major industrial, manufacturing, and distributing centers such as Detroit, Akron, Rochester, Philadelphia, Pittsburgh, and Columbus. Cleveland, Indianapolis and Buffalo also contribute significant commercial activities and those freight flows, as well as those traversing any part of the identified highways and rail lines are included in the corridor analysis.

This chapter describes the physical infrastructure of the highways, railroads and waterways within the study area. The discussion of the highway infrastructure presents the road networks, and discusses the regulations governing the operating characteristics of freight vehicles on those highways. The discussion of the railroad infrastructure provides a description of the railroad network and the ownership of the rail lines. Finally this chapter briefly summarizes the ports contained in the corridor.

2.2 Highway Network

The main Interstate highways connecting the upper Midwest and East Coast are the I-80 and I-90 Interstates traversing seven States: Illinois, Indiana, Ohio, Michigan, Pennsylvania, New York, and New Jersey. Table 2-1 shows the mileage of the I-80 and I-90 Interstates across the corridor States, as well as each State's total Interstate Highway and National Highway System (NHS) miles. The lengths of I-80 and I-90 between Chicago and New York represent 30 percent and 24 percent, respectively, of their total distances across the nation. For the purposes of the corridor analysis, additional lengths of both I-80 and I-90 Interstates extending 100 miles west of Chicago are included.

Table 2-1. Roadway Extent in Corridor Compared to State and National Totals

State	State (miles)			
	I-80	I-90	Interstate	NHS
Illinois	163	109	2,162	5,681
Indiana	152	21	1,171	2,883
Michigan			1,241	4,744
Ohio	237	102	1,575	4,384
Pennsylvania	311	46	1,776	5,486
New York	0	386	1,688	5,150
New Jersey	71	0	434	2,073
Total	935	665	10,047	30,401
US Total	2,889	2,796	46,747	161,131

Source: NHPN GIS Database, 2004. FHWA Office of Interstate and Border Planning, 2003.

The I-80 and I-90 Interstates together comprise 24.6 percent of the corridor's total Interstate and NHS mileage. At a national level, the Interstates contained within the corridor comprise 18.8 percent of the Interstate Highway System and 5.5 percent of the NHS. Of that, I-80 and I-90 represent approximately 3 percent of all Interstate mileage and less than one percent of the NHS mileage.

Important east-west segments of Interstate highways in the corridor include the following:

- I-76 from New Jersey and across Pennsylvania to I-71 just beyond Akron, Ohio
- I-78 in New Jersey and eastern Pennsylvania and New York Route 17 across counties in southern New York
- I-96, I-196, and I-94 across Michigan
- I-70 from the Pennsylvania-Maryland border to the Illinois-Missouri border
- I-74 from Cincinnati across Indiana and Illinois, bypassing the Chicago metropolitan area and joining I-80 just across the Mississippi River north of Bettendorf, Iowa

North-south routes passing through the corridor from east to west are:

- I-71 across Ohio from Cleveland to Cincinnati
- I-65 Nashville, Tennessee; Louisville, Kentucky; and Indianapolis, Indiana to Chicago
- I-75 Cincinnati, Ohio and Toledo, Ohio to Detroit
- I-77 originating in Columbia, South Carolina via Charleston, West Virginia to Cleveland
- I-81 in Tennessee via Roanake, Virginia and Harrisburg, Pennsylvania to Syracuse, New York
- I-69 from Indianapolis via Lansing, Michigan to Port Huron and Ontario

Table 2-2 shows relationships between population, Interstate mileage, and land area for the seven States along the corridor and for the other 41 continental States as a whole. While the population density for the corridor States is three times that of the average for other continental States, population served per Interstate mile for the corridor is only about 1.5 times greater than that for the other continental States. In contrast, the square miles of land area of the corridor States served per Interstate mile is 52 percent of that for the entire nation. Each mile of Interstate highway in the Chicago-New York City corridor serves more people than the average mile for the rest of the nation with more Interstate mileage per square mile in the corridor than for the other 41 continental States.

Table 2-2. Corridor Density

	Population per Square Mile	Population per Interstate Mile	Square Miles per Interstate Mile
Corridor States	271	9,025	33
Other States	93	5,966	64

Source: U.S. Census Bureau, 2001.

2.2.1 Turnpikes and Toll Roads

In 1956 when the Federal Aid Highway Act created the interstate system existing freeways, toll roads and turnpikes were utilized wherever possible. Many sections of the corridor's toll roads and turnpikes supersede the creation of the Interstate system. When they were brought into the Interstate system the roads retained their status as toll facilities under Grandfather provisions. The following sections of the highways in the corridor are tolled:

- I-80 starting from Joliet, Illinois is the Tri-State Tollway merging with I-90 at Gary, Indiana
- I-80 and I-90 share the right-of-way along the Indiana E-W Toll Road and the Ohio Turnpike
- I-90 is the Northwest Tollway in Illinois becoming the Chicago Skyway until it merges with I-80
- I-90 becomes the New York State Thruway and finally the I-90 Massachusetts Turnpike
- I-76 is the Pennsylvania Turnpike from the New Jersey border through Philadelphia to I-71 just beyond Akron, Ohio.

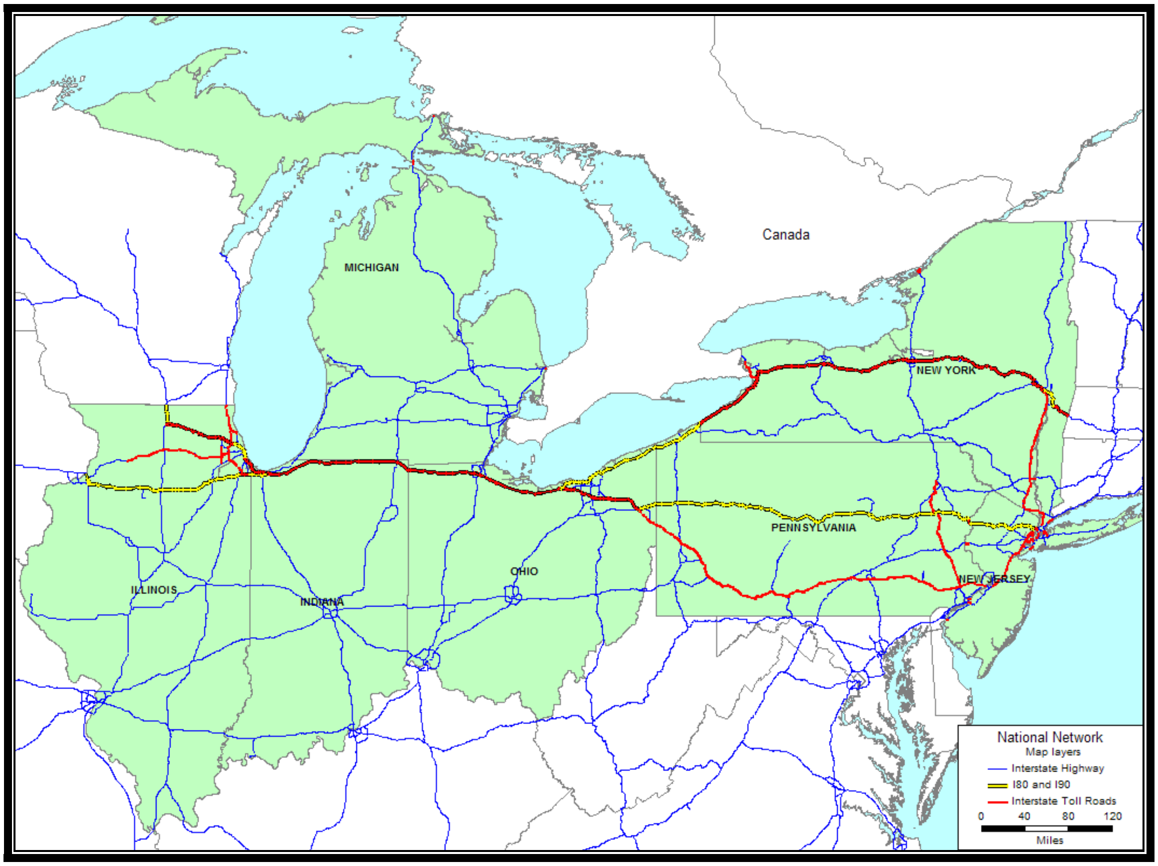
Table 2-3 summarizes the operating authority, location and length of the Interstate toll sections in the corridor States. Figure 2-2 shows the tolled highway sections along the corridor.

Table 2-3. Toll Roads and Turnpikes on Interstate Sections in Corridor States

Facility	Financing or Operating Authority	Location	Length (miles)
Illinois			
East-West Tollway	Illinois State Toll Highway Authority	Various Sections	98.5
North-South Tollway	Illinois State Toll Highway Authority	Various Sections	17.5
Northwest Tollway	Illinois State Toll Highway Authority	Various Sections	75.8
Chicago Skyway	Illinois State Toll Highway Authority	Various Sections	7.7
Tri-State Tollway	Illinois State Toll Highway Authority	Various Sections	82
Indiana			
Indiana East West Toll Road (I-80/90)	Indiana Department of Transportation	From Chicago Skyway and Indianapolis Boulevard to Ohio Turnpike Illinois Line	156.8
Michigan			
Michigan	No toll roads or turnpikes		
Ohio			
Ohio Turnpike	Ohio Turnpike Commission	Pennsylvania State Line to junction Interstate 80 and Interstate 76 to the Indiana State Line	392.2
Pennsylvania			
Pennsylvania Turnpike (I-76)	Pennsylvania Turnpike Commission	From Irwin to Carlisle	159.5
Eastern Extension (I-76)	Pennsylvania Turnpike Commission	From Carlisle to Valley Forge	100.5
Northeastern Extension	Pennsylvania Turnpike Commission	I-81 to I-276	110.3
Western Extension (I-76)	Pennsylvania Turnpike Commission	From Irwin to Ohio Line	67.1
Delaware River Extension (I-276)	Pennsylvania Turnpike Commission	From Valley Forge to Delaware River Bridge	31.9
New York			
New York State Thruway	NY State Thruway Authority	From Pennsylvania line to Albany and from New York City to Albany	494.2
New Jersey			
New Jersey Turnpike Mainline	New Jersey Turnpike Authority	From GW Bridge to Penn Turnpike Exit	72.4
Newark Bay Extension	New Jersey Turnpike Authority	From Newark Airport to Holland Tunnel	8.6
Penn Turnpike Extension	New Jersey Turnpike Authority	From Delaware River Bridge to New Jersey Turnpike – westbound only	5.6

Source: USDOT Bureau of Transportation Statistics, State Transportation Profiles, 2000.

Figure 2-2. Tolled Sections of I-80/I-90 Interstate Highway



Source: Highway Performance Monitoring System (HPMS) data, 2002.

2.2.2 Truck Size and Weight (TSW) Regulations

The United States has a long history of evolving truck, size and weight regulations. In general the federal size and weight regulations apply to Interstate highways (including tolled Interstate highways) except if the State allowed heavier or longer vehicles before the 1982 legislative "freeze" preventing further State changes on the Interstate system. Figure 2-3 summarizes the federal size and weight limits.

Figure 2-3. Federal Truck Size and Weight Limits

- 20,000 POUNDS FOR SINGLE AXLES ON THE INTERSTATE SYSTEM;
- 34,000 POUNDS FOR TANDEM AXLES ON THE INTERSTATE SYSTEM;
- APPLICATION OF BRIDGE FORMULA B FOR OTHER AXLE GROUPS, UP TO THE MAXIMUM OF 80,000 POUNDS FOR GROSS VEHICLE WEIGHT (GVW) ON THE INTERSTATE SYSTEM;
- 102 INCHES FOR VEHICLE WIDTH ON THE NATIONAL NETWORK*;
- 48 FOOT (MINIMUM) FOR SEMITRAILERS IN A SEMITRAILER COMBINATION ON THE NATIONAL NETWORK; AND 28 FOOT (MINIMUM) FOR TRAILERS IN A TWIN-TRAILER COMBINATION ON THE NATIONAL NETWORK.
- GRANDFATHER RIGHTS UNDER WHICH CERTAIN LONGER COMBINATION VEHCILES (LCVS) ARE ALLOWED TO OPERATE IN EACH STATE.

* The National Network (NN) is the system of highways designated by the States in cooperation with FHWA on which the 48-foot semitrailers and short twin trailer combinations that States were required to allow under the Surface Transportation Assistance Act of 1983 (STAA) would be allowed to operate. Those highways were judged by the States to be suitable for use by those truck configurations.

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) enforced a freeze limiting the use of longer, heavier double and triple trailer combinations to those states in which they were already operating in 1991. The size and weight limits included in the 1991 grandfather provisions are summarized in Table 2-4, for the corridor States. Table 2-5 shows the truck size and weight rules on the corridor's turnpikes and toll roads. The gross-vehicle weights (GVW) displayed in the following tables and maps show the *maximum* GVW. The number of truck axles required will vary with different truck weights, the number of axles is determined by either the Bridge Formula B or a slightly modification of that formula.[2]

Table 2-4. Operation of Vehicles subject to the ISTEA Freeze Maximum Size and Weight Limits

State	Truck Tractor and Two Trailing Units	Truck Tractor and Three Trailing Units	Other
Length in Feet (‘), Weight in 1,000 pounds (K)			
Indiana	106’, 127.4K	104.5’, 127.4K	58’
Michigan	58’, 164K	No	No
New York	102’, 143K	No	No
Ohio	102’, 127.4K	95’, 115K	No

Source: FHWA Publication Number FHWA-MC-96-03

[2] See the U.S. Department of Transportation's Comprehensive Truck Size and Weight Study, Volume II, Table II-2 for a complete listing of State exceptions to the Bridge Formula B.

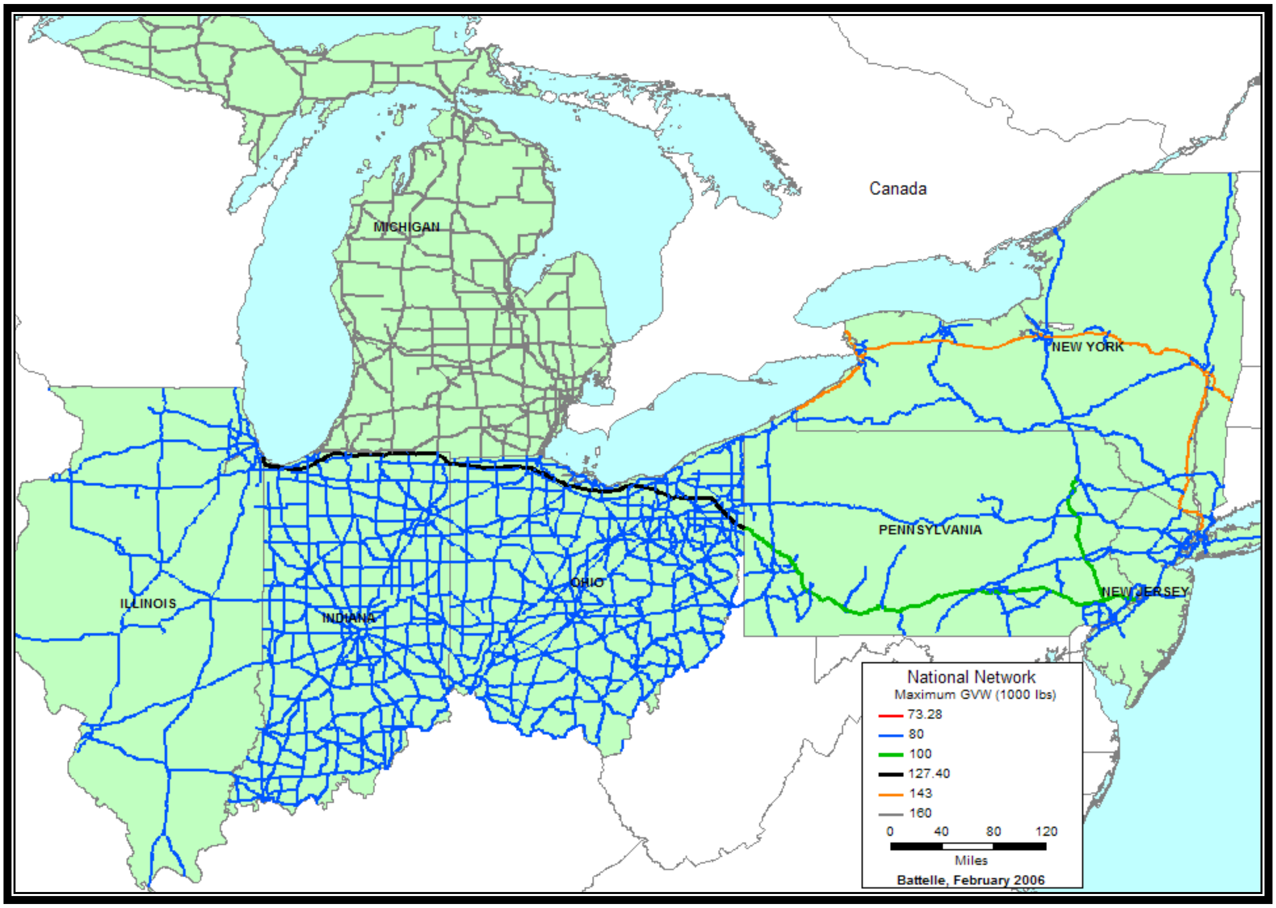
Table 2-5. Longer/Heavier Combinations/Turnpike/Toll Road Operations

State	Longer/Heavier Combinations/Turnpike/ Toll Road Operations
Illinois	None
Indiana	The Indiana Toll Road Commission will authorize the movement of twin 48-foot, 6-inch trailer combinations not exceeding 127,400 lbs GVW on the toll road. Triple trailer combinations are allowed on the toll road only subject to 28-foot trailer length, no overall length limit, and 127,400 lbs GVW.
Michigan	None
Ohio	The Ohio Turnpike Authority will allow a tractor-semitrailer and short doubles combination no longer than 75 feet or turnpike doubles up to 90 feet without a permit. Both are subject to 127,400 lbs GVW. Combinations exceeding 90 feet must obtain an operating permit, which includes mileage-based fees. Special permission required on doubles travel.
Pennsylvania	The Pennsylvania Turnpike Authority will allow twin 28-foot, 6-inch trailers on the turnpike, subject to an overall length of 85 feet and 100,000 lbs GVW. Triple trailer combinations are not allowed.
New York	The New York Thruway Authority allows twin 48-foot turnpike doubles subject to 114-foot overall length, 143,000 lbs GVW, and equipment and driver certification. No triple combinations are allowed.
New Jersey	None

Source: American Trucking Associations' Summary of Size and Weight Limits, 1996

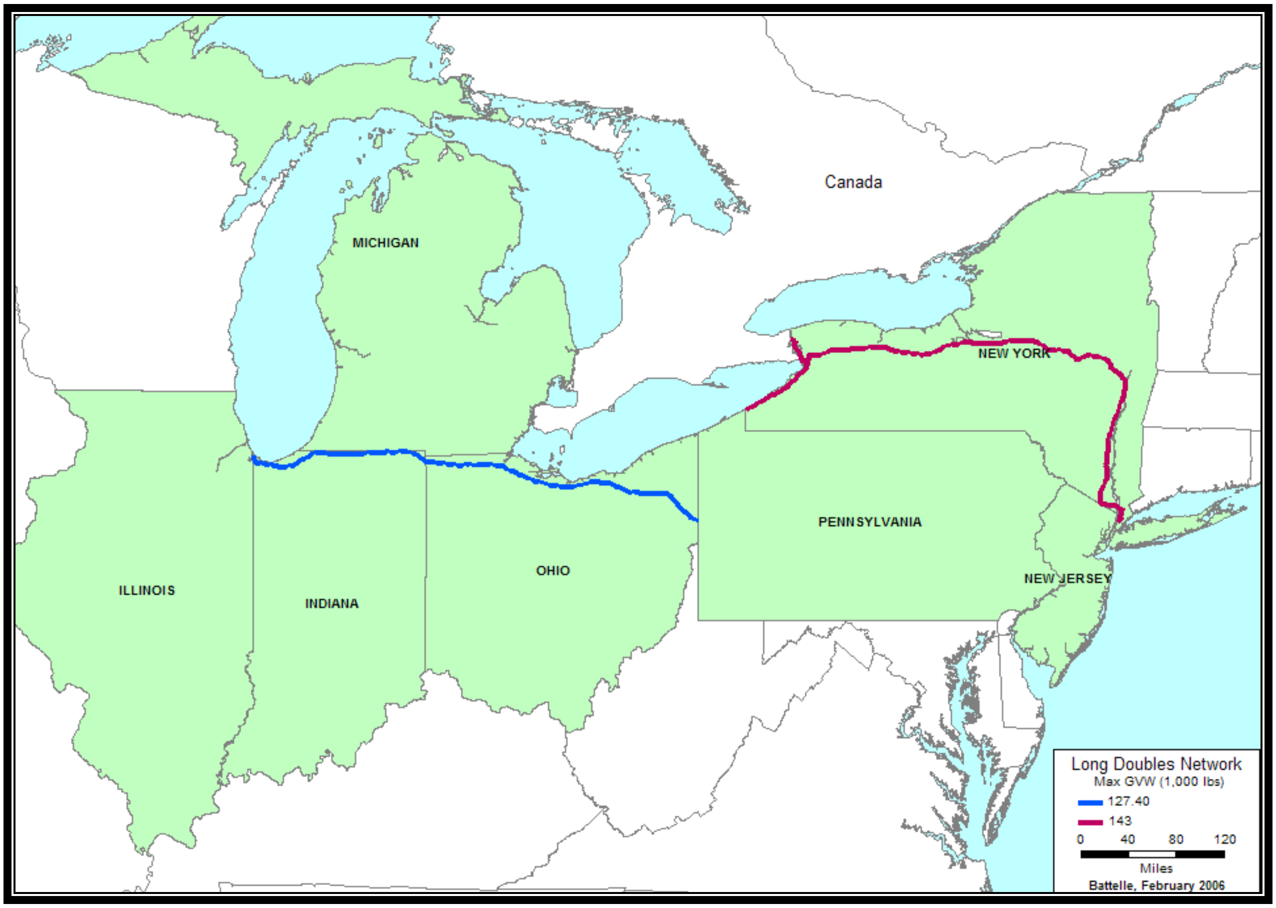
Figure 2-4 through Figure 2-6 geographically display the maximum gross vehicle weight limits in the corridor states: Figure 2-4 shows single trailer limits; Figure 2-5 shows double trailer limits; Figure 2-6 shows triple trailer limits. With the exception of Michigan and some Illinois State highways the single trailer weight and length limits are remarkable uniform throughout the corridor.

Figure 2-4. Single Trailer Gross Vehicle Weight Limits in Corridor



Source: U.S. Department of Transportation Comprehensive Truck Size and Weight Study, Volume II

Figure 2-5. Long Double Trailer Gross Vehicle Weight Limits in Corridor



Source: FHWA Publication Number FHWA-MC-96-03

The network of highways, toll roads and turnpikes that allow doubles in the corridor States represent a hodge-podge of different GVW and length limits. When one considers only the network of long doubles as defined by those greater than twin 28.5-foot trailers, the doubles network is reduced to 3 states, Indiana, Ohio and New York.

Figure 2-6. Triple Trailer Gross Vehicle Weight Limits in Corridor

Source: FHWA Publication Number FHWA-MC-96-03

Triple trailers are only allowed in two of the corridor States. Indiana and Ohio have two different weight limits but the same trailer length limits. They are primarily utilized by less-than-truckload carriers such as UPS and Fed-Ex. The 28-foot trailers used in triples are operated as STAA double trailers in other states.

Similar to the maximum GVW among the corridor States, the single and short double trailer-length requirements are consistent among the corridor States but the length allowance for double trailers and triples are different among the States. Table 2-6 shows the uniformity of the maximum semitrailer lengths for the corridor States.

Table 2-6. Maximum Semitrailer Lengths by State

National Network for Large Trucks			Other State Highway		
State	Length	Kingpin	Length	Kingpin	Overall
Illinois	53-0	42-6 KCRA	53-0	42.0 KCRA	
Indiana	53-0	40-6 KCRA	53-0	40-6 KCRA	
Michigan	53-0	41-0 KCRT	50-0		
New Jersey	53-0	41-0 KCRT	53-0	41-0 KCRT	
New York	53-0	41-0 KCRT	No limit		60-0
Ohio	53-0		53-0		
Pennsylvania	53-0		No limit		60-0

KCRA = Kingpin to center of rear axle

KCRT = Kingpin to center of rear tandem

2.2.3 Over Size/Over Weight Permits

States have the option to issue over-size/over-weight (OS/OW) permits. For non-divisible loads, states may issue permits without regard to the axle, gross, or Federal bridge formula requirements. A non-divisible load is defined as any load or vehicle exceeding applicable length or weight limits which if loaded into smaller loads or vehicles, would: compromise the intended use of the vehicle, destroy the value of the load or vehicle, or require more than 8 work hours to dismantle using appropriate equipment. States may issue designated divisible load permits based on historic State "grandfather" rights or Congressional authority for a state-specific commodity or route.

Overweight divisible loads are permitted in approximately half of the states in the United States, with some states allowing only specific commodities such as nuclear waste to receive permits. On the other hand, single-trip permits are issued in 12 states, while 21 states issue annual trip permits for divisible loads. Table 2-7 shows the number of permits issued by the corridor States in 2003.

Indiana issues permits that are valid for one day from steel mills to the Michigan Line. These permits allow a GVW of 134,000 pounds on designated routes. Indiana issues annual permits for travel less than 15 miles to or from Indiana toll roads (not including Interstate routes) with a maximum allowable weight of 127,400 pounds. Pennsylvania issues annual permits at a flat fee for flat rolled steel coils, raw milk, and bulk animal feed for non-Interstate highways. In addition, divisible single-trip permits are granted. New York grants annual divisible permits only and non-divisible single trip permits for a maximum GVW of 120,000 pounds. Fees charged for the various permits are dependent on the vehicle type/configuration, valid counties, and GVW.

Table 2-7. Number of Permits Issued in Corridor States (2003)

State	Non-divisible		Divisible		Permits/ Year	Percent of National Permits
	Single Trip	Annual	Single Trip	Annual		
Illinois	133,619	0	0	0	133,619	3.82%
Indiana	125,630	0	68,369	13,610	207,609	5.93%
Michigan	102,056	21,220	0	216	123,492	3.53%
Ohio	92,751	4,028	6,810	17,186	120,775	3.45%
Pennsylvania	104,830	7,310	0	0	112,140	3.20%
New York	116,587	4,989	0	72,394	193,970	5.54%
New Jersey	9,592	0	0	0	9,592	0.27%
National Total	**2,629,392**	**234,697**	**258,296**	**377,482**	**3,544,449**	

Source: FHWA Office of Operations, http://ops.fhwa.dot.gov/freight/sw/permit_report.htm.

2.3 Rail Network

Freight rail is an important part of the transportation system in the corridor. All the states have extensive rail networks and are serviced by at least two major Class I Railroads. As defined by the Surface Transportation Board in 2002, a Class I Railroad is a railroad with operating revenues of at least $272 million. A Regional Railroad is a non-Class I, line-haul railroad operating 350 or more miles of road or with revenues of at least $40 million. A Local Railroad is neither a Class I nor Regional and is engaged primarily in line-haul service. Switching and Terminal Railroads do not offer point-to-point service but rather pickup and delivery service for a connecting line-haul railroad. Table 2-8 provides the number of railroad entities and the railroad miles operated in the corridor States. Table 2-9 provides similar information for Class I Railroads by the railroad entity. Figure 2-7 shows the network of Class I, II and III Railroads in the corridor States and Figure 2-8 shows railroads by ownership.

The major Class I Railroads serving the corridor are CSX and Norfolk Southern (NS). CSX operates a 23,000-mile rail network in the eastern United States and NS operates 21,500 route miles in the same region. Of these miles, 39 percent of CSX miles and 48 percent of NS miles are within the study corridor. Both companies serve lake and seaports within the Chicago-New York City corridor and connect with Class I railroads and short line railroads in the West.

The corridor has undergone major railroad network changes since the Staggers Rail Act of 1980 deregulated railroads to a significant extent. Following the act Railroads may largely determine their rates and operations. The Class I railroads have shed short line operations through sales to Class II and III operations and there have been major consolidations. In 1998 the Surface Transportation Board approved the joint acquisition of Consolidated Rail (Conrail) by CSX Transportation and Norfolk Southern.

Table 2-8. Number and Miles of Railroad in Corridor States (2003)

Number of Railroads in Corridor (2003)						
State	Class I	Regional	Local	Switching and Terminal	Canadian[1]	Total
Illinois	7	4	11	18	0	40
Indiana	5	2	19	13	0	39
Michigan	4	2	8	7	0	21
Ohio	3	2	12	16	0	33
Pennsylvania	3	3	28	24	1	59
New York	2	4	20	7	2	35
New Jersey	2	1	7	6	1	17
United States, Total	**7**	**31**	**314**	**204**	**2**	**558**
Miles of Railroad						
State	Class I	Regional	Local	Switching and Terminal	Canadian	Total
Illinois	5,932	365	719	322	0	7,338
Indiana	2,890	57	1,071	174	0	4,192
Michigan	2,025	405	973	187	0	3,590
Ohio	3,302	702	813	362	0	5,179
Pennsylvania	2,481	651	1,317	484	127	5,060
New York	1,610	292	1,135	127	389	3,553
New Jersey	190	78	188	461	0	917

[1] Refers to Canadian-owned lines not affiliated with U.S rail subsidiary.

Source: Association of American Railroads, Railroads and States – 2004, Washington, DC: 2005, available at http://www.aar.org/AboutTheIndustry/StateInformation.asp as of February, 2006.

The corridor is a leader in the formation of multi-state and public-private partnerships to improve railroad infrastructure. The corridor contains New Jersey and New York Port Inland Distribution Network (PIDN) and the Chicago CREATE project.

The following sections detail the ownership and operations of the railroads in the corridor.

2.3.1 Norfolk Southern

Norfolk Southern (NS) operates 21,500 route miles in 22 eastern states, the District of Columbia and the province of Ontario, Canada. NS carries traffic from New York to Chicago on its own lines. Two routes travel from Buffalo to Chicago one line going through Cleveland and Ft. Wayne and the other across southern Ontario and through Detroit. NS also provides service to Kansas City, St. Louis, and beyond for corridor cities such as Columbus, Buffalo, Cleveland, Detroit, and Toledo. In 1998 NS was augmented with the acquisition of over half of Conrail.

Table 2-9. Class I and Canadian Railroads in Corridor States

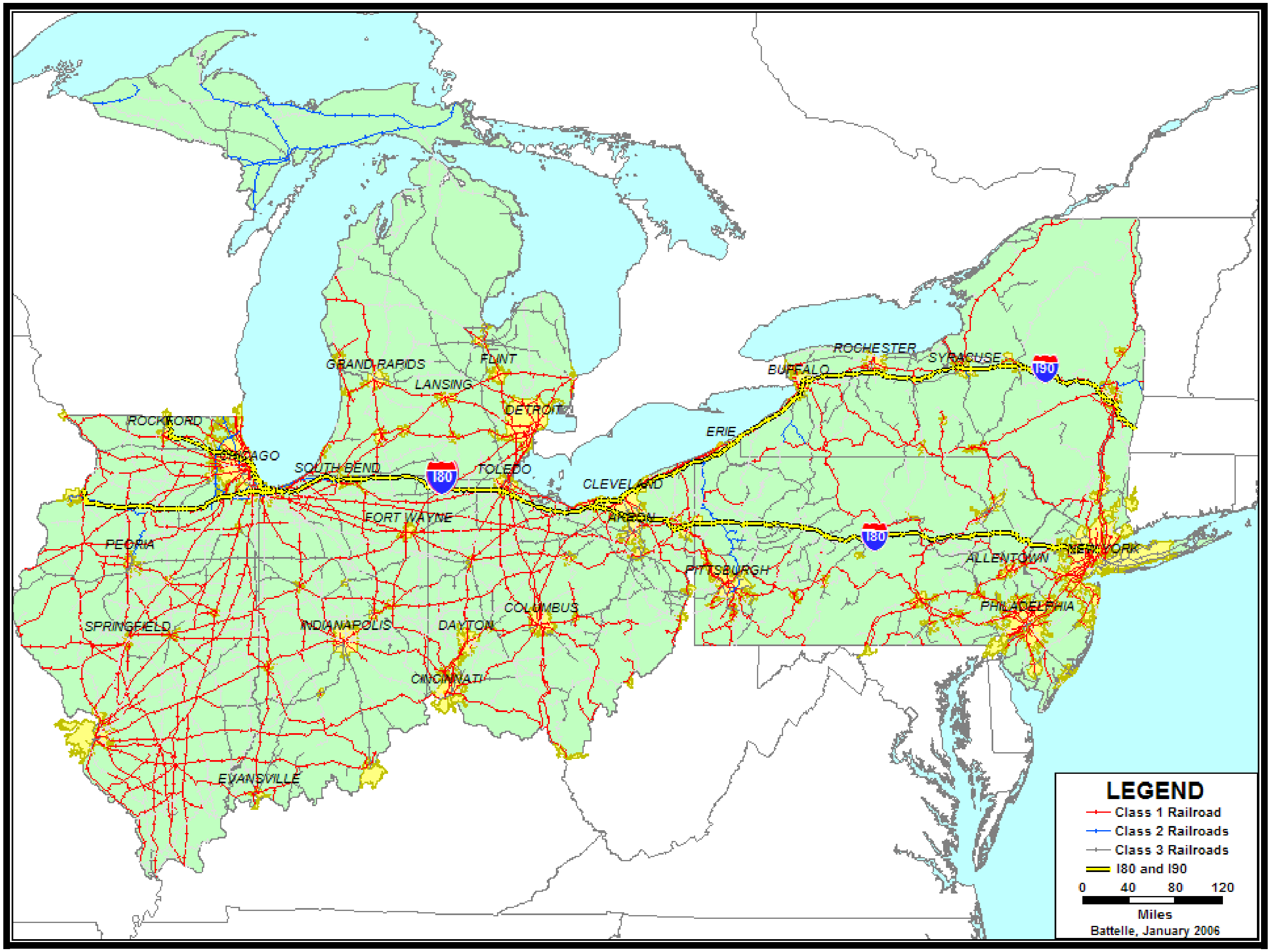
Railroad (mileage of ownership)	State							Corridor Totals
	Illinois	Indiana	Michigan	Ohio	Penn-sylvania	New York	New Jersey	
Burlington Northern & Santa Fe Railroad (BNSF)	1,414							1,440
Canadian National Railway (CN)						800		3
Canadian Pacific Railway (CPR)					452	3	68	1,326
CSX Transportation	1,045	1,715	809	1,925	1,062	1,309	648	9,088
Grand Truck Corporation (GTC)	1,519	80	1,016	7	155			2,618
Kansas City Southern Railway Co. (KCSR)	186							169
Norfolk Southern (NS)	1,260	1,543	644	2,233	2,433	862	933	10,080
Soo Line Railroad Co. (SOO)	356	291	262					909
Union Pacific Railroad (UPR)	2,247	4						2,245
Total Class 1 and Canadian	8,027	3,633	2,731	4,165	4,102	2,974	1,649	27,878

Notes: As defined by the Surface Transportation Board in 2002, a Class I Railroad is a railroad with operating revenues of at least $272 million. Railroads operating as of December 31, 2003. Some mileages may be estimated.

Includes Trackage Rights. Excludes 362 miles owned by Amtrak. All or some of the Amtrak mileage might be operated by freight railroads under trackage rights.

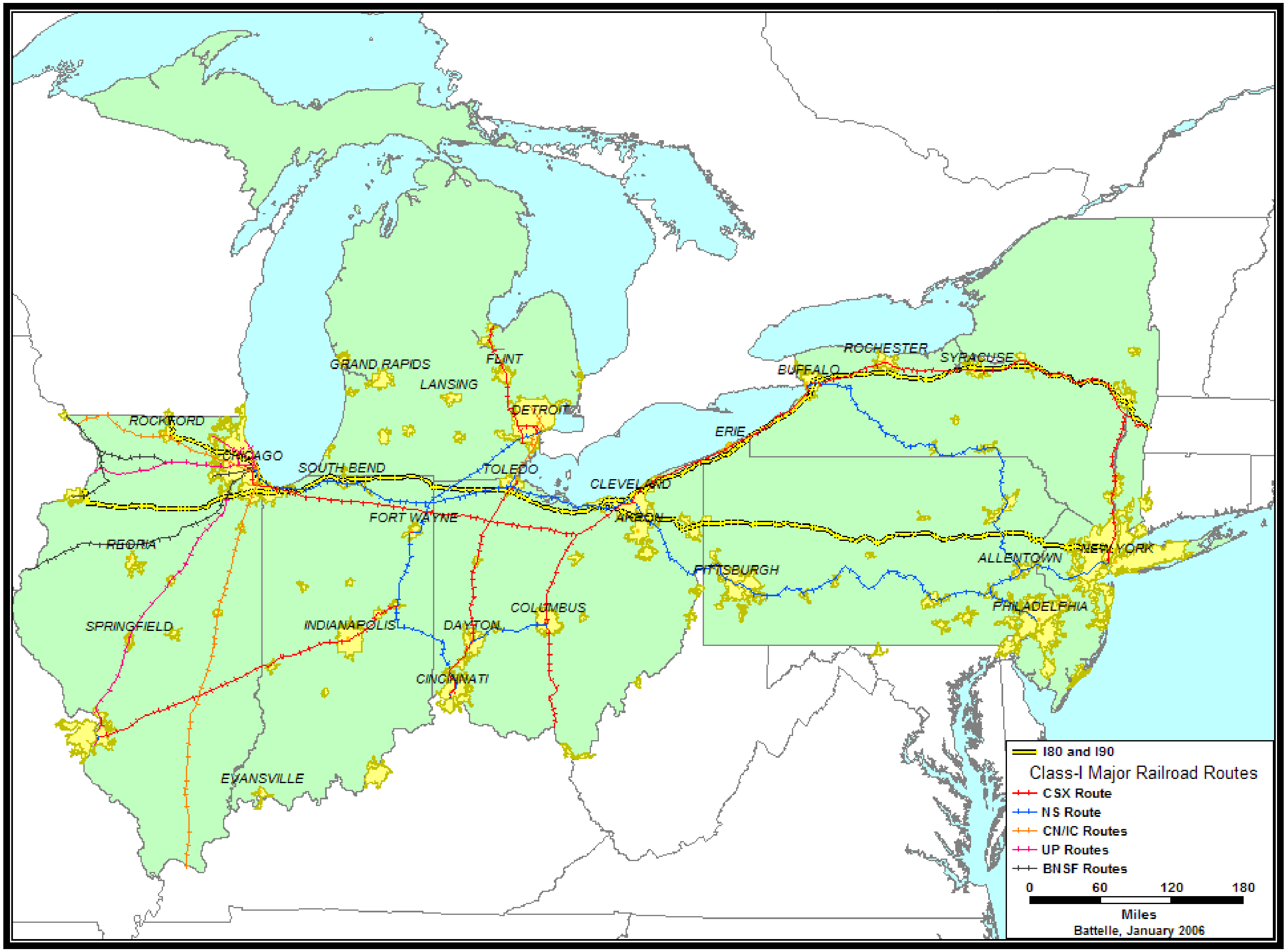
Source: Association of American Railroads, Railroads and States – 2004, Washington, DC: 2005, available at http://www.aar.org/AboutTheIndustry/StateInformation.asp as of February, 2006.

Figure 2-7. Class I, II, and III Railroads



Source: Transportation Data CD, Caliper, Inc., 1998.

Figure 2-8. Major Class I Railroad Lines and I80/I90



Source: Transportation Data CD, Caliper, Inc., 1998.

2.3.2 CSX Transportation

CSX Transportation (CSX) is the other major Class I railroads serving the corridor. In 1998 CSX acquired 42 percent of Conrail's assets. As a result of the transaction CSX's rail operations through its new subsidiary New York Central Lines, grew to include 3,800 miles of the Conrail system. These lines include the former Conrail lines connecting the east coast ports of Boston, New York, Philadelphia, and Baltimore to Chicago and St. Louis. The CSX rail line to Chicago parallels the Norfolk Southern rail lines. CSX also serves Detroit and several other major cities in Michigan.

2.3.3 Grand Trunk Western Railroad / Canadian National Railway

The Grand Truck Western Railroad (GWT) is a subsidiary of the Canadian National (CN) Railway's Grand Truck Corporation. A CN system-wide re-branding beginning in 1995 has seen the GT and GWT logo largely replaced by its parent company. GTW line serves as CN's connection between Prot Huron and Chicago, Illinois, where the railroad connects to CN subsidiaries Wisconsin Central Ltd. and Illinois Central, and other US railroads.

2.3.4 Soo Line / Canadian Pacific Railway

Canadian Pacific Railway (CPR) operates the Soo Line. CPR provides freight connections to Canada and the northern States of Wisconsin and Minnesota as part of their network. In the corridor States, the Soo Line miles are present in Illinois, Michigan, and Indiana. Canadian Pacific Railway (CPR) also own limited miles in New Jersey, New York, and Pennsylvania.

2.3.5 Regional Railroads

The Association of American Railroads (AAR) defines regional lines as non-Class I Railroads operating more than 350 miles of road and/or with revenues of at least $40 million. There are 2,836 miles of regional railroad including trackage rights in the corridor. The major regional railroad operators in the corridor include the following:

- Iowa, Interstate Railroad Ltd. – Illinois, 218 miles of railroad including trackage rights
- New York, Susquehanna and Western Railway – New Jersey, 78 miles; New York, 306 miles
- Tuscola & Saginaw Bay Railway – Michigan, 396 miles
- Buffalo and Pittsburgh Railroad, Inc. – Pennsylvania, 224 miles; New York, 146 miles
- Wheeling and Lake Erie Railway Co. – Pennsylvania, 185 miles.

2.3.6 Local and Switching Lines

The Association of American Railroads (AAR) defines shortline railroads as primarily engaged in operating railroads for the transport of cargo over a short distance, usually less than 100 miles, on local rail lines not part of a rail network. A switching line is typically a road servicing a relatively confined area, such as a port, a metropolitan area, an industrial complex or even, in some cases, a single industry. For example, "Little" Conrail is a switching carrier that works the "shared asset" areas. These areas were created out of the Conrail transaction and include Detroit and the areas of Northern New Jersey to the Philadelphia area.

An interline carrier is a full participant in all aspects of marketing and accounting including the new Interline Settlement System (ISS), which became mandatory for the rail industry on October 1, 1996. This relationship is most prevalent among Class I, Class II, and relatively large shortline railroads. A Junction Settlement Road or Handling Line is a shortline road for which its settlement of revenue is performed by connecting carriers.

2.4 Water Network

The corridor encompasses two major waterway systems, the port of New York and New Jersey and the great lakes. The Army Corps of Engineers oversees inland waterways, inland ports and many deep-water ports. Water freight is primarily a private sector service regulated by federal and state laws. Harbor depth, lock length and federal laws define the utilization of the waterway system. Table 2-10 identifies the important water ports based on total tonnage of freight in 2002. Figure 2-9 shows the waterways in the corridor as well as the locations of ports. The major water ports in the area include the Port of New York and New Jersey, Chicago, Huntington (KY-OH-WV), Pittsburgh, Philadelphia, and Detroit.

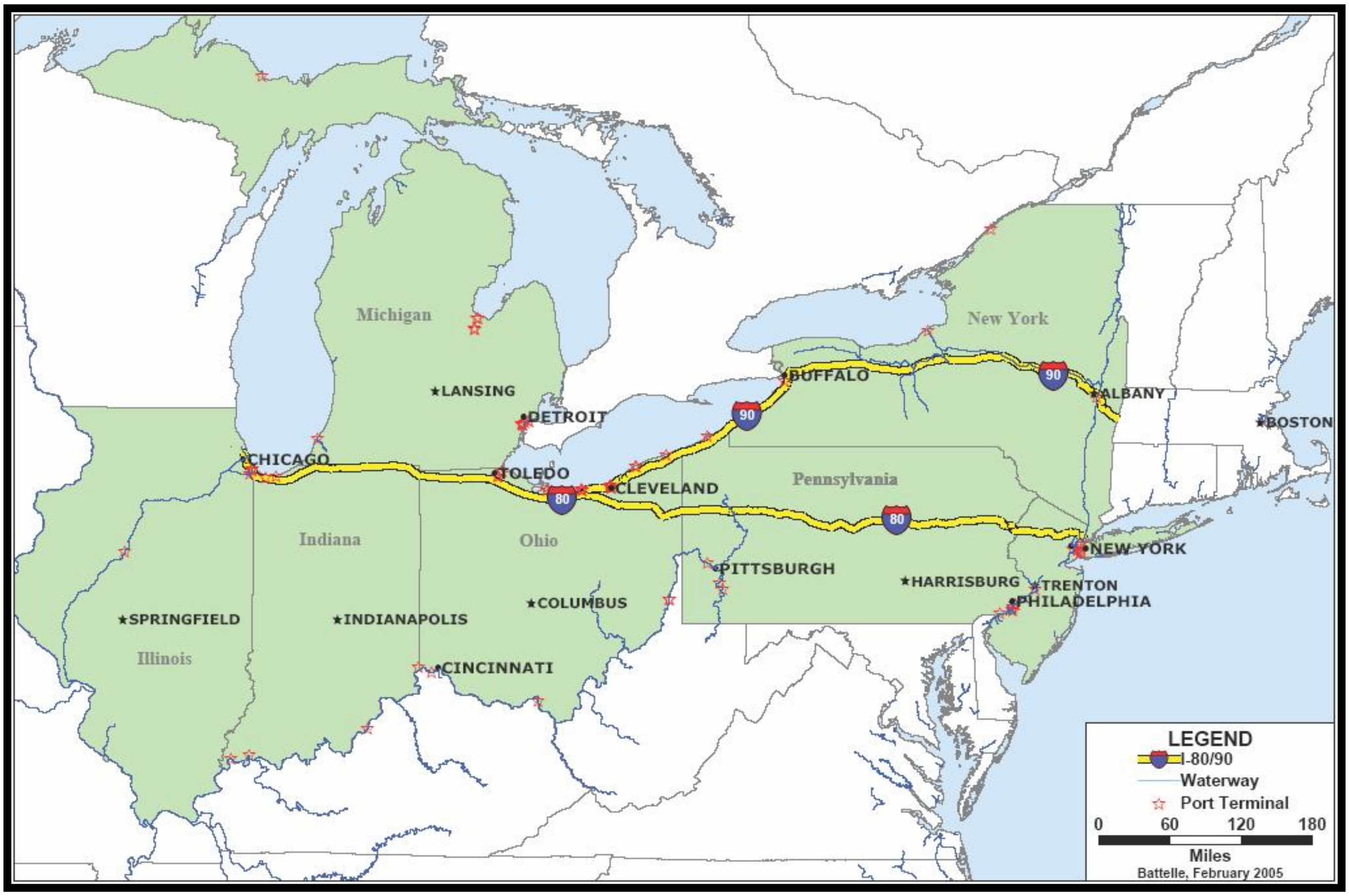
Table 2-10. Ports with over 15 Million Tons in the Corridor States

Port Name	Total Ton	Domestic	Foreign	Imports	Exports	National Ranking by Tons
New York, NY and NJ	134,504,500	64,372,653	69,571,858	59,419,046	10,152,812	3
Huntington, tri-state*	81,063,663	81,063,663	0	0	0	6
Pittsburgh, PA	52,050,661	52,050,661	0	0	0	13
Philadelphia, PA	34,100,664	13,719,934	20,380,733	20,073,391	307,342	20
Chicago, IL	20,402,907	18,777,496	1,625,411	1,059,317	566,094	35
Detroit, MI	17,305,875	12,897,162	4,408,713	4,201,545	207,168	39

* Kentucky, Ohio and West Virginia

Source: Waterborne Commerce in the United States, U.S. Army Corps of Engineers, 2002. http://www.iwr.usace.army.mil/ndc/wcsc/portton02.htm

Figure 2-9. Waterways and Port Terminal



Source: NHS Intermodal Connectors, 2000.

2.5 Intermodal Facilities and Connectors

Public roads leading to major intermodal terminals are designated NHS connectors by the USDOT, in cooperation with State departments of transportation and metropolitan planning organizations. Several criteria are considered, including the level of activity of an intermodal terminal and its importance to a State's economy. In the United States, there are 517 freight-only terminals and 99 major airports that handle both passengers and freight. These 616 intermodal freight terminals are connected to the NHS by 1,222 miles of connectors. The Chicago – New York City corridor contain 22 percent of these connector miles.

Table 2-11 lists the number of the NHS intermodal terminals by State. Ohio contains 21 port terminals along its 312-mile Lake Erie shoreline. Illinois has 34 percent of the corridor's rail/truck terminals asserting its importance as a rail hub linking the Midwest to the western States. The only three truck/pipeline terminals are located in Pennsylvania, 40 miles south of I-80 with direct NHS connectors linking with I-76, the Pennsylvania Turnpike. Figure 2-10 shows the locations of truck/rail and other intermodal facilities in the corridor States.

Table 2-11. Freight Intermodal Facilities in the I-80/I-90 Corridor States

State	Port Terminal	Truck/Rail Facility	Truck/Pipeline Terminal
Illinois	5	24	0
Indiana	3	1	0
Michigan	9	8	0
Ohio	21	11	0
Pennsylvania	9	9	3
New York	8	9	0
New Jersey	6	5	0

Source: USDOT FHWA NHS Intermodal Freight Connectors: Report to Congress, December 2000 http://ops.fhwa.dot.gov/freight/freight_analysis/nhs_connect.htm.

Figure 2-10. NHS Intermodal Connector Locations

Source: NHPN v. 06, 2004.

This Page Intentionally Left Blank

CHAPTER 3.0 FREIGHT TRAFFIC GENERATION AND ATTRACTION

This chapter describes freight generation and attraction activities along the corridor and presents characteristics of freight movement between Chicago and New York City.

3.1 Commercial Activities by State

Higher concentrations of commercial and industrial activities often have a direct link to freight movement. Tables 3-1, 3-2, and 3-3 summarize commercial activities in each corridor State. Figure 3-1 illustrates the distribution of economic activity by State and industry. Commercial activity is divided into seven categories: mining, utilities, construction, manufacturing, wholesale trade, retail trade, and the combination of transportation and warehousing. Retail comprises at least 39 percent of each State's commercial establishments, followed by construction and wholesale trade facilities at 23 and 17 percent, respectively. New York has the highest number of manufacturing, wholesale trade, retail trade, and transportation establishments, while Ohio and Pennsylvania have the most mining and utility establishments, as shown in Figure 3-1. The distribution of commercial establishments in the corridor States closely mirrors that of the national distribution. Of the total number of commercial establishments in the corridor States, 23 percent are located within the State of New York, followed by Illinois, Ohio, and Pennsylvania, each with 15 percent.

Table 3-1. Number of Commercial Establishments by State

Industry	State							Total	
	Illinois	Indiana	Michigan	Ohio	Pennsylvania	New York	New Jersey	Corridor States	U.S.
Mining	650	347	445	828	914	359	95	3,638	25,000
Utilities	390	418	385	533	606	371	294	2,997	15,513
Construction	27,953	16,000	25,399	26,047	27,563	36,806	22,102	181,870	656,434
Manufacturing	17,953	9,303	16,045	17,974	17,128	23,908	11,812	114,123	363,753
Wholesale	21,951	8,896	13,936	17,322	17,138	37,499	17,812	134,554	453,470
Retail	44,568	24,954	39,564	44,521	50,208	75,241	34,837	313,893	1,118,447
Transportation	8,559	4,389	4,733	6,709	6,379	10,485	6,632	47,886	178,025
Total	**122,024**	**64,307**	**100,507**	**113,934**	**119,936**	**184,669**	**93,584**	**798,961**	**2,810,642**

Source: U.S. Census Bureau, 2001.

Table 3-2. Distribution of Commercial Activities by State and Industry (Percent of Corridor Total)

Industry	State							Total		
	Illinois	Indiana	Michigan	Ohio	Pennsylvania	New York	New Jersey	Corridor States	U.S.	Difference*
Mining	0.08%	0.04%	0.06%	0.10%	0.11%	0.04%	0.01%	0.46%	0.89%	-0.43%
Utilities	0.05%	0.05%	0.05%	0.07%	0.08%	0.05%	0.04%	0.38%	0.55%	-0.18%
Construction	3.50%	2.00%	3.18%	3.26%	3.45%	4.61%	2.77%	22.76%	23.36%	-0.59%
Manufacturing	2.25%	1.16%	2.01%	2.25%	2.14%	2.99%	1.48%	14.28%	12.94%	1.34%
Wholesale	2.75%	1.11%	1.74%	2.17%	2.15%	4.69%	2.23%	16.84%	16.13%	0.71%
Retail	5.58%	3.12%	4.95%	5.57%	6.28%	9.42%	4.36%	39.29%	39.79%	-0.51%
Transportation	1.07%	0.55%	0.59%	0.84%	0.80%	1.31%	0.83%	5.99%	6.33%	-0.34%
Total	**15.27%**	**8.05%**	**12.58%**	**14.26%**	**15.01%**	**23.11%**	**11.71%**	**100%**	**100%**	

*Difference between corridor and national totals.

Source: U.S. Census Bureau, 2001.

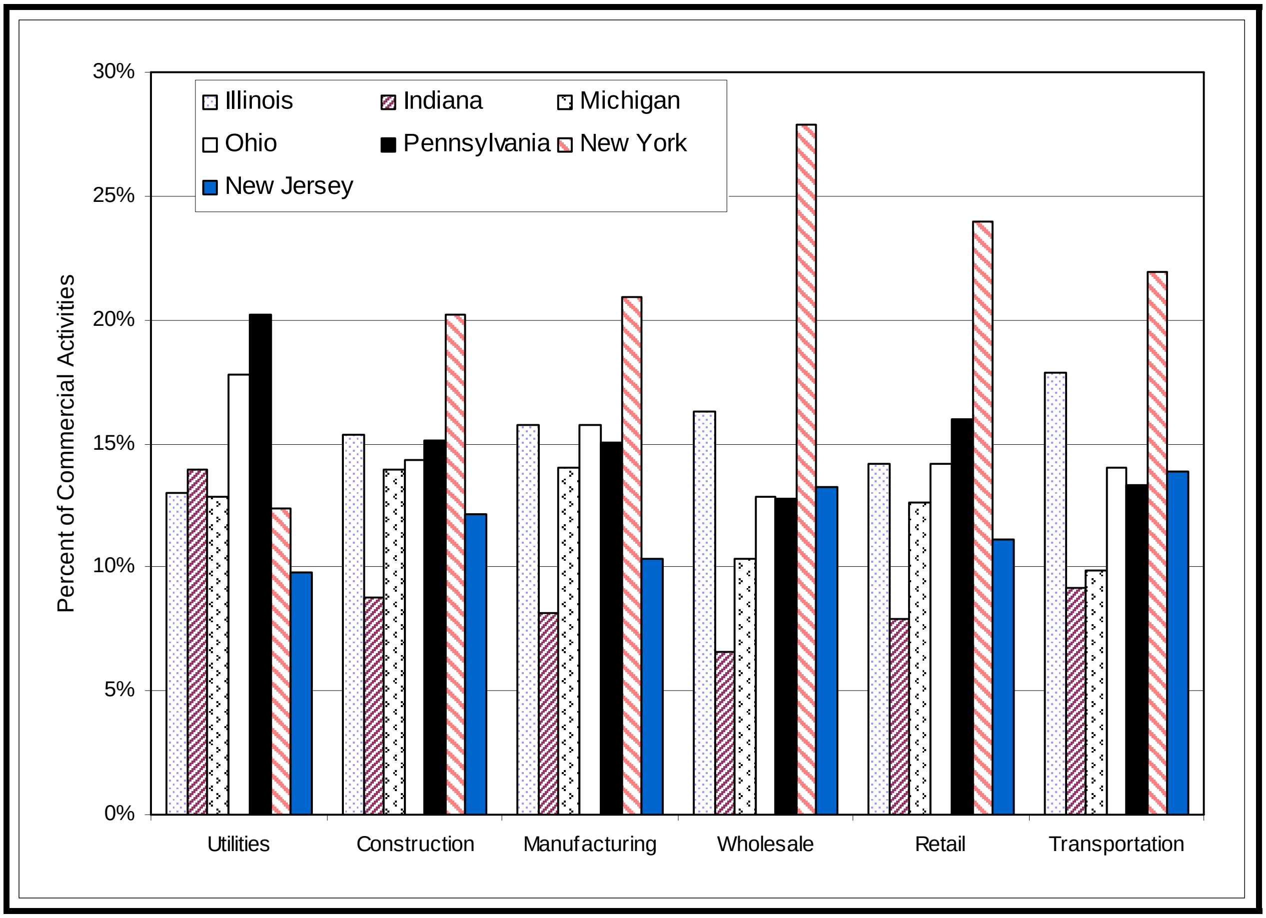
Table 3-3. Distribution of Commercial Activities by State (Percent of Industry Total)

Industry	State							Total
	Illinois	Indiana	Michigan	Ohio	Pennsylvania	New York	New Jersey	
Mining	17.87%	9.54%	12.23%	22.76%	25.12%	9.87%	2.61%	100%
Utilities	13.01%	13.95%	12.85%	17.78%	20.22%	12.38%	9.81%	100%
Construction	15.37%	8.80%	13.97%	14.32%	15.16%	20.24%	12.15%	100%
Manufacturing	15.73%	8.15%	14.06%	15.75%	15.01%	20.95%	10.35%	100%
Wholesale	16.31%	6.61%	10.36%	12.87%	12.74%	27.87%	13.24%	100%
Retail	14.20%	7.95%	12.60%	14.18%	16.00%	23.97%	11.10%	100%
Transportation	17.87%	9.17%	9.88%	14.01%	13.32%	21.90%	13.85%	100%

Note: Values represent percent of industry total.

Source: U.S. Census Bureau, 2001.

Figure 3-1. Distribution of Commercial Activities by State and by Industry



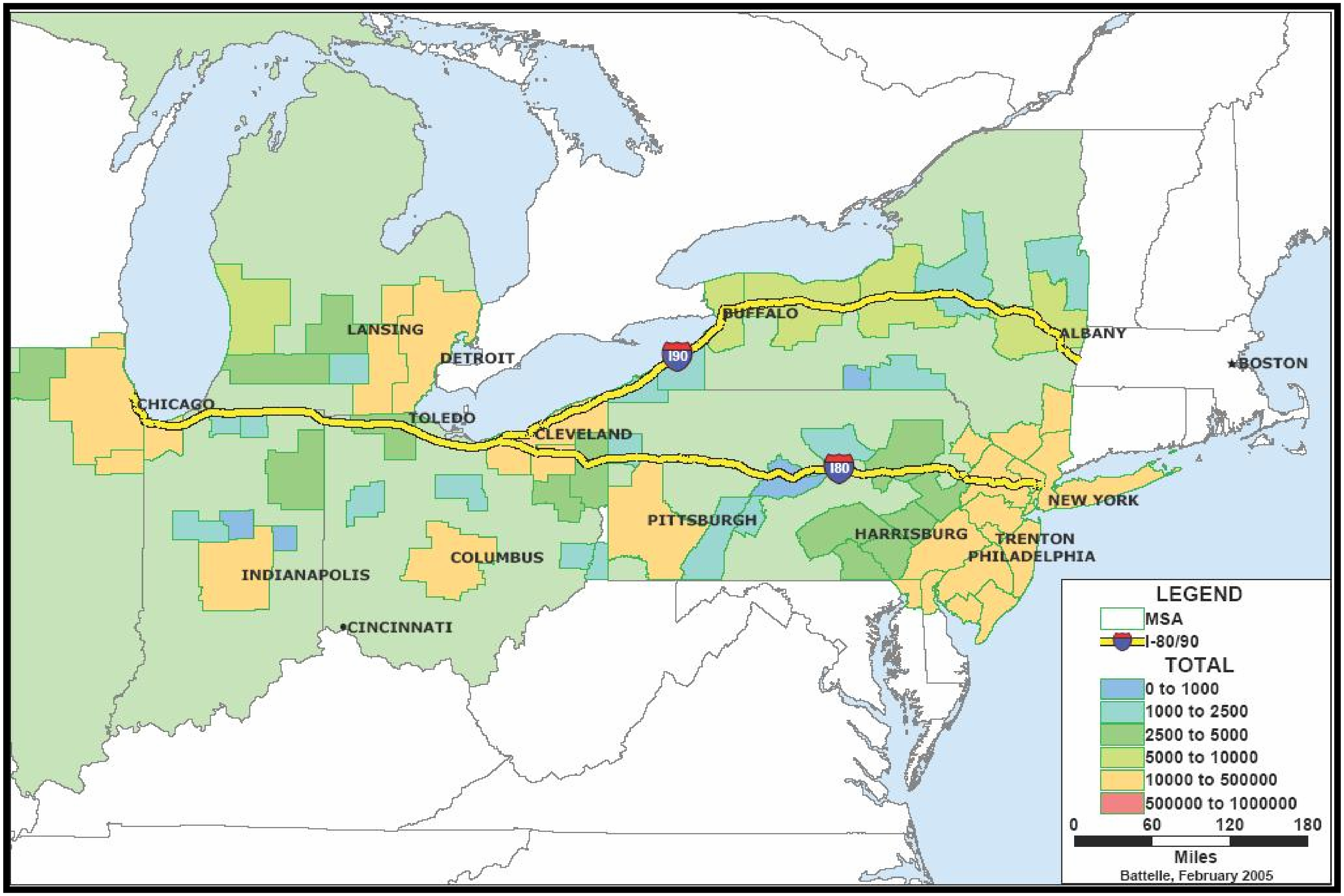
Source: U.S. Census Bureau, 2001.

3.2 Commercial Activities by Metropolitan Area

Metropolitan Statistical Areas (MSAs) and Consolidated Metropolitan Statistical Areas (CMSAs) within the corridor were selected to produce the distribution of commercial activities in the more populated regions. Figure 3-2 depicts the statistical areas in relation to the Chicago – New York City corridor. The corridor contains a total of 41 MSAs and 5 CMSAs. A metropolitan area identified as a CMSA typically has a population of one million or more and also has separate component metropolitan areas. The following are the CMSAs in the corridor:

- Chicago, Illinois; Gary, Indiana; and Kenosha, Wisconsin
- Detroit, Ann Arbor, and Flint, Michigan
- Cleveland and Akron, Ohio
- Philadelphia, Pennsylvania; Wilmington, Delaware; Atlantic City, New Jersey; and portions of northern Maryland
- New York, New York; Long Island, New York; Northern New Jersey, and southern Connecticut.

Figure 3-2. Commercial Activities by Metropolitan Area



Source: 1997 Economic Census.

Tables 3-4a through 3-4g provide the total number of establishments for each of the seven States within the corridor by type for each MSA. Of note, the MSAs in the corridor consist of 24 percent of the national total commercial establishments, minus mining and construction activities, further delineating the corridor's dense population and industrial characteristics. Distribution among the MSAs mirrors that of the corridor States with half the establishments belonging to the retail trade sector, 24 percent in wholesale trade, 19 percent in manufacturing, and 7 percent in transportation and warehousing. Utilities accounted for less than 0.5 percent of all establishments.

The five CMSAs, or most populated centers in the corridor, clearly possess the bulk of activity within the corridor, holding 70 percent of all the MSA-tabulated commercial establishments. Further augmenting the corridor's national significance, the five CMSAs contain 17 percent of the nation's establishments, with the New York area accounting for 8.3 percent; Chicago, 3.2 percent; Philadelphia, 2.1 percent; Detroit, 1.9 percent; and Cleveland, 1.2 percent.

Table 3-4a. Commercial Activities by Metropolitan Area (Illinois) (number of establishments)

Industry	Illinois			
	State Total	MSA Total	Chicago, Gary, Kenosha	Rockford
Utilities	390	170	161	9
Manufacturing	17,953	14,992	14,080	912
Wholesale	21,951	17,967	17,360	607
Retail	44,568	31,658	30,327	1,331
Transportation	8,559	6,023	5,791	232
Total	**93,421**	**70,810**	**67,719**	**3,091**

Source: U.S. Census Bureau, 2001.

Table 3-4b. Commercial Activities by Metropolitan Area (Indiana) (number of establishments)

Industry	Indiana								
	State Total	MSA Total	South Bend	Elkhart, Goshen	Fort Wayne	Indianapolis	Kokomo	Lafayette	Muncie
Utilities	418	112	6	2	20	65	4	9	6
Manufacturing	9,303	4,760	457	894	955	2,014	102	162	176
Wholesale	8,896	5,206	472	382	899	3,040	130	164	119
Retail	24,954	11,759	1,069	751	2,037	6,203	461	690	548
Transportation	4,389	1,821	140	118	319	1,027	48	108	61
Total	**47,960**	**23,658**	**2,144**	**2,147**	**4,230**	**12,349**	**745**	**1,133**	**910**

Source: U.S. Census Bureau, 2001.

Table 3-4c. Commercial Activities by Metropolitan Area (Michigan) (number of establishments)

Industry	Michigan						
	State Total	MSA Total	Detroit, Ann Arbor, Flint	Grand Rapids, Muskegon, Holland	Jackson	Kalamazoo, Battle Creek	Lansing, East Lansing
Utilities	385	219	157	25	13	14	10
Manufacturing	16,045	12,498	8,637	2,334	351	748	428
Wholesale	13,936	11,561	8,413	1,902	196	543	507
Retail	39,564	28,450	20,340	3,978	564	1,812	1,756
Transportation	4,733	3,359	2,362	534	72	196	195
Total	**74,663**	**56,087**	**39,909**	**8,773**	**1,196**	**3,313**	**2,896**

Source: U.S. Census Bureau, 2001.

Table 3-4d. Commercial Activities by Metropolitan Area (Ohio)
(number of establishments)

Industry	Ohio								
	State Total	MSA Total	Cleveland, Akron	Canton, Massillon	Lima	Toledo	Mansfield	Youngstown, Warren	Columbus
Utilities	533	264	89	21	10	24	5	16	87
Manufacturing	17,974	10,789	6,021	669	225	954	310	896	1,577
Wholesale	17,322	11,043	5,790	542	236	988	209	749	2,340
Retail	44,521	26,202	11,511	1,697	734	2,475	763	2,568	5,710
Transportation	6,709	3,847	1,679	218	127	383	107	370	860
Total	**87059**	**52,145**	**25,090**	**3,147**	**1,332**	**4,824**	**1,394**	**4,599**	**10,574**

Source: U.S. Census Bureau, 2001.

Table 3-4e. Commercial Activities by Metropolitan Area (Pennsylvania)
(number of establishments)

Industry	Pennsylvania														
	State Total	MSA Total	Erie	Allentown, Bethlehem, Easton	Altoona	Harrisburg, Lebanon, Carlisle	Johnstown	Lancaster	Philadelphia, Wilmington, Atlantic City	Pittsburgh	Reading	Scranton, Wilkes-Barre, Hazleton	Sharon	State College	Williamsport	York
Utilities	606	512	11	23	4	22	28	10	186	127	24	34	9	10	8	16
Manufacturing	17,128	16,743	570	920	157	674	271	918	7,571	3,000	587	849	198	159	208	661
Wholesale	17,138	18,802	334	906	160	736	231	663	9,964	3,811	439	747	124	100	137	450
Retail	50,208	51,818	1,225	2,427	639	2,711	1,060	2,012	24,437	9,664	1,468	2,888	618	617	605	1,447
Transportation	6,379	6,352	133	278	86	327	199	258	2,902	1,157	176	416	84	90	76	170
Total	**91,459**	**94,227**	**2,273**	**4,554**	**1,046**	**4,470**	**1,789**	**3,861**	**45,060**	**17,759**	**2,694**	**4,934**	**1,033**	**976**	**1,034**	**2,744**

Source: U.S. Census Bureau, 2001.

Table 3-4f. Commercial Activities by Metropolitan Area (New York) (number of establishments)

Industry	New York										
	State Total	MSA Total	Albany, Schenectady, Troy	Binghamton	Buffalo, Niagara Falls	Elmira	Glens Falls	Jamestown	Rochester	Utica, Rome	Syracuse
Utilities	371	114	20	9	25	1	3	9	22	8	17
Manufacturing	23,908	5756	752	290	1,561	94	183	222	1,516	351	787
Wholesale	37,499	6726	1,094	292	1,917	107	137	159	1,536	278	1,206
Retail	75,241	1,8845	3,582	974	4,514	412	675	591	3,977	1,225	2,895
Transportation	10,485	2215	367	96	653	43	49	85	434	135	353
Total	**147,504**	**3,3656**	**5,815**	**1,661**	**8,670**	**657**	**1,047**	**1,066**	**7,485**	**1,997**	**5,258**

Source: U.S. Census Bureau, 2001.

Table 3-4g. Commercial Activities by Metropolitan Area (New Jersey) (number of establishments)

Industry	New Jersey		
	State Total	MSA Total	New York, Northern New Jersey, Long Island
Utilities	294	477	477
Manufacturing	11,812	29,610	29,610
Wholesale	17,812	47,914	47,914
Retail	34,837	85,012	85,012
Transportation	6,632	13,867	13,867
Total	**71,387**	**176,880**	**176,880**

Source: U.S. Census Bureau, 2001.

3.3 Freight Movements

This section presents data on freight movements by highway, rail, air, and water in the corridor states as well as movements into and from these states to other states. The Freight Analysis Framework (FAF) demand data for the year 1998 were analyzed to characterize freight movement along the corridor.

- For each mode (highway, rail, water, and air), freight volume and value were analyzed for movements within the corridor States, freight originating from the corridor States and destined outside the corridor, and freight originating outside the corridor and terminating in the corridor (water movements include domestic freight only).

- The top five commodities were identified by volume that is moved within, out of, and into the corridor States by highway, rail, and water.

The results of these analyses are discussed in the next section.

3.3.1 Modal Split

Figure 3-3 shows the percent modal split by volume and value for total shipments within, into, and out of the corridor states. Figure 3-4 shows the breakdown of the movements by mode and distribution among the three types of shipment: (i) within the corridor states only, (ii) originating from the corridor states and destined outside the corridor, and (iii) originating elsewhere and terminating in the corridor states.

Highway dominates as the mode for freight movements in the corridor accounting for 72 percent of all movements. This percent varies from 55 to 80 percent depending on the origin and destination (Figure 3-3). Highway freight movement within the corridor states is the highest among all types of movements and modes. Highway movements are also of higher value than movements by rail and water combined. Highway shipments into the corridor states are of slightly higher value than those destined for locations outside the corridor (Figure 3-3).

The volumes of freight movement by rail originating and terminating within the corridor states and those with origins elsewhere and terminating in the corridor states are comparable. The values of all shipments by rail are similar and much lower than those shipped by highway (Figure 3-3). The volumes of domestic freight movement by water into and out of the corridor states are identical and represent 8 to 12 percent of all shipments. The value of water shipments is about 2 percent of the value of highway shipments. Air shipments have the least volume. The value of air freight that originates from the corridor and those destined outside the corridor are generally higher than movements within the corridor (Figure 3-3).

Figure 3-3. Modal Split

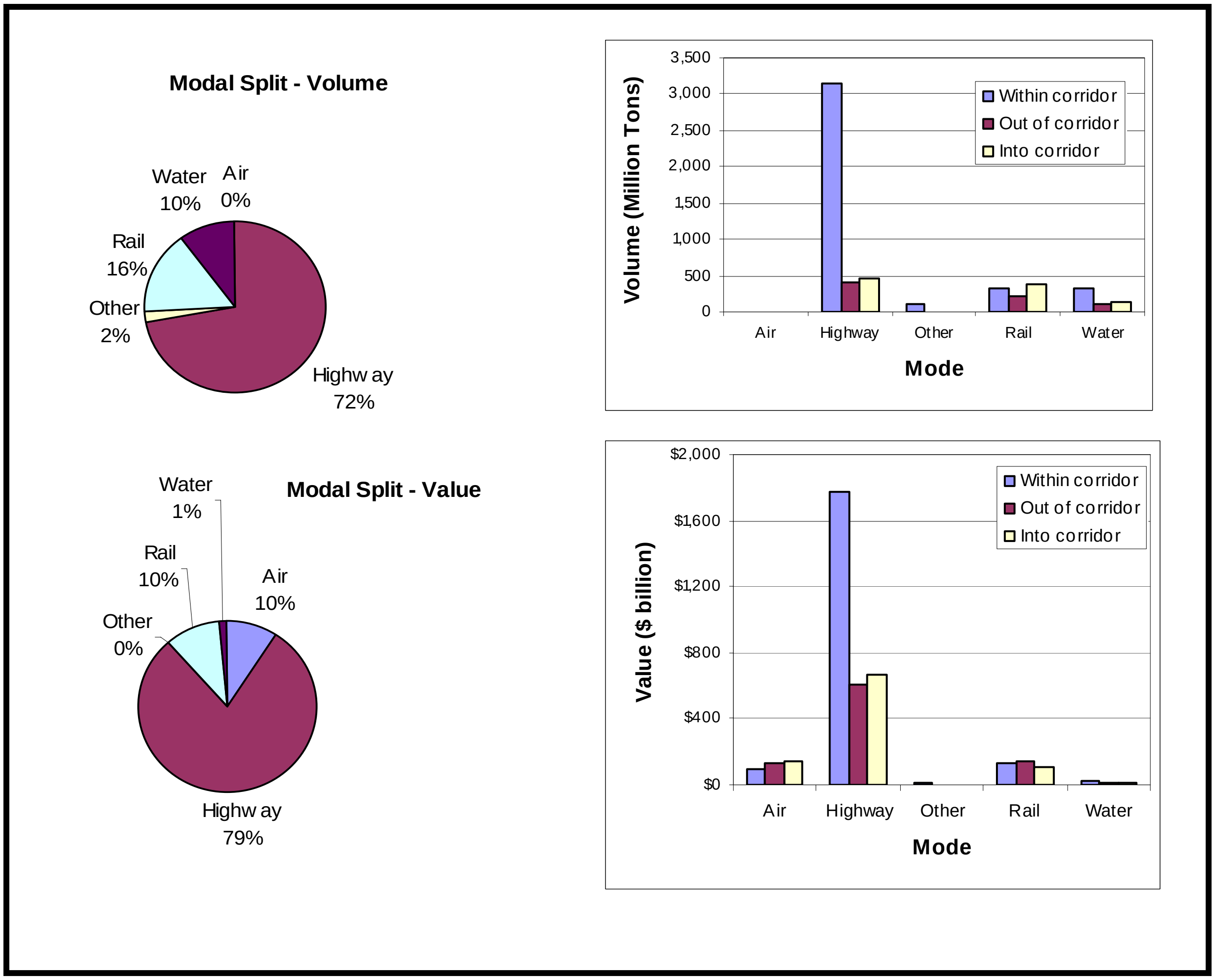
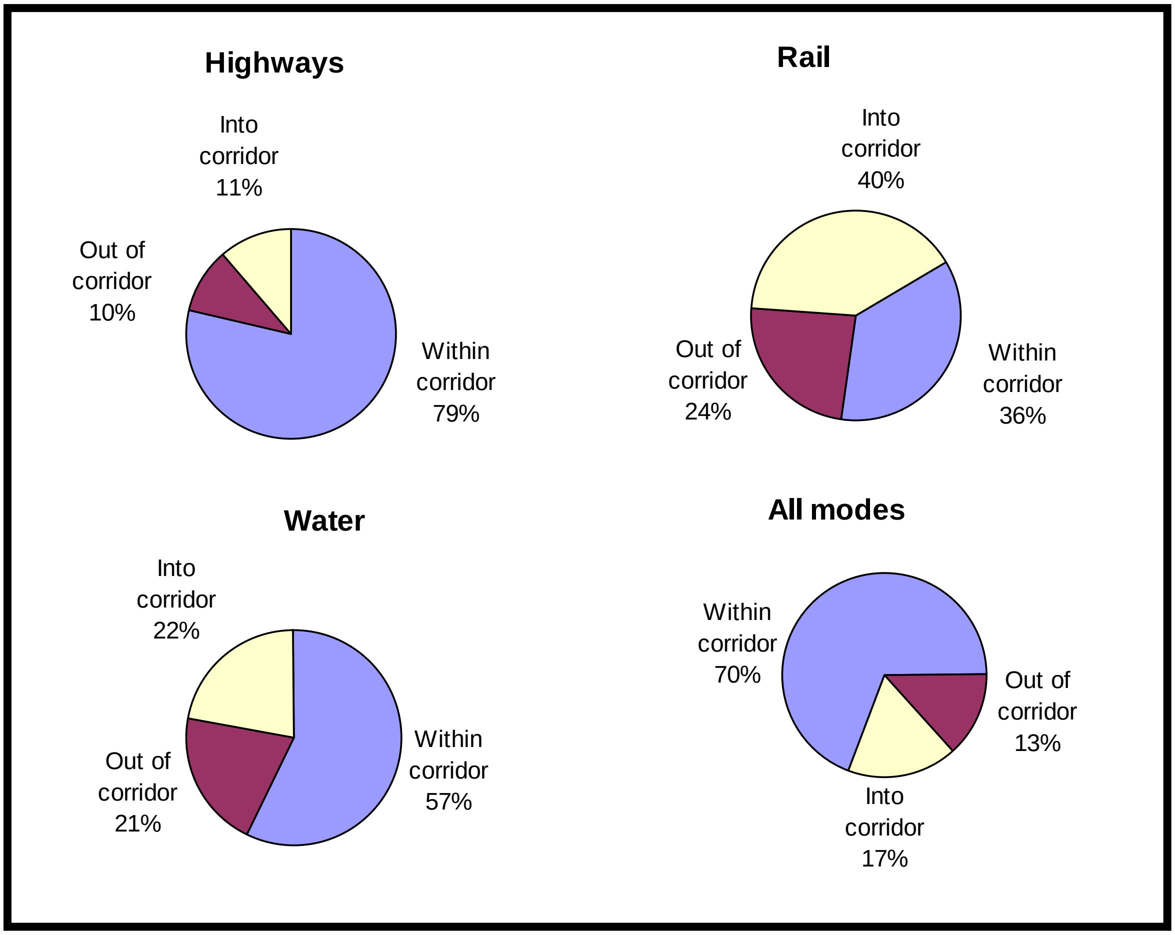


Figure 3-4 shows the distribution by mode among the three types of shipments. Freight movement within the corridor dominates for each mode. For example, about 79 percent of shipments by highway and 57 percent by water are within the corridor. However, for rail shipments, the split by type of shipment is fairly balanced.

Figure 3-4. Modal Share by Type of Freight Movement



3.3.2 Freight Movements by Highway

Tables 3-5a and 3-5b show the ranking of the corridor states in terms of volume and value of all freight shipments by highway within, originating from, and destined to the corridor states. The distance distributions of these shipments are also shown. Table 3-5a shows intra-state shipments for each of the corridor states. It is noted that Ohio has the highest tonnage of intrastate shipments and New Jersey has the least among the corridor states. The majority (more than 84 percent) of intra-state shipments are hauled less than 250 miles. Between 17 and 66 percent are hauled 50 miles or less.

Table 3-5b shows freight movements among the corridor States ranked by tonnage and value. It is noted that comparable tonnages of freight originate from Indiana, Illinois, and Pennsylvania that are destined for other corridor states. For these states, incoming tonnage is less than outgoing tonnage. On the other hand, incoming tonnage is greater than outgoing tonnage for Ohio, New York, and New Jersey. For Michigan, incoming and outgoing tonnages are fairly balanced. In terms of tonnage, between 35 and 71 percent of the incoming (33 to 67 percent of outgoing) shipments are hauled less than 250 miles. Less then 20 percent of the tonnage of freight movements within the corridor states is hauled less than 100 miles.

Table 3-5a. Summary of Intra-State Shipments and Distances in Corridor States by Highway

Intra-State Movements Within Corridor States by Highway									
Total Tonnage (1998)		**< 50 miles**	**<100 miles**	**< 250 miles**	**Total Value ($000) in 1998**		**< 50 miles**	**<100 miles**	**< 250 miles**
Ohio	394,658,987	36%	73%	99%	Michigan	$215,413,444	42%	62%	95%
Pennsylvania	379,559,932	17%	58%	90%	Illinois	$160,631,800	47%	61%	91%
New York	348,624,074	55%	72%	84%	Ohio	$159,593,941	25%	44%	98%
Illinois	322,647,483	43%	76%	93%	New York	$158,389,597	39%	46%	66%
Indiana	271,402,836	37%	80%	97%	Pennsylvania	$101,367,631	27%	45%	77%
Michigan	269,604,720	45%	70%	96%	Indiana	$75,168,550	25%	50%	95%
New Jersey	153,945,838	66%	97%	100%	New Jersey	$72,307,955	70%	95%	100%

Source: Freight Analysis Framework, Demand Database, 2002.

Table 3-5c shows shipments into and out of the corridor States. Among the corridor States, Illinois attracts the most freight shipments in terms of both volume and value with origins outside the corridor. Illinois also ranks highest in volume in generating shipments destined outside the corridor States. In terms of volume of shipments, Ohio ranks second for these types of shipments. Ohio and Indiana are the only States where outgoing shipments are less than incoming shipments from outside the corridor States. Shipments from outside the corridor States that are destined for New Jersey are more than two times those outgoing from that State. Except for Illinois, more than 70 percent of shipments from outside the corridor States that are destined for the other six corridor States are hauled more than 500 miles. More than 50 percent of shipments from each of the corridor States destined outside the corridor are hauled greater than 500 miles. Less than 10 percent of shipments from the corridor States destined elsewhere are hauled less than 100 miles. The distance distributions clearly show that over 90 percent of the tonnage of shipments into and out of Michigan is hauled more than 500 miles.

Table 3-6a shows the top five commodities shipped by highway, within, originating from, and destined to the corridor States. Important commodities originating and terminating in the corridor States include non-metallic minerals, clay/concrete/glass/stone products, petroleum/coal products, farm products, and food/kindred products. Ohio generates and attracts the highest volume of freight movements within the corridor, followed by Pennsylvania and New York. In terms of value, however, Michigan ranks highest.

Table 3-6b shows that the primary commodity shipped by highway in Ohio, Michigan, and Illinois is non-metallic minerals. Secondary moves rank second in Michigan and third in Ohio, but secondary moves do not rank in the top five in Illinois. Instead, "freight all kind" ranked second in Illinois for both "destined for" and "originating from" Illinois. It is also noted that Illinois is the only State within the corridor where "freight all kind" ranks in the top five.

The results clearly show that, at a corridor level, the majority of the freight movements by highway occur within the corridor States, which is consistent with information presented in the previous section.

Table 3-5b. Summary of Shipments and Distances within Corridor States by Highway

Origin State for All Shipments Within the Chicago-NYC Corridor States (Between Corridor States) by Highway									
Total Tonnage (1998)		< 100 miles	< 250 miles	< 500 miles	**Total Value ($000) in 1998**		< 100 miles	< 250 miles	< 500 miles
Indiana	70,518,405	18%	67%	92%	Ohio	$86,936,392	4%	43%	85%
Illinois	67,691,801	9%	52%	76%	Illinois	$81,826,619	6%	40%	71%
Pennsylvania	65,764,053	13%	50%	83%	Michigan	$80,048,661	5%	36%	69%
Ohio	55,520,201	5%	34%	68%	Indiana	$77,696,343	12%	54%	78%
New York	54,603,316	19%	38%	63%	New York	$74,490,038	19%	36%	65%
Michigan	52,617,258	6%	33%	61%	Pennsylvania	$60,004,631	8%	32%	58%
New Jersey	36,354,872	21%	34%	47%	New Jersey	$39,301,888	20%	30%	40%

Destination State for All Shipments Within the Chicago-NYC Corridor States (Between Corridor States) by Highway									
Total Tonnage (1998)		<100 miles	< 250 miles	< 500 miles	**Total Value ($000) in 1998**		< 100 miles	< 250 miles	< 500 miles
Ohio	62,566,654	9%	51%	93%	Michigan	$91,959,534	3%	38%	79%
Pennsylvania	62,195,803	17%	44%	81%	New York	$86,500,987	14%	35%	66%
Indiana	61,297,508	13%	71%	91%	Ohio	$71,839,053	5%	38%	72%
Illinois	58,233,336	17%	60%	86%	Illinois	$70,409,733	11%	39%	68%
New York	57,859,480	15%	40%	71%	Pennsylvania	$66,305,047	11%	29%	55%
Michigan	53,354,989	4%	34%	66%	Indiana	$63,426,398	7%	48%	63%
New Jersey	47,562,135	26%	49%	65%	New Jersey	$49,863,821	20%	29%	38%

Source: Freight Analysis Framework, Demand Database, 2002.

Table 3-5c. Summary of Shipments and Distances Into and Out of Corridor States by Highway

Origin Corridor State for All Shipments Out of the Chicago-NYC Corridor States by Highway									
Total Tonnage (1998)		< 100 miles	< 250 miles	< 500 miles	**Total Value ($000) in 1998**		< 100 miles	< 250 miles	< 500 miles
Illinois	96,954,553	8%	18%	46%	Ohio	$145,568,442	2%	11%	44%
Ohio	79,214,023	2%	10%	38%	Illinois	$130,097,037	5%	11%	30%
Pennsylvania	61,245,849	9%	30%	45%	Michigan	$104,224,994	0%	0%	7%
Indiana	59,509,598	2%	11%	33%	New York	$90,043,459	1%	10%	21%
New York	53,784,663	3%	14%	28%	Indiana	$65,429,497	1%	5%	16%
Michigan	40,409,168	0%	1%	7%	Pennsylvania	$57,964,028	4%	12%	20%
New Jersey	20,896,337	1%	11%	13%	New Jersey	$25,139,914	1%	7%	9%

Destination State for All Shipments Into the Chicago-NYC Corridor States by Highway									
Total Tonnage (1998)		<100 miles	< 250 miles	< 500 miles	**Total Value ($000) in 1998**		< 100 miles	< 250 miles	< 500 miles
Illinois	112,375,607	12%	30%	53%	Illinois	$146,700,909	9%	20%	40%
Ohio	69,073,722	3%	10%	27%	New York	$109,947,779	1%	10%	23%
New York	67,338,855	1%	9%	21%	Michigan	$101,530,924	0%	0%	13%
Pennsylvania	64,899,541	6%	14%	24%	Ohio	$95,169,764	2%	7%	24%
Michigan	45,757,165	0%	1%	9%	Pennsylvania	$76,781,888	5%	11%	19%
Indiana	43,226,195	1%	6%	18%	New Jersey	$61,756,818	1%	7%	11%
New Jersey	42,874,346	2%	9%	12%	Indiana	$50,153,329	0%	5%	13%

Source: Freight Analysis Framework, Demand Database, 2002.

Table 3-6a. Top 5 Commodities by Volume Shipped Within Corridor States by Highway

State of Origin (1998 Shipments)			State of Destination (1998 Shipments)		
Commodity	**Tonnage**	**%**	**Commodity**	**Tonnage**	**%**
Illinois					
Non-metallic Minerals	133,804,302	33%	Non-metallic Minerals	135,437,158	33%
Freight All Kind	48,137,975	12%	Freight All Kind	51,412,686	13%
Farm	38,849,404	10%	Farm	39,054,926	10%
Food/Kindred	35,500,872	9%	Clay/Concrete/Glass/Stone	34,473,210	8%
Clay/Concrete/Glass/Stone	29,637,313	7%	Food/Kindred	32,633,087	8%
All Other	117,624,861	29%	All Other	114,754,686	28%
Indiana					
Non-metallic Minerals	165,303,658	48%	Petroleum/Coal	165,237,073	49%
Clay/Concrete/Glass/Stone	32,601,518	9%	Farm	29,120,869	9%
Secondary Moves	32,333,072	9%	Clay/Concrete/Glass/Stone	26,961,209	8%
Primary Metal	25,211,735	7%	Secondary Moves	25,848,796	8%
Farm	24,830,452	7%	Freight All Kind	21,962,997	6%
All Other	67,426,660	19%	All Other	69,384,901	20%
Michigan					
Non-metallic Minerals	99,350,155	30%	Non-metallic Minerals	97,960,568	30%
Secondary Moves	63,416,771	19%	Secondary Moves	62,096,309	19%
Clay/Concrete/Glass/Stone	40,756,720	12%	Clay/Concrete/Glass/Stone	40,386,170	12%
Farm	22,938,837	7%	Farm	22,022,151	7%
Transportation Equipment	17,925,328	5%	Primary Metal	18,667,314	6%
All Other	84,133,605	26%	All Other	88,256,048	27%
Ohio					
Non-metallic Minerals	209,515,445	46%	Non-metallic Minerals	207,483,195	45%
Clay/Concrete/Glass/Stone	43,960,375	10%	Clay/Concrete/Glass/Stone	44,900,142	10%
Secondary Moves	42,963,187	9%	Secondary Moves	44,042,325	10%
Food/Kindred	26,702,812	6%	Farm	36,287,692	8%
Farm	26,109,816	6%	Food/Kindred	24,840,956	5%
All Other	105,737,667	23%	All Other	105,342,986	23%
Pennsylvania					
Non-metallic Minerals	227,962,530	51%	Non-metallic Minerals	226,452,149	51%
Clay/Concrete/Glass/Stone	42,974,130	10%	Clay/Concrete/Glass/Stone	36,991,156	8%
Petroleum/Coal	30,020,576	7%	Secondary Moves	26,352,141	6%
Secondary Moves	22,445,119	5%	Petroleum/Coal	24,955,133	6%
Food/Kindred	20,699,111	5%	Food/Kindred	22,862,897	5%
All Other	106,368,623	24%	All Other	108,988,529	24%
New York					
Non-metallic Minerals	189,323,304	45%	Non-metallic Minerals	189,531,461	46%
Clay/Concrete/Glass/Stone	50,569,862	12%	Clay/Concrete/Glass/Stone	50,681,583	12%
Secondary Moves	37,002,677	9%	Secondary Moves	38,818,137	9%
Food/Kindred	32,926,884	8%	Food/Kindred	33,650,432	8%
Farm	21,553,684	5%	Farm	14,542,690	4%
All Other	91,005,329	22%	All Other	88,177,341	21%
New Jersey					
Non-metallic Minerals	78,709,059	40%	Non-metallic Minerals	83,977,061	40%
Secondary Moves	40,787,190	21%	Secondary Moves	33,643,281	16%
Petroleum/Coal	19,109,193	10%	Petroleum/Coal	18,339,869	9%
Clay/Concrete/Glass/Stone	12,911,005	7%	Clay/Concrete/Glass/Stone	17,040,221	8%
Chemicals/Allied	11,090,542	6%	Food/Kindred	10,218,225	5%
All Other	33,908,438	17%	All Other	44,198,016	21%

Source: Freight Analysis Framework, Demand Database, 2002.

Table 3-6b. Top 5 Commodities by Value Shipped Within Corridor States by Highway

State of Origin (1998 Shipments)			State of Destination (1998 Shipments)		
Commodity	Value ($000)	%	Commodity	Value ($000)	%
Illinois					
Freight All Kind	$49,582,114	19%	Freight All Kind	$52,955,067	21%
Food/Kindred	$35,970,564	14%	Food/Kindred	$33,064,837	13%
Transportation Equipment	$24,843,844	10%	Secondary Moves	$30,919,326	12%
Secondary Moves	$24,425,964	9%	Transportation Equipment	$25,210,327	10%
Chemicals/Allied	$23,934,218	9%	Chemicals/Allied	$16,892,357	7%
All Other	$99,910,460	39%	All Other	$95,491,372	38%
Indiana					
Secondary Moves	$33,303,064	21%	Chemicals/Allied	$26,624,260	19%
Transportation Equipment	$25,966,107	16%	Freight All Kind	$22,621,887	16%
Primary Metal	$23,366,042	15%	Primary Metal	$16,455,416	12%
Freight All Kind	$12,002,862	8%	Transportation Equipment	$14,803,955	10%
Farm	$10,506,567	7%	Farm	$12,321,981	9%
All Other	$54,452,277	34%	All Other	$49,173,979	35%
Michigan					
Transportation Equipment	$115,897,656	38%	Transportation Equipment	$118,979,321	37%
Secondary Moves	$65,319,274	21%	Secondary Moves	$63,959,198	20%
Machinery Exc Electrical	$19,898,003	7%	Machinery Exc Electrical	$21,786,350	7%
Primary Metal	$14,181,795	5%	Primary Metal	$17,300,723	5%
Fabricated Metal	$13,766,165	5%	Instr/Optical/Watches/Clocks	$11,725,946	4%
All Other	$75,573,727	25%	All Other	$85,707,551	27%
Ohio					
Transportation Equipment	$46,231,496	18%	Secondary Moves	$45,363,595	19%
Secondary Moves	$44,252,083	17%	Transportation Equipment	$33,186,826	14%
Chemicals/Allied	$33,926,921	13%	Chemicals/Allied	$30,305,071	13%
Food/Kindred	$27,056,102	11%	Food/Kindred	$25,169,613	11%
Primary Metal	$17,817,816	7%	Primary Metal	$18,455,136	8%
All Other	$85,365,967	34%	All Other	$84,307,053	36%
Pennsylvania					
Secondary Moves	$23,118,472	14%	Secondary Moves	$27,142,705	16%
Food/Kindred	$20,972,969	13%	Food/Kindred	$23,165,383	13%
Primary Metal	$16,762,836	10%	Primary Metal	$17,564,459	10%
Transportation Equipment	$15,864,393	9%	Chemicals/Allied	$17,354,952	10%
Chemicals/Allied	$13,983,465	8%	Transportation Equipment	$11,345,311	7%
All Other	$76,924,006	46%	All Other	$76,010,134	44%
New York					
Secondary Moves	$38,112,757	15%	Secondary Moves	$39,982,681	15%
Food/Kindred	$33,362,522	13%	Transportation Equipment	$38,677,438	15%
Transportation Equipment	$24,095,399	10%	Food/Kindred	$34,095,642	13%
Instr/Optical/Watches/Clocks	$18,456,748	7%	Instr/Optical/Watches/Clocks	$18,934,126	7%
Chemicals/Allied	$17,850,565	7%	Chemicals/Allied	$16,931,753	7%
All Other	$118,779,008	47%	All Other	$109,632,091	42%
New Jersey					
Secondary Moves	$42,010,806	36%	Secondary Moves	$34,652,579	27%
Chemicals/Allied	$15,033,383	13%	Transportation Equipment	$13,343,473	10%
Food/Kindred	$8,190,149	7%	Chemicals/Allied	$12,938,499	10%
Freight All Kind	$6,916,288	6%	Food/Kindred	$10,353,417	8%
Transportation Equipment	$6,010,378	5%	Freight All Kind	$8,886,174	7%
All Other	$38,943,966	33%	All Other	$47,597,825	37%

Source: Freight Analysis Framework, Demand Database, 2002.

3.3.3 Freight Movement by Rail

Tables 3-7a and 3-7b rank the corridor states by volume and value of freight movement by rail within, into, and out of the seven corridor states as well as freight originating from and terminating in corridor states. The top five commodities shipped by rail with origin or termination in the corridor states are shown in Tables 3-8a and 3-8b.

Table 3-7a. Summary of Shipments within Corridor States by Rail

Origin State for All Shipments Within the Chicago-NYC Corridor States by Rail			
Total Tonnage (1998)		**Total Value ($000) in 1998**	
Illinois	94,918,687	Michigan	$35,954,263
Pennsylvania	52,461,942	Illinois	$27,418,499
Ohio	47,280,155	Ohio	$23,524,799
Indiana	45,175,703	New York	$11,770,959
Michigan	34,658,393	Indiana	$10,289,318
New York	23,819,387	Pennsylvania	$9,275,479
New Jersey	6,894,121	New Jersey	$2,704,421
Destination State for All Shipments Within the Chicago-NYC Corridor States by Rail			
Total Tonnage (1998)		**Total Value ($000) in 1998**	
Illinois	62,475,665	Illinois	$29,726,891
Ohio	61,550,487	Ohio	$23,252,633
Indiana	55,728,504	Michigan	$18,985,509
Pennsylvania	43,838,585	New Jersey	$13,514,960
Michigan	38,486,379	Pennsylvania	$11,789,988
New York	23,901,570	New York	$10,423,730
New Jersey	16,291,019	Indiana	$8,330,911

Source: Freight Analysis Framework, Demand Database, 2002.

Top-ranking commodities moved by rail are non-metallic minerals, coal, primary metals, and metallic ore. As Tables 3-7a and 3-7b show, Illinois attracts the most freight (volume and value) originating from within and from outside the corridor as well as generating the most freight for destinations outside the corridor. Ohio, Pennsylvania, and Indiana are the other major origins or destinations for freight. Michigan generates or attracts high-value commodities compared to the other top ranking states.

Table 3-7b. Summary of Shipments Into and Out of Corridor States by Rail

Origin State for All Shipments Out of the Chicago-NYC Corridor States by Rail			
Total Tonnage (1998)		**Total Value ($000) in 1998**	
Illinois	96,653,574	Illinois	$73,863,318
Ohio	26,872,632	Michigan	$26,108,572
Pennsylvania	24,199,651	Ohio	$21,725,351
Indiana	20,740,617	Indiana	$7,040,768
Michigan	16,336,019	New York	$6,284,372
New York	13,430,389	Pennsylvania	$4,338,032
New Jersey	3,714,605	New Jersey	$1,107,755
Destination State for All Shipments Into the Chicago-NYC Corridor States by Rail			
Total Tonnage (1998)		**Total Value ($000) in 1998**	
Illinois	152,345,281	Illinois	$51,137,364
Ohio	48,374,963	Michigan	$17,891,534
Michigan	25,676,843	Ohio	$11,153,000
Indiana	21,126,720	Pennsylvania	$8,835,469
Pennsylvania	20,837,945	New Jersey	$5,092,573
New York	16,265,074	Indiana	$4,062,419
New Jersey	9,475,051	New York	$3,822,382

Source: Freight Analysis Framework, Demand Database, 2002.

Table 3-8a. Top 5 Commodities by Volume Shipped Within Corridor States by Rail

State of Origin (1998 Shipments)			State of Destination (1998 Shipments)		
Commodity	**Tonnage**	**%**	**Commodity**	**Tonnage**	**%**
Illinois					
Coal	37,564,269	40%	Coal	21,782,890	35%
Food/Kindred	12,359,968	13%	Food/Kindred	7,222,668	12%
Freight All Kind	10,061,073	11%	Farm	6,379,810	10%
Farm	9,707,708	10%	Non-metallic Minerals	5,680,679	9%
Chemicals/Allied	6,949,472	7%	Freight All Kind	4,759,891	8%
All Other	18,276,196	19%	All Other	16,649,726	27%
Indiana					
Coal	27,060,591	60%	Coal	34,603,434	62%
Primary Metal	7,987,584	18%	Primary Metal	7,231,465	13%
Food/Kindred	2,544,896	6%	Waste/Scrap Materials	2,775,496	5%
Waste/Scrap Materials	2,253,387	5%	Petroleum/Coal	2,144,599	4%
Farm	1,619,604	4%	Chemicals/Allied	2,061,234	4%
All Other	3,709,641	8%	All Other	6,912,275	12%
Michigan					
Metallic Ores	9,449,033	27%	Coal	12,103,202	31%
Transportation Equipment	5,525,147	16%	Metallic Ores	9,483,486	25%
Pulp/Paper/Allied	3,323,580	10%	Primary Metal	2,647,258	7%
Chemicals/Allied	2,765,848	8%	Transportation Equipment	2,559,741	7%
Primary Metal	2,751,581	8%	Chemicals/Allied	2,506,412	7%
All Other	10,843,205	31%	All Other	9,186,281	24%
Ohio					
Non-metallic Minerals	9,756,466	21%	Coal	15,921,306	26%
Metallic Ores	7,933,351	17%	Non-metallic Minerals	10,211,582	17%
Coal	7,915,112	17%	Primary Metal	5,467,277	9%
Primary Metal	6,860,724	15%	Metallic Ores	4,964,460	8%
Transportation Equipment	3,131,871	7%	Waste/Scrap Materials	3,931,438	6%
All Other	11,682,630	25%	All Other	21,054,423	34%
Pennsylvania					
Coal	31,718,884	60%	Coal	13,597,315	31%
Petroleum/Coal	4,919,276	9%	Metallic Ores	4,797,347	11%
Primary Metal	4,456,653	8%	Primary Metal	4,549,666	10%
Non-metallic Minerals	2,670,889	5%	Food/Kindred	3,131,811	7%
Metallic Ores	1,873,182	4%	Waste/Scrap Materials	3,083,720	7%
All Other	6,823,058	13%	All Other	14,678,727	33%
New York					
Non-metallic Minerals	6,244,068	26%	Non-metallic Minerals	5,083,601	21%
Chemicals/Allied	3,256,338	14%	Coal	4,313,392	18%
Pulp/Paper/Allied	1,998,006	8%	Farm	2,738,837	11%
Clay/Concrete/Glass/Stone	1,500,904	6%	Food/Kindred	2,627,917	11%
Food/Kindred	1,400,356	6%	Primary Metal	1,779,675	7%
All Other	9,419,715	40%	All Other	7,358,148	31%
New Jersey					
Freight All Kind	2,110,296	31%	Freight All Kind	4,985,991	31%
Petroleum/Coal	956,904	14%	Non-metallic Minerals	2,437,942	15%
Chemicals/Allied	924,892	13%	Transportation Equipment	1,717,684	11%
Primary Metal	898,370	13%	Chemicals/Allied	1,549,932	10%
Non-metallic Minerals	662,793	10%	Food/Kindred	1,364,253	8%
All Other	1,340,867	19%	All Other	4,235,217	26%

Source: Freight Analysis Framework, Demand Database, 2002.

Table 3-8b. Top 5 Commodities by Value Shipped Within Corridor States by Rail

State of Origin (1998 Shipments)			State of Destination (1998 Shipments)		
Commodity	**Value ($000)**	**%**	**Commodity**	**Value ($000)**	**%**
Illinois					
Transportation Equipment	$9,940,605	36%	Transportation Equipment	$18,550,155	62%
Freight All Kind	$4,783,083	17%	Food/Kindred	$2,720,660	9%
Food/Kindred	$4,655,795	17%	Freight All Kind	$2,262,875	8%
Chemicals/Allied	$2,248,164	8%	Primary Metal	$1,782,672	6%
Farm	$1,290,880	5%	Chemicals/Allied	$953,264	3%
All Other	$4,499,973	16%	All Other	$3,457,266	12%
Indiana					
Primary Metal	$4,068,672	40%	Food/Kindred	$3,683,524	44%
Transportation Equipment	$3,327,074	32%	Transportation Equipment	$1,429,805	17%
Food/Kindred	$958,620	9%	Coal	$686,913	8%
Coal	$537,180	5%	Chemicals/Allied	$666,812	8%
Freight All Kind	$428,254	4%	Waste/Scrap Materials	$351,275	4%
All Other	$969,517	9%	All Other	$1,512,581	18%
Michigan					
Transportation Equipment	$28,703,743	80%	Transportation Equipment	$13,298,134	70%
Pulp/Paper/Allied	$1,622,853	5%	Primary Metal	$1,348,446	7%
Primary Metal	$1,401,585	4%	Chemicals/Allied	$810,828	4%
Chemicals/Allied	$894,756	2%	Metallic Ores	$749,907	4%
Machinery Exc Electrical	$822,559	2%	Machinery Exc Electrical	$680,650	4%
All Other	$2,508,768	7%	All Other	$2,097,544	11%
Ohio					
Transportation Equipment	$16,270,416	69%	Transportation Equipment	$14,134,937	61%
Primary Metal	$3,494,678	15%	Primary Metal	$2,784,892	12%
Chemicals/Allied	$642,248	3%	Chemicals/Allied	$1,231,578	5%
Metallic Ores	$627,330	3%	Food/Kindred	$958,236	4%
Food/Kindred	$625,752	3%	Freight All Kind	$846,541	4%
All Other	$1,864,374	8%	All Other	$3,296,449	14%
Pennsylvania					
Transportation Equipment	$3,311,349	36%	Transportation Equipment	$3,058,492	26%
Primary Metal	$2,270,106	24%	Primary Metal	$2,317,484	20%
Petroleum/Coal	$804,560	9%	Freight All Kind	$1,421,828	12%
Freight All Kind	$706,349	8%	Food/Kindred	$1,179,701	10%
Coal	$629,652	7%	Pulp/Paper/Allied	$913,298	8%
All Other	$1,553,464	17%	All Other	$2,899,185	25%
New York					
Transportation Equipment	$6,530,887	55%	Transportation Equipment	$5,843,764	56%
Chemicals/Allied	$1,053,430	9%	Food/Kindred	$989,893	9%
Pulp/Paper/Allied	$975,595	8%	Primary Metal	$906,521	9%
Primary Metal	$599,372	5%	Chemicals/Allied	$549,091	5%
Food/Kindred	$527,491	4%	Pulp/Paper/Allied	$409,348	4%
All Other	$2,084,184	18%	All Other	$1,725,112	17%
New Jersey					
Freight All Kind	$1,003,245	37%	Transportation Equipment	$8,923,558	66%
Primary Metal	$457,607	17%	Freight All Kind	$2,370,364	18%
Transportation Equipment	$414,848	15%	Food/Kindred	$513,891	4%
Chemicals/Allied	$299,204	11%	Chemicals/Allied	$501,405	4%
Petroleum/Coal	$156,504	6%	Pulp/Paper/Allied	$215,435	2%
All Other	$373,014	14%	All Other	$990,306	7%

Source: Freight Analysis Framework, Demand Database, 2002.

3.3.4 Freight Movement by Water

Water transportation is quite significant in the corridor, primarily because of the proximity to the Great Lakes and the 2,000-mile St. Lawrence Seaway that lies within the corridor. Tables 3-9a and 3-9b show the ranking of volume and value of freight movement by water within the corridor as well as freight originating from and terminating in the corridor States based on 1998 freight demand data. Top-ranking commodities moved by water include petroleum, coal, non-metallic minerals, and waste/scrap materials. The top five commodities shipped by water that originate from and terminate in each of the seven corridor States are shown in Tables 3-10a and 3-10b.

Table 3-9a. Summary for Shipments within Corridor States by Water

Origin State for All Shipments Within the Chicago-NYC Corridor States by Water			
Total Tonnage (1998)		**Total Value ($000) in 1998**	
Michigan	65,639,716	New York	$6,297,810
Ohio	43,558,355	Michigan	$4,949,303
Pennsylvania	40,992,273	New Jersey	$4,481,445
New York	39,319,277	Pennsylvania	$2,583,997
Illinois	32,709,749	Ohio	$2,404,500
New Jersey	30,026,052	Illinois	$2,126,237
Indiana	19,211,605	Indiana	$1,239,710
Destination State for All Shipments Within the Chicago-NYC Corridor States by Water			
Total Tonnage (1998)		**Total Value ($000) in 1998**	
Michigan	74,113,922	New York	$5,861,202
Ohio	44,179,921	Michigan	$3,622,676
Indiana	43,867,377	Ohio	$3,315,281
Pennsylvania	40,274,725	New Jersey	$3,186,671
New York	38,022,379	Indiana	$3,165,043
New Jersey	21,026,812	Pennsylvania	$2,294,864
Illinois	19,989,675	Illinois	$1,842,602

Source: Freight Analysis Framework, Demand Database, 2002.

Table 3-9b. Summary of Shipments Into and Out of Corridor States by Water

Origin State for All Shipments Out of the Chicago-NYC Corridor States by Water			
Total Tonnage (1998)		**Total Value ($000) in 1998**	
Illinois	67,828,333	Illinois	$8,684,159
Indiana	10,844,907	New York	$980,398
Michigan	10,695,458	Michigan	$884,204
Ohio	9,526,729	Indiana	$730,777
Pennsylvania	5,819,704	Ohio	$674,797
New York	5,577,322	Pennsylvania	$574,814
New Jersey	2,877,171	New Jersey	$424,278
Destination State for All Shipments Into the Chicago-NYC Corridor States by Water			
Total Tonnage (1998)		**Total Value ($000) in 1998**	
Ohio	44,563,882	Ohio	$5,118,506
Pennsylvania	20,367,669	Indiana	$2,695,002
Indiana	18,834,813	Illinois	$2,723,299
Illinois	13,776,537	Pennsylvania	$2,265,291
Michigan	6,175,259	New Jersey	$758,715
New York	5,655,198	New York	$532,662
New Jersey	5,489,253	Michigan	$815,097

Source: Freight Analysis Framework, Demand Database, 2002.

Table 3-10a. Top 5 Commodities by Volume Shipped Within Corridor States by Water

State of Origin (1998 Shipments)			State of Destination (1998 Shipments)		
Commodity	**Tonnage**	**%**	**Commodity**	**Tonnage**	**%**
Illinois					
Coal	18,601,490	57%	Non-metallic Minerals	5,486,471	27%
Non-metallic Minerals	5,015,289	15%	Coal	4,670,573	23%
Petroleum/Coal	3,792,409	12%	Petroleum/Coal	3,358,899	17%
Farm	2,260,894	7%	Farm	2,125,178	11%
Chemicals/Allied	1,073,447	3%	Waste/Scrap Materials	1,120,387	6%
All Other	1,966,221	6%	All Other	3,228,167	16%
Indiana					
Non-metallic Minerals	8,472,924	44%	Waste/Scrap Materials	16,657,372	38%
Coal	3,950,242	21%	Waste/Scrap Materials	10,588,527	24%
Waste/Scrap Materials	2,459,375	13%	Non-metallic Minerals	8,141,624	19%
Petroleum/Coal	2,073,896	11%	Metallic Ores	6,462,144	15%
Metallic Ores	1,260,775	7%	Petroleum/Coal	1,195,839	3%
All Other	994,393	5%	All Other	821,871	2%
Michigan					
Non-metallic Minerals	33,655,837	51%	Coal	27,410,000	37%
Metallic Ores	19,968,617	30%	Non-metallic Minerals	27,358,475	37%
Clay/Concrete/Glass/Stone	3,778,778	6%	Waste/Scrap Materials	8,191,486	11%
Waste/Scrap Materials	3,048,661	5%	Metallic Ores	6,217,219	8%
Crude Petro/Natural Gas	1,899,435	3%	Clay/Concrete/Glass/Stone	2,004,618	3%
All Other	3,288,388	5%	All Other	2,932,124	4%
Ohio					
Coal	25,685,235	59%	Coal	14,662,043	33%
Non-metallic Minerals	7,204,585	17%	Metallic Ores	14,031,943	32%
Metallic Ores	6,884,843	16%	Non-metallic Minerals	12,299,952	28%
Waste/Scrap Materials	2,178,450	5%	Petroleum/Coal	1,204,324	3%
Petroleum/Coal	668,909	2%	Waste/Scrap Materials	912,789	2%
All Other	936,333	2%	All Other	1,068,869	2%
Pennsylvania					
Coal	24,121,630	59%	Coal	24,627,500	61%
Petroleum/Coal	8,582,539	21%	Petroleum/Coal	5,276,580	13%
Non-metallic Minerals	3,915,512	10%	Non-metallic Minerals	4,930,183	12%
Waste/Scrap Materials	3,260,805	8%	Waste/Scrap Materials	2,950,533	7%
Chemicals/Allied	765,060	2%	Metallic Ores	906,537	2%
All Other	346,727	1%	All Other	1,583,391	4%
New York					
Petroleum/Coal	25,307,167	64%	Petroleum/Coal	26,684,362	70%
Waste/Scrap Materials	8,067,902	21%	Waste/Scrap Materials	6,120,231	16%
Non-metallic Minerals	1,623,314	4%	Coal	1,464,651	4%
Metallic Ores	919,380	2%	Crude Petro/Natural Gas	1,176,341	3%
Crude Petro/Natural Gas	830,728	2%	Non-Metallic Minerals	1,158,649	3%
All Other	2,570,786	7%	All Other	1,418,146	4%
New Jersey					
Petroleum/Coal	27,570,552	92%	Petroleum/Coal	14,666,479	70%
Waste/Scrap Materials	1,862,324	6%	Waste/Scrap Materials	4,089,611	19%
Chemicals/Allied	451,348	2%	Crude Petro/Natural Gas	798,075	4%
Crude Petro/Natural Gas	54,066	0%	Chemicals/Allied	720,867	3%
Coal	42,382	0%	Freight All Kind	447,714	2%
All Other	45,380	0%	All Other	304,066	1%

Source: Freight Analysis Framework, Demand Database, 2002.

Table 3-10b. Top 5 Commodities by Value Shipped Within Corridor States by Water

State of Origin (1998 Shipments)			State of Destination (1998 Shipments)		
Commodity	**Value ($000)**	**%**	**Commodity**	**Value ($000)**	**%**
Illinois					
Petroleum/Coal	$564,250	27%	Petroleum/Coal	$499,751	27%
Coal	$455,094	21%	Farm	$316,643	17%
Farm	$336,865	16%	Chemicals/Allied	$261,194	14%
Chemicals/Allied	$310,728	15%	Waste/Scrap Materials	$131,609	7%
Primary Metal	$116,642	5%	Metallic Ores	$126,769	7%
All Other	$342,658	16%	All Other	$506,636	27%
Indiana					
Petroleum/Coal	$308,563	25%	Waste/Scrap Materials	$1,243,805	39%
Waste/Scrap Materials	$288,896	23%	Metallic Ores	$1,069,358	34%
Metallic Ores	$208,634	17%	Coal	$407,530	13%
Coal	$96,644	8%	Petroleum/Coal	$177,922	6%
Primary Metal	$90,901	7%	Primary Metal	$53,866	2%
All Other	$246,072	20%	All Other	$212,562	7%
Michigan					
Metallic Ores	$3,304,415	67%	Metallic Ores	$1,028,828	28%
Waste/Scrap Materials	$358,118	7%	Waste/Scrap Materials	$962,231	27%
Crude Petro/Natural Gas	$236,404	5%	Coal	$670,598	19%
Clay/Concrete/Glass/Stone	$230,912	5%	Petroleum/Coal	$239,938	7%
Petroleum/Coal	$220,586	4%	Non-Metallic Minerals	$166,097	5%
All Other	$598,868	12%	All Other	$554,983	15%
Ohio					
Metallic Ores	$1,139,307	47%	Metallic Ores	$2,322,012	70%
Coal	$628,401	26%	Coal	$358,714	11%
Waste/Scrap Materials	$255,897	11%	Petroleum/Coal	$179,184	5%
Petroleum/Coal	$99,523	4%	Chemicals/Allied	$147,796	4%
Chemicals/Allied	$94,694	4%	Waste/Scrap Materials	$107,223	3%
All Other	$186,679	8%	All Other	$200,353	6%
Pennsylvania					
Petroleum/Coal	$1,276,945	49%	Petroleum/Coal	$785,071	34%
Coal	$590,147	23%	Coal	$602,523	26%
Waste/Scrap Materials	$383,038	15%	Waste/Scrap Materials	$346,591	15%
Chemicals/Allied	$221,460	9%	Chemicals/Allied	$235,443	10%
Primary Metal	$39,908	2%	Metallic Ores	$150,014	7%
All Other	$72,500	3%	All Other	$175,222	8%
New York					
Petroleum/Coal	$3,765,303	60%	Petroleum/Coal	$3,970,207	68%
Waste/Scrap Materials	$947,714	15%	Waste/Scrap Materials	$718,927	12%
Machinery Exc Electrical	$324,935	5%	Machinery Exc Electrical	$320,737	5%
Transportation Equipment	$292,407	5%	Transportation Equipment	$295,839	5%
Freight All Kind	$203,047	3%	Crude Petro/Natural Gas	$146,407	2%
All Other	$764,404	12%	All Other	$409,086	7%
New Jersey					
Petroleum/Coal	$4,102,058	92%	Petroleum/Coal	$2,182,138	68%
Waste/Scrap Materials	$218,762	5%	Waste/Scrap Materials	$480,395	15%
Chemicals/Allied	$130,650	3%	Chemicals/Allied	$208,667	7%
Freight All Kind	$10,435	0%	Freight All Kind	$164,085	5%
Crude Petro/Natural Gas	$6,729	0%	Crude Petro/Natural Gas	$99,328	3%
All Other	$12,810	0%	All Other	$52,057	2%

Source: Freight Analysis Framework, Demand Database, 2002.

CHAPTER 4.0 OPERATIONAL CHARACTERISTICS

This chapter focuses on the movements of freight along the networks, operating capacity, and operating safety. There is a discussion of the highway freight bottlenecks in the corridor that comes directly from *An Initial Assessment of Freight Bottlenecks on Highways*. The measurement of the bottlenecks, both nationally and within the corridor, was included in Phase 1 of the Strategic Multimodal Analysis (SMA). Finally this chapter addresses the safety of the highway and rail systems.

4.1 Highway Operations

Table 4-1 shows the traffic volume and percentage of trucks by State on the I-80 and I-90 highways between Chicago and New York City. Truck traffic as a percentage of the total traffic picture varies across the corridor. Ohio and Pennsylvania show the highest percentage of trucks in the traffic mix. Figure 4-1 shows the average annual daily traffic (AADT) and Figure 4-2 shows the average annual daily truck traffic (AADTT) volume on the I-80/I-90 highways linking Chicago to New York City. Truck traffic includes single unit trucks and combination trucks. These figures, based on 2002 traffic data, indicate that traffic on these two Interstate highways range between 2,000 to 5,000 vehicles a day. Highway I-90 between Cleveland and New York carries truck traffic of 7,000 to 10,000 trucks per day and 20,000 to 25,000 per day at some locations, especially close to the major cities. Truck traffic on the I-90 portion (Cleveland to New York) is higher than on I-80 between Cleveland through Buffalo to Albany. Figure 4-3 illustrates the variation of service-volume ratios along the I-80/I-90 highways between Chicago and New York City. These highways are operating below capacity for rural portions but approaching or above capacity in the major cities.

4.2 Highway Congestion and Freight Bottlenecks

In this corridor and throughout the United States, the last several decades have witnessed steady growth in the demand for freight transportation, driven by economic expansion and global trade. Over that same time freight transportation capacity has been expanding slower than the demand growth. If this continues the freight productivity improvements gained through the investment in the Interstate highway system and deregulation will begin to decline. The white paper *An Initial Assessment of Freight Bottlenecks on Highways* is an effort to identify and quantify, on a national basis, highway bottlenecks that delay trucks and potentially increase costs to businesses and consumers. Summarized from the report is the typology of freight bottlenecks, a summary of the national estimates and a presentation of freight bottlenecks in the Chicago – New York Corridor.

Table 4-1. Traffic Characteristics (2002)

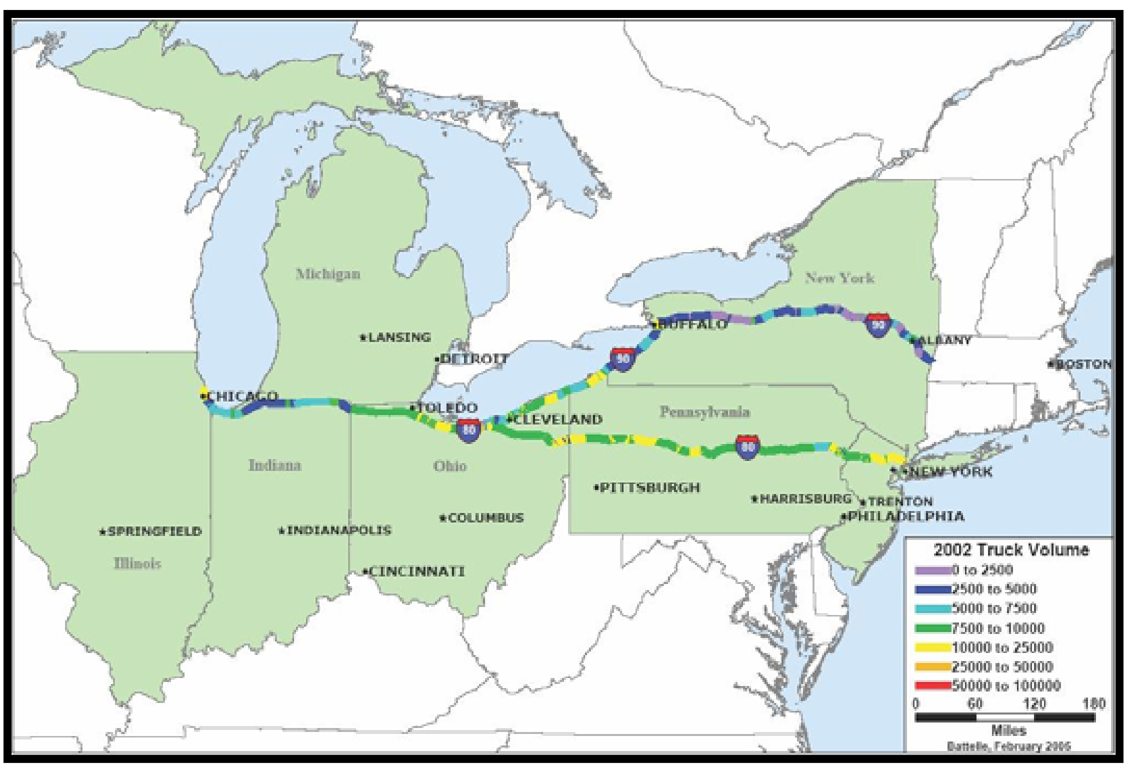
Route	Location	Average Daily Traffic	Average Daily Truck Traffic	Percentage of Trucks
Illinois				
I-90	Chicago	311,000	31,000	10
I-90	Chicago (Downtown)	31,000	5,000	16
Indiana				
I-80	East Chicago – West of I-80/90 Merge	18,000	1,000	6
I-90	Gary	30,000	5,000	17
I-80/90	Gary	30,000	5,000	17
I-80/90	South Bend	25,000	4,000	16
Ohio				
I-80/90	Toledo (West)	24,000	9,000	38
I-80/90	Toledo	31,000	9,000	29
I-80/90	Cleveland	38,000	11,000	29
I-90	Cleveland (East of I-80/90 Split)	9,000	2,000	22
I-90	Cleveland (East)	103,000	8,000	8
I-90	Conneaut – West of Pennsylvania Border	19,000	7,000	37
I-80	Youngstown (West)	51,000	15,000	29
I-80	Youngstown (East)	36,000	11,000	31
Pennsylvania				
I-80	State College	23,000	8,000	35
I-80	Williamsport	33,000	9,000	27
I-80	Scranton	23,000	9,000	39
I-80	West of New Jersey Border near Stroudsburg	55,000	11,000	20
I-90	East of Ohio Border	21,000	6,000	29
I-90	Erie	47,000	10,000	21
New York				
I-90	West of Pennsylvania Border near Fredonia	27,000	3,000	11
I-90	Buffalo (West)	130,000	13,000	10
I-90	Buffalo	139,000	14,000	10
I-90	Buffalo (East)	48,000	5,000	10
I-90	Rochester	30,000	3,000	10
I-90	Rochester (East)	41,000	2,000	5
I-90	Syracuse (West)	37,000	3,000	8
I-90	Syracuse (East)	39,000	7,000	18
I-90	Utica	26,000	3,000	12
I-90	Albany (West)	29,000	2,000	7
I-90	Albany	97,000	8,000	8
New Jersey				
I-80	East of Pennsylvania Border	47,000	8,000	17
I-80	Paterson	120,000	16,000	13
I-80	New York (West)	162,000	16,000	10

Source: HPMS 2002.

Figure 4-1. Traffic Flow on I-80/I-90 (AADT)

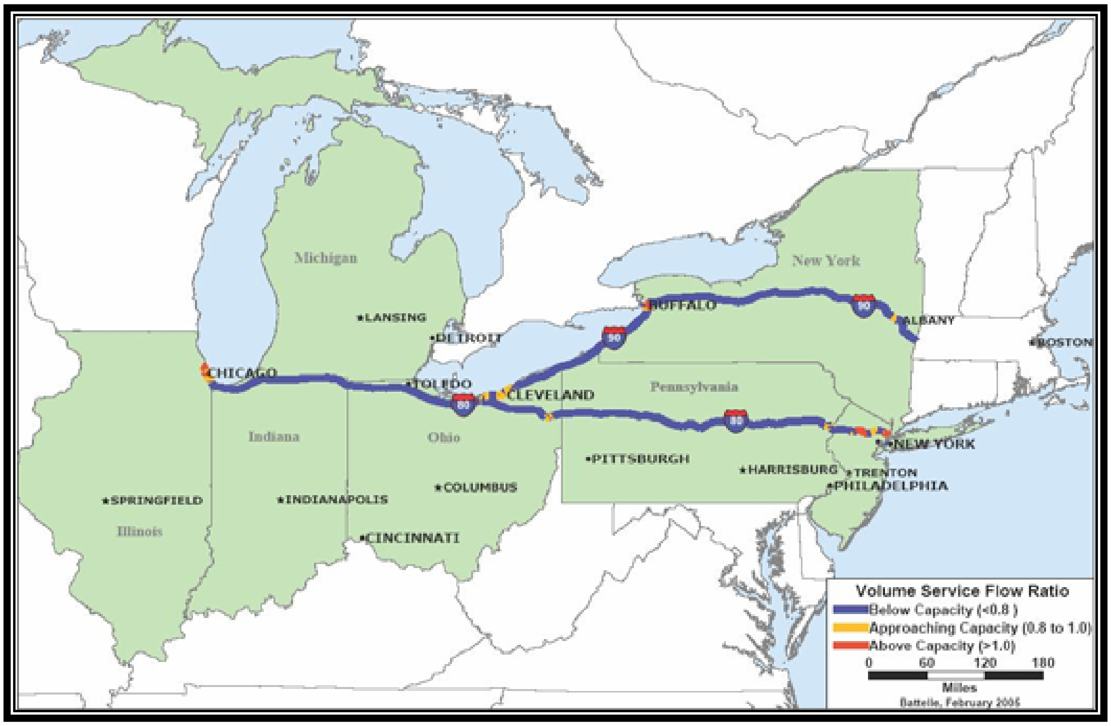
Source: HPMS 2002.

Figure 4-2. Truck Traffic Flow on I-80/I-90 (AADTT)



Source: HPMS 2002.

Figure 4-3. Volume-Service Flow Ratios



Source: HPMS 2002.

4.2.1 Truck Bottleneck Typology

The first task of the research was to create a typology of truck bottlenecks to categorize bottlenecks clearly and consistently. A typology was necessary to avoid double counting when calculating truck hours of delay and to establish – for future policy and program analysis work – a framework for attaching strategies and costs for congestion mitigation to each type of bottleneck. Table 4-2 presents the truck bottleneck typology by the type of constraint, roadway utilized, and freight route.

Table 4-2. Truck Bottleneck Typology

Constraint Type	Roadway Type	Freight Route Type
Lane-Drop Interchange Intersection/Signal Roadway Geometry Rail Grade Crossing Regulatory Barrier	Freeway Arterial Collectors/Local Roads	Intercity Truck Corridor Urban Truck Corridor Intermodal Connector Truck Access Route

More detailed definitions of each element are provided below, but as an example, a truck bottleneck may be caused by a lane drop that creates insufficient lane capacity on a freeway used as an intercity truck corridor, or a bottleneck may be caused by lane drop on an arterial that serves as a urban truck corridor. Similarly, a truck bottleneck may be caused by congestion at an interchange on a freeway serving as an intercity truck corridor, or a truck bottleneck may be caused by poorly timed traffic signals at intersections on an arterial road that serves as an urban truck corridor.

Several combinations are not used; for example, neither signalized intersections nor rail grade crossings exist on freeways; and most truck access routes are by definition on arterial roadways or collectors/local roadways, not freeways. Other combinations such as an interchange involving a collector/local road are rare.

The six capacity constraints are:

1. **Lane-Drop Constraint.** An example of this type of bottleneck would be a lane drop, where a highway narrows from three to two lanes or two lanes to one lane, reducing throughput and creating traffic queues. These bottlenecks typically affect one direction of traffic flow.

2. **Interchange Constraint.** An example of this type of bottleneck would be an urban interchange connecting two Interstate highways (or an interchange connecting an Interstate highway and a major arterial) where the geometry of the interchange, traffic weaving and merging movements, and high volumes of traffic reduce throughput and create traffic queues on the ramps and the mainlines. Severely congested interchanges may cause queues on one or both highways. Where interchanges are closely spaced, queues from one interchange may create additional bottlenecks at upstream interchanges, producing a series of closely linked bottlenecks.

3. **Intersection/Signal Constraint.** An example of this type of bottleneck would be an urban or suburban arterial road with closely spaced intersections operating at or near capacity, often with poorly timed signals. As with queues at closely spaced interchanges, queues at one congested intersection often impact traffic flow at other intersections upstream of the affected location. These bottlenecks may affect flows in both directions on all intersecting roadways.

4. **Roadway Geometry Constraint.** An example of this type of bottleneck would be a steep hill, where heavily loaded trucks must slow to climb and descend. The total volume of traffic, the number of heavy trucks, the number of lanes, and the presence or absence of an additional climbing lane determines the throughput of these bottlenecks. Other roadway geometry barriers include curves with insufficient turning radii for trucks (usually on two-lane roadways), bridges with gross vehicle weight limits that force trucks to make long detours, and tunnels with reduced overhead or side clearance.

5. **Rail Grade Crossing Constraint.** An example of this type of bottleneck would be a highway-rail at-grade crossing where an urban roadway carrying high volumes of truck traffic crosses a rail line carrying high volumes of passenger or freight trains. Frequent gate closings may cause long traffic queues in both directions on the roadway.

6. **Regulatory Barrier Constraint.** Examples of this type of bottleneck include toll barriers, international border custom inspection stations, and increasingly, security inspection checkpoints. Also included in this category are safety, hazardous materials (hazmat), and weight restrictions that prohibit truck movements across a bridge, through a tunnel, or along a road, forcing trucks to make long detours.

The three roadway types are:

1. **Freeways.** This group includes Interstates, expressways, toll roads, major state highways, and other limited-access (typically divided) highways with multiple lanes and access control.

2. **Arterials.** This group includes major state and city roads. They are typically multilane, but not divided roadways. In urban areas, they carry much of the traffic circulating within the urban area.

3. **Collectors/Local Roads.** Collectors are typically two-lane roads that collect and distribute traffic to and from the freeway and arterial systems, proving connections to and among residential neighborhoods and commercial and industrial areas.

The four types of freight routes are:

1. **Intercity Truck Corridors.** Intercity truck corridors are transcontinental and interregional routes, using rural Interstate highways and rural state highways. Almost all these corridors are designated as truck corridors on the National Truck Network and state truck networks.

2. **Urban Truck Corridors.** Urban truck corridors are Interstate highways and major state and city arterials that serve both local distribution and through moves. Most but not all of these corridors are designated as truck corridors on the National Truck Network, and state and city truck networks.

3. **Intermodal Connectors.** Intermodal connectors are the "last mile" of National Highway System roadway connecting major port, airport, rail, or truck terminals to intercity routes.

4. **Truck Access Routes.** Truck access routes include designated truck routes to industrial or commercial zones, warehousing and distribution centers, central business districts, and suburban centers. The category includes local, urban, and rural routes not designated as urban truck corridors or intermodal connectors.

The typology is not exhaustive. The categories have been designed so that they can be broadened when additional detail is needed for future studies.

4.2.2 Freight Bottlenecks – National Summary

The study identifies and measures 14 types of highway truck bottlenecks. Table 4-3 lists the types of bottlenecks and the annual truck hours of delay associated with each type. The study's methodology first located the highway bottlenecks using the Highway Performance Monitoring System (HPMS), then determined the truck volumes at the bottlenecks using HPMS and the freight analytical framework, finally delay was calculated using a simplified queuing-based model, QSIM, developed by Rich Margiotta, Harry Cohen and Patrick DeCorla-Souza.[3]

4.2.3 Freight Bottlenecks – Corridor Summary

The Chicago – New York corridor encompasses several of the United State's major production and population centers. That economic activity creates a high freight demand on the corridor's infrastructure. That infrastructure contains some of the nation's first toll roads, turnpikes and earliest interstate segments. While that highway has been expanded and improved greatly since the first half of the 20th century, many areas are constrained by the metropolitan areas they serve.

The system strain is most evident at the freeway interchange bottlenecks. On a national basis, and for this corridor, the interchanges represent slightly over half of the annual hours of truck delay. Figure 4-4 shows the location of all the freeway interchange bottlenecks in the corridor. The bottleneck locations are indicated by a solid dot.

---

[3] Richard Margiotta, Harry Cohen, and Patrick DeCorla-Souza, *Speed and Delay Prediction Models for Planning Applications*, Proceedings of the Transportation Research Board Conference on Planning for Small- and Medium-Size Communities, Spokane, Washington, 1998. For copies of the paper, contact the author, Richard Margiotta, through the Cambridge Systematics web site "Contact Us" page at www.camsys.com/conta02.htm.

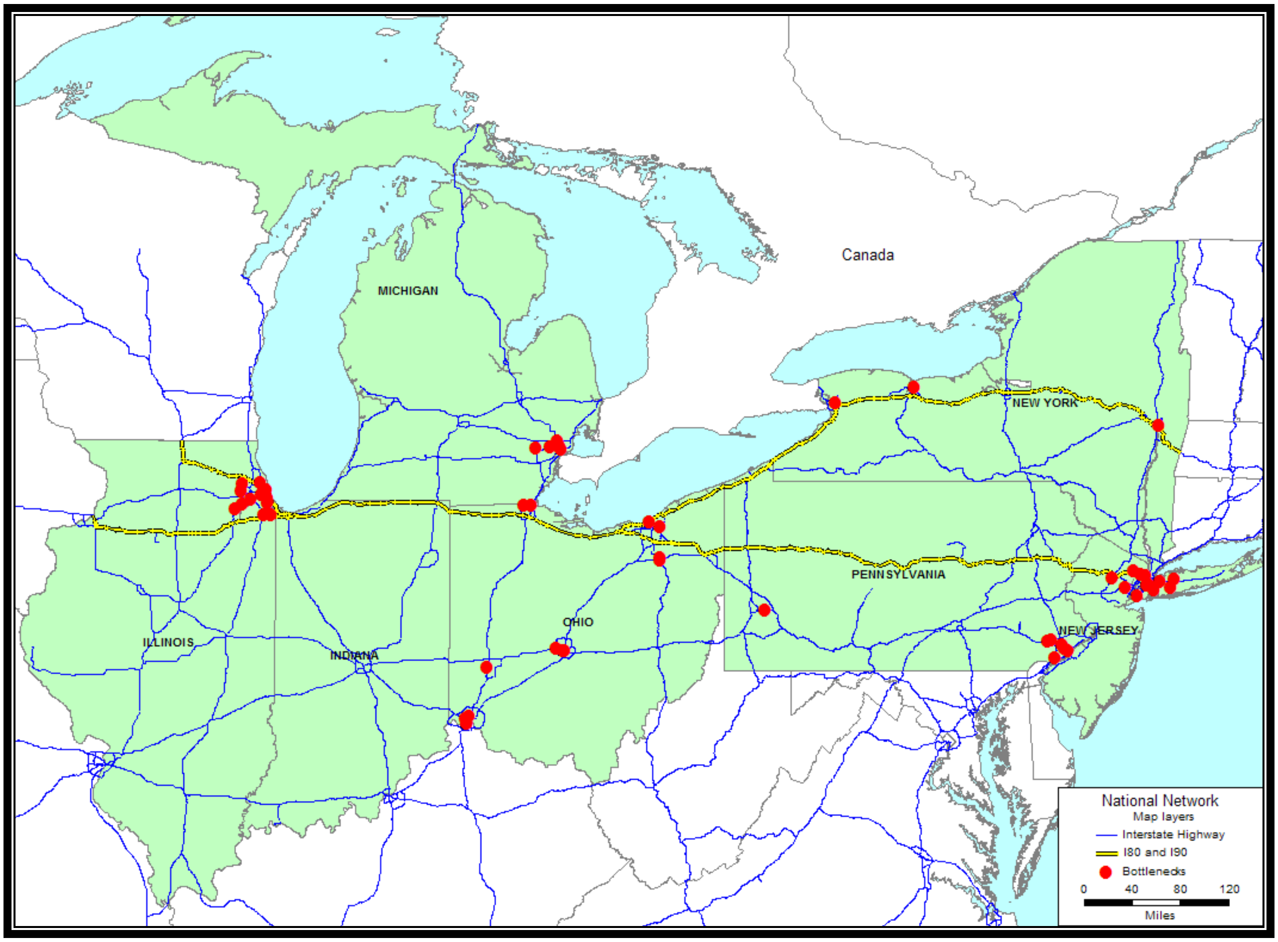
Table 4-3. Truck Hours of Delay by Type of Highway Freight Bottleneck

Bottleneck Type			National Annual Truck Hours of Delay, 2004 (Estimated)
Constraint	**Roadway**	**Freight Route**	
Interchange	Freeway	Urban Freight Corridor	123,895,000
		Subtotal	**123,895,000***
Steep Grade	Arterial	Intercity Freight Corridor	40,647,000
Steep Grade	Freeway	Intercity Freight Corridor	23,260,000
Steep Grade	Arterial	Urban Freight Corridor	1,509,000
Steep Grade	Arterial	Truck Access Route	303,000
		Subtotal	**65,718,000**‡
Signalized Intersection	Arterial	Urban Freight Corridor	24,977,000
Signalized Intersection	Arterial	Intercity Freight Corridor	11,148,000
Signalized Intersection	Arterial	Truck Access Route	6,521,000
Signalized Intersection	Arterial	Intermodal Connector	468,000
		Subtotal	**43,113,000**‡
Lane Drop	Freeway	Intercity Freight Corridor	5,221,000
Lane Drop	Arterial	Intercity Freight Corridor	3,694,000
Lane Drop	Arterial	Urban Freight Corridor	1,665,000
Lane Drop	Arterial	Truck Access Route	41,000
Lane Drop	Arterial	Intermodal Connector	3,000
		Subtotal	**10,622,000**‡
		Total	**243,032,000**

* The delay estimation methodology calculated delay resulting from queuing on the critically congested roadway of the interchange (as identified by the scan) and the immediately adjacent highway sections. Estimates of truck hours of delay are based on two-way traffic volumes. However, the methodology did not calculate delay on the other roadway at the interchange. This means that truck hours of delay were calculated on only one of the two intersecting highways or two of the four legs on an interchange, probably underreporting total delay at the interchange. The bottleneck delay estimation methodology also did not account for the effects of weaving and merging at interchanges, which aggravates delay, but could not be calculated from the available HPMS data. Estimates have been rounded to the nearest thousand.

‡The HPMS sampling framework supports expansion of volume-based data from these sample sections to a national estimate, but does not support direct estimation of the number of bottlenecks. Estimates of truck hours of delay are based on two-way traffic volumes. Estimates have been rounded to the nearest thousand.

Figure 4-4. Interchange Capacity Bottlenecks on Corridor Freeways Used as Urban Truck Corridors



Source: *An Initial Assessment of Freight Bottlenecks on Highways*, FHWA, October 2005.

Table 4-4 lists the corridor's top 25 interchange bottlenecks ranked by annual hours of delay for all trucks. The full bottleneck report also contains tables ranked by the percentage of trucks traveling over 500 miles.

Although the highway interchange bottlenecks represent the largest portion of bottleneck congestion, the corridor also contains bottlenecks arising from steep grades, signalized intersections and lane drops. Figure 4-5 focuses the bottleneck locations that arise from these other types of bottlenecks. The steep grade bottlenecks (shown as purple circles) are broadly dispersed throughout the corridor. The signalized intersections and lane drop capacity constraints, like the interchange bottlenecks, are localized around the major metropolitan areas.

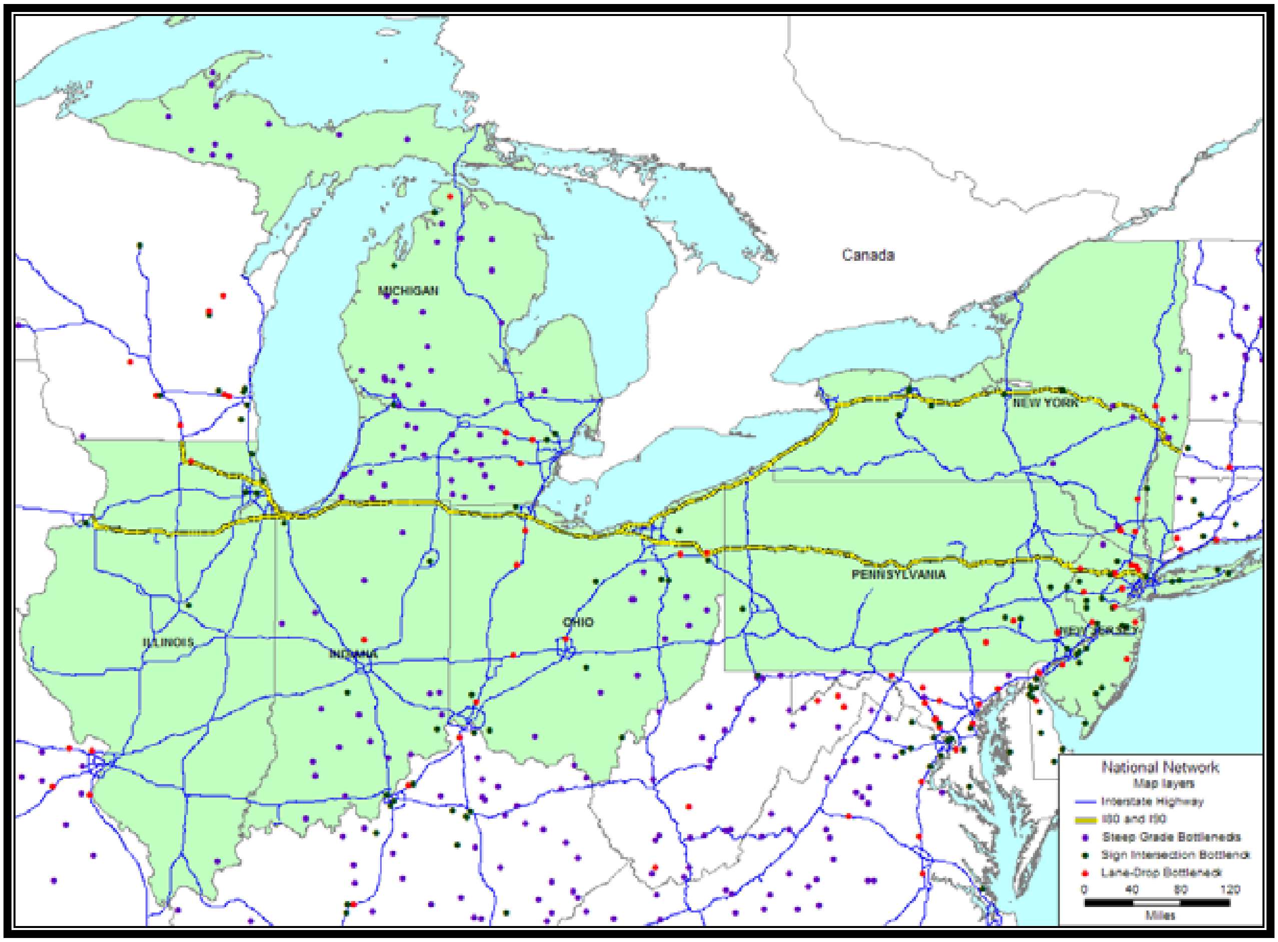
Table 4-4. Corridor's Top 25 Interchange Bottlenecks for Trucks

Bottleneck				All Vehicles		All Trucks			"Large Trucks Making Longer-Distance Trips"						
Location	Urban Area	Critically Congested Route No.	No. of Lanes	AADT	Daily Minutes of Delay per Vehicle	AADTT	Percent of All Vehicles	Annual Hours of Delay All Trucks	AADTT	Percent of All Trucks	Annual Hours of Delay Large Trucks …	Annual Commodity Tons Large Trucks…	Annual Commodity Value Large Trucks…	Percent Trips Greater Than 500 Miles	Hours of Delay … Greater Than 500 Miles
I-90 @ I-290	Buffalo-Niagara Falls	90	4	136,500	8.3	33,100	24%	1,661,900	7,300	22%	367,000	2,632,500	$2,968,000	58%	212,900
I-90/94 @ I-290 Interchange ("Circle Interchange")	Chicago-Northwestern IN	90	8	305,800	9.7	26,300	9%	1,544,900	9,200	35%	540,400	3,718,000	$4,218,000	53%	286,400
I-94 (Dan Ryan Expwy) @ I-90 Skyway Split (Southside)	Chicago-Northwestern IN	94	8	271,700	7.9	31,600	12%	1,512,900	11,100	35%	531,500	4,485,900	$5,089,000	53%	281,700
I-80/I-94 split (southside)	Chicago-Northwestern IN	80	4	139,600	8.6	25,600	18%	1,343,600	9,000	35%	472,400	3,637,200	$4,127,000	53%	250,400
Pulaski Rd @ I-55	Chicago-Northwestern IN	55	6	197,200	7.5	28,700	15%	1,300,400	10,000	35%	453,700	4,041,300	$4,585,000	53%	240,500
I-290 @ I-355	Chicago-Northwestern IN	290	6	223,100	8.3	24,800	11%	1,246,200	8,700	35%	437,300	3,515,900	$3,989,000	53%	231,800
I-75 @ I-74 Interchange	Cincinnati (OH-KY)	75	6	193,100	9.7	19,200	10%	1,128,900	6,900	36%	405,300	2,735,200	$3,044,000	63%	255,300
SR-315 @ I-70 Interchange	Columbus	315	2	64,000	8.3	21,800	34%	1,097,600	5,500	25%	276,500	2,180,200	$2,426,000	14%	38,700
I-270 @I-70 Interchange (West)	Columbus	270	4	122,600	9.5	18,600	15%	1,077,800	4,700	25%	271,900	1,863,100	$2,073,000	14%	38,100
I-55 (Stevenson Expwy) @ I-294 Interchnage	Chicago-Northwestern IN	55	6	172,600	9.6	17,200	10%	1,001,600	6,000	35%	349,900	2,424,800	$2,751,000	53%	185,400
I-76 @ Girard Av	Philadelphia (PA-NJ)	76	6	200,400	7.3	22,100	11%	982,200	5,600	26%	249,200	2,133,600	$2,397,000	26%	64,800

Table 4-4. Corridor's Top 25 Interchange Bottlenecks for Trucks (Continued)

Bottleneck				All Vehicles		All Trucks			"Large Trucks Making Longer-Distance Trips"						
Location	Urban Area	Critically Congested Route No.	No. of Lanes	AADT	Daily Minutes of Delay per Vehicle	AADTT	Percent of All Vehicles	Annual Hours of Delay All Trucks	AADTT	Percent of All Trucks	Annual Hours of Delay Large Trucks …	Annual Commodity Tons Large Trucks…	Annual Commodity Value Large Trucks…	Percent Trips Greater Than 500 Miles	Hours of Delay … Greater Than 500 Miles
Darby Paoli Rd @ US-202	Philadelphia (PA-NJ)	202	4	114,200	8.3	18,900	17%	950,600	4,800	26%	241,300	1,828,800	$2,055,000	26%	62,700
I-75 @ US-35 Interchange	Dayton	75	4	127,400	8.3	18,400	14%	923,100	7,900	43%	397,100	3,131,600	$3,485,000	54%	214,400
I-70 @US-23 Interchange	Columbus	70	5	163,900	8.3	16,700	10%	839,100	4,200	25%	211,100	1,664,900	$1,853,000	14%	29,600
I-57 @ 12th St	Chicago-Northwestern IN	57	6	174,200	3.8	31,600	18%	733,800	11,100	35%	257,600	4,485,900	$5,089,000	53%	136,500
I-76 @ SR-77 Interchange+J179	Akron	76	4	122,600	8.3	14,000	11%	705,200	7,000	50%	351,900	2,774,800	$3,088,000	52%	183,000
Southern State Parkway @ Exit 25A	New York-Northeastern NJ	908	6	204,500	5.4	21,400	10%	699,800	6,200	29%	203,200	2,235,800	$2,521,000	27%	54,900
I-75 @ I-275 Interchange	Cincinnati (OH-KY)	75	6	174,800	4.7	23,400	13%	662,900	8,400	36%	237,800	3,095,900	$3,451,000	63%	149,800
I-278 @ Exit 36	New York-Northeastern NJ	278	6	210,000	7.7	13,900	7%	654,600	4,000	29%	188,200	1,442,500	$1,626,000	27%	50,800
US-1 @ I-95 Interchange	Philadelphia (PA-NJ)	95	8	207,800	5.7	18,600	9%	643,900	4,700	26%	162,600	1,742,100	$1,938,000	26%	42,300
I-94 @ I-75 Interchange	Detroit	94	6	167,200	6.9	15,400	9%	643,700	4,400	29%	184,200	1,597,400	$1,795,000	32%	58,900
I-90 @I-94 Interchange ("Edens Interchange")	Chicago-Northwestern IN	90	6	189,700	8.3	11,900	6%	596,300	4,200	35%	211,100	1,697,300	$1,926,000	53%	111,900
I-278 (Staten Island Expwy) before Verrazano Br	New York-Northeastern NJ	278	6	204,400	7.3	13,300	7%	593,400	3,900	29%	173,600	1,406,400	$1,586,000	27%	46,900
I-95 @ Chestnut St	Philadelphia (PA-NJ)	95	6	177,000	4.7	19,600	11%	553,900	5,000	26%	141,500	1,905,000	$2,141,000	26%	36,800

Figure 4-5. Other Bottlenecks on the New York – Chicago Intercity Truck Corridor



Source: *An Initial Assessment of Freight Bottlenecks on Highways* FHWA, October 2005.

4.3 Rail, Intermodal, and Water Movements

Unlike highways, there are no publicly available network models currently available to evaluate the capacity of the rail, intermodal, and water modes of freight movements. The discussion of the operational characteristics and capacity of these modes is based on anecdotal information from literature that reflects the current and projected capacities of these modes in handling and transporting freight. As such, the discussion is less specific to the corridor. However, to the maximum extent possible, the discussion focuses on capacity issues that are closely related to freight movement along the corridor. Note that railroads and port are private entities with limited public data on their infrastructure and operations.

4.3.1 Rail Capacity Outlook

Macroeconomic forecasts for 2005[4] suggest that strong rail freight demand patterns will continue. Shipments of raw materials and finished goods are expected to remain strong as U.S. manufacturing output continues to grow. Coal volumes, which are responsible for approximately 21 percent of the revenue at the top four Class I Railroads, are expected to be robust. Coal demand from electric utilities, in particular, will remain strong due to a growing need for electrical power in the United States, combined with a preference for using coal while natural gas prices remain high. Intermodal volumes, which lately have driven about 18 percent of revenues at the largest Class I Railroads, will also continue to increase, largely due to strong U.S. demand for imported goods and foreign demand for U.S. exports. Demand was also high for other railroad staples such as coal, chemicals, and agricultural products. Adding to railroad demand was a shortage of truck drivers that led to capacity constraints in the trucking industry.

Although the railroads have been adding capacity in 2004 to improve operational efficiency and customer service, it is expected that capacity will continue to remain fairly tight relative to demand in 2005. Against this backdrop of increased demand is a relatively constrained supply of rail capacity.

4.3.2 Port and Intermodal Capacity

The growth in container volumes at the Port of New York and New Jersey is accompanied by increased demand for capacity for direct-to-rail movements of international shipping containers. The growth at the port and the railroad can be attributed to several trends in international and domestic shipping. The following are significant trends:

- As global manufacturing consolidates in Asia, more and more goods are being imported into the United States. With congestion growing at West Coast ports, shipping lines are adding more direct services to the East Coast from Asia. Continuing growth in Asian trade boosted container volumes in the Port of New York and New Jersey by 14.6 percent during the first half of 2003. Imports from Far East Asia grew by 38 percent, while imports from Southeast Asia grew by 31 percent. Asian cargo imports, which include furniture, clothing, linens, toys, and lighting products, accounted for 41 percent of all containerized cargo handled by the New York/New Jersey Port in 2003. These cargo volumes make Asia the Port's largest market, surpassing Europe for the first time. Total general cargo increased from 10,195,000 metric tons in the first half of 2002 to 11,582,000 metric tons in 2003, a 13.6-percent increase, according to an analysis of data from the U.S. Census Bureau. General cargo imports increased by 16.8 percent, from 7,195,000 metric tons in the first half of 2002 to 8,404,000 in 2003. General cargo exports increased 5.9 percent, from 3,000,000 in the first half of 2002 to 3,178,000 in 2003.[5]

---

[4] "Fitch: Healthy Economy Should Fuel U.S. Rail Performance in 2005." http://railforce.com/Rail_Performance.htm.

[5] NY/NJ Port Activity Increases During First Half of 2003. PortViews. A newsletter for port tenants and users. Vol. 2, No. 3 December 2003.

- In addition to Asia, the Port of New York and New Jersey also reported significant increases in trade with Latin America, up 19 percent; Africa, up 32 percent; and Australia, up 38 percent. Trade with Europe grew by 3 percent.[6]

4.4 Highway Safety

Safety is the critical mission of freight operations. There are a mix of factors that influence safe operations: driver performance; roadway design and condition; weather and light conditions; vehicle design; and motor carrier management commitment to safety. This section summarizes the results of the corridors freight operations with respect to safety.

Law enforcement officers within the jurisdiction report crashes on the highway network. Data from these reports are collected and maintained by the National Highway Traffic Safety Administration (NHTSA) in the Fatality Analysis Reporting System (FARS), a census of all crashes involving a fatality, and the General Estimates System (GES), a sample of all law enforcement reported crashes. The Federal Motor Carrier Safety Administration (FMCSA) maintains the Motor Carrier Management Information System (MCMIS), which contains data on truck crashes and for this report, is used to distribute GES truck involved non-fatal crashes to states.

Vehicle types involved in fatal crashes during 2002 are summarized in Table 4-5. Eighty-three percent of vehicles involved in fatal crashes within the corridor States were passenger vehicles, including light weight service/trade vehicles. Large trucks accounted for 7.9 percent, slightly above the national average of 7.8 percent.

Table 4-5. Vehicles Involved in Fatal Crashes by Vehicle Type (2002)

State	Total	Percent				
		Passenger Vehicle	Motorcycle	Bus	Large Truck	Other/ Unknown
Illinois	1,940	83.0	5.3	0.4	8.2	3.2
Indiana	1,157	80.7	7.7	0.1	10.4	1.1
Michigan	1,856	86.9	4.7	0.6	6.6	1.2
Ohio	2,000	81.5	7.0	0.4	9.4	1.7
Pennsylvania	2,198	83.6	6.2	0.6	7.9	1.6
New York	2,076	81.9	7.2	1.2	6.3	3.4
New Jersey	1,043	85.3	5.0	1.2	6.6	1.8
Corridor	12,270	83.3	6.2	0.6	7.9	2.1
US Total	58,426	83.9	5.8	0.5	7.8	2.0

Source: FARS, 2002.

[6] NY/NJ Port Activity Increases During First Half of 2003. PortViews. A newsletter for port tenants and users. Vol. 2, No. 3 December 2003.

To examine the distribution of fatal crashes by highway functional class, Table 4-6 shows the number of all fatal crashes while Table 4-7 shows the number of fatal crashes involving large trucks. The corridor States accounted for 21 percent of the nation's fatal crashes as well as 21 percent of the fatal crashes in which a large truck was involved. However, the highway types on which those crashes occurred vary between the two distributions as well as among the study States.

In the corridor states, 9.3 percent of fatal crashes occurred on interstate highways in 2002, while 12.7 percent of fatal crashes nationwide occurred on interstate highways. Table 4-5 shows a similar absolute difference for fatal crashes involving a large truck – 24.2 of these crashes occurred on interstate highways nationwide, while 21.3 percent occur on interstate highways in the corridor states.

Overall, fatal crash rates are lower in the corridor than the nation as a whole for all fatal crashes as well as for truck involved fatal crashes. Truck involved fatal crash rates in the corridor states are significantly below the national rates for interstate and other principal arterials and somewhat higher than the national rates on minor arterials, collectors and local roads.

Table 4-6. Fatal Crashes by State and Functional Highway Class (2002)

State	Fatal Crashes						Fatal Crash Rate (per 100 Million Vehicle Miles Traveled)					
	Interstate Highway	Other Principal Arterial	Minor Arterial	Collector	Local Road	Total*	Interstate Highway	Other Principal Arterial	Minor Arterial	Collector	Local Road	Total*
Illinois	171	315	224	212	351	1,273	0.563	1.181	1.079	1.431	2.746	1.208
Indiana	60	23	121	170	336	714	0.379	0.129	0.958	1.030	3.440	0.985
Michigan	108	301	219	321	202	1,173	0.489	0.952	1.048	1.968	2.191	1.171
Ohio	118	240	218	440	256	1,285	0.380	0.974	1.290	2.581	1.404	1.191
Pennsylvania	112	369	350	293	334	1,462	0.466	1.194	1.714	1.936	2.391	1.399
New York	101	465	291	252	295	1,411	0.399	1.222	1.026	1.121	1.563	1.060
New Jersey	79	248	103	89	178	698	0.576	0.874	0.921	1.414	1.715	0.998
Corridor	749	1,961	1,526	1,777	1,952	8,016	0.461	0.990	1.164	1.637	2.094	1.156
US Total	4,903	10,295	6,879	8,288	7,868	38,491	0.712	1.203	1.334	1.988	2.075	1.348

* Total columns include crashes that were not assigned to any highway functional class.

Sources:

(i) Crash data – FARS
(ii) VMT data – Highway Statistics, 2002, FHWA State vehicle class VMT estimates.

Table 4-7. Fatal Crashes Involving Large Trucks by State and Functional Highway Class (2002)

State	Number of Crashes Involving Large Trucks						Truck Involvement Rate (crashes per 100 Million Vehicle Miles Traveled)					
	Interstate Highway	Other Principal Arterial	Minor Arterial	Collector	Local Road	Total	Interstate Highway	Other Principal Arterial	Minor Arterial	Collector	Local Road	Total
Illinois	35	48	25	18	16	142	0.511	2.521	2.865	3.334	4.049	1.345
Indiana	21	4	40	27	17	110	0.597	0.204	4.509	2.128	1.732	1.277
Michigan	21	41	30	23	4	120	0.928	2.106	3.848	3.811	1.134	2.018
Ohio	33	51	42	42	13	182	0.630	1.525	3.870	3.034	2.317	1.567
Pennsylvania	37	57	33	19	10	157	0.924	3.036	3.788	2.706	1.569	1.940
New York	23	45	16	24	15	123	0.825	1.972	1.500	2.651	2.661	1.617
New Jersey	21	24	5	7	6	63	1.636	1.410	1.083	2.728	8.883	1.670
Corridor	191	270	191	160	81	897	0.736	1.798	3.171	2.827	2.276	1.596
US Total	1,019	1,441	774	642	324	4,214	1.166	2.389	2.891	2.644	2.054	1.964

Sources:

(i) Crash data – FARS
(ii) VMT data – Highway Statistics, 2002, FHWA State vehicle class VMT estimates.

Table 4-8 shows a summary of all truck involved highway crashes in the corridor. Of the total number of truck involved crashes, 44.2 percent were without casualty, 52.3 percent resulted in injury and 3.5 percent resulted in death. About two percent of the crashes involved a truck hauling hazardous materials in a quantity requiring the truck to be placarded.

Table 4-8. Summary of Number of Large Trucks Reported in Crashes (2002)

State	Fatal and Non-Fatal Crashes	Fatal Crashes	Non-Fatal Crashes	Injury Crashes	Tow-away Crashes	HM Placard Crashes	Fatalities	Injuries
Illinois	3,543	159	3,384	1,598	3,385	54	156	2,238
Indiana	4,402	120	3,922	1,722	3,817	102	131	2,424
Michigan	2,963	123	2,840	2,286	1,269	26	135	3,159
Ohio	4,492	189	4,303	2,859	2,854	151	203	4,156
Pennsylvania	2,192	174	2,018	1,229	1,425	76	174	1,748
New York	3,415	131	3,284	1,534	3,180	131	132	2,270
New Jersey	6,928	69	6,859	3,193	6,493	0	72	4,694
Corridor	27,935	965	26,610	14,421	22,423	540	1,003	20,689

Source: FARS & MCMIS.

4.5 Rail Safety

Rail operations in the corridor consist of freight service, intercity passenger service and commuter rail service. The extent of the freight railroad network is described in Chapter 2. Commuter rail, operating primarily on track owned by other railroads, operates approximately 4,000 route miles in the corridor. Amtrak owns and operates about 360 miles in the corridor, primarily in the northeast, as well as operating over freight railroad rights-of-way in other parts of the corridor.

Incidents involving loss of life, injury/illness, or property damage are reported by the railroads to the Federal Railroad Administration. Highway crossing accidents and rail equipment accidents are reported on FRA Forms F-6180.57 and F-6180.54 respectively. Other incidents involving illness or injury not resulting from highway crossing or equipment accidents, primarily railroad workers injured on the job, are reported on FRA Form F-6180.55a. The summary safety statistics reported here do not include incidents reported on the latter form.

Table 4-9 shows the average annual number of highway crossing and rail equipment accidents in the corridor between 2000 and 2004 as well as the average annual number of deaths and injuries associated with these accidents. Table 4-9 shows the distribution of these accidents by train consist type – Freight, Yard/Switching, Passenger and Other.

Table 4-9. Rail Accidents and Casualties in Corridor States (annual average 2000-2004)

State	Highway Crossing Accidents			Equipment Accidents			Total		
	Count	Deaths	Injuries	Count	Deaths	Injuries	Count	Deaths	Injuries
Illinois	190	29	74	246	0	40	436	29	113
Indiana	169	21	47	77	0	5	246	21	52
Michigan	107	9	39	37	0	3	144	10	39
Ohio	139	18	39	113	0	4	252	18	44
Pennsylvania	76	4	14	116	0	7	192	5	21
New York	38	6	13	120	0	31	158	6	44
New Jersey	40	6	11	70	0	12	110	6	23
Corridor Total	759	94	234	779	1	101	1,538	95	336
US Total	3,189	381	1,101	3,016	10	586	6,205	391	1,687

Note: Columns and rows may not sum to Total due to rounding of annual averages.

Source: Summary of data from Federal Railroad Administration's Rail Equipment Accident/Incident reports and Highway-Rail Accident/Incident reports from years 2000 – 2004.

From Table 4-9 it can be seen that although highway crossing and equipment accidents each comprise about half of the combined total accidents, the number of casualties is much higher for crossing accidents than equipment accidents. This is expected, as equipment accidents, which are over two-thirds derailments, often do not involve conflict with persons, while highway crossing accidents almost always do.

Table 4-10 indicates that a significant number of highway crossing accidents in the corridor involve consists other than freight trains – including accidents in yard and switching freight service and in passenger service. In states with extensive commuter rail service, Illinois, New Jersey and New York, over one-fifth of highway crossing accidents involve passenger rail service. Each of these states has over 900 route miles in commuter rail service.

Table 4-10. Distribution of Rail Accidents in Corridor States by Consist Type

State	Highway Crossing Accidents				Equipment Accidents			
	Freight	Yard/ Switch	Passenger	Other	Freight	Yard/ Switch	Passenger	Other
Illinois	62%	9%	21%	9%	42%	39%	3%	16%
Indiana	78%	6%	10%	7%	42%	35%	2%	21%
Michigan	70%	10%	9%	12%	59%	30%	4%	7%
New Jersey	36%	16%	30%	18%	14%	31%	27%	27%
New York	61%	5%	23%	12%	28%	26%	29%	17%
Ohio	83%	6%	4%	7%	47%	39%	1%	14%
Pennsylvania	78%	5%	5%	11%	51%	26%	15%	8%
Corridor Total	71%	8%	12%	9%	40%	34%	10%	16%
US Total	75%	8%	8%	9%	50%	31%	5%	13%

Source: Summary of data from Federal Railroad Administration's Rail Equipment Accident/Incident reports and Highway-Rail Accident/Incident reports from years 2000 – 2004.

CHAPTER 5.0 REFERENCES

American Trucking Associations. *Size & Weight Exceptions.* Truckline Website. www.truckline.com.

Battelle and John Woodrooffe and Associates. Developing a Practical, Federally Supervised, State-based System for Responsibility for Permitting the Controlled Use of Larger and Heavier Trucks. Office of Policy, FHWA, U.S. DOT. Washington, DC. 2003.

CSX Corporation Website. *Shortlines by State.* www.csxt.com.

CSX Intermodal Website. *CSXI Terminals.* www.csxi.com.

Cambridge Systematics, Inc. & Parsons Brinckerhoff Quade and Douglas, Inc. *Multi-Client Port Access Project: Final Report. I-95 Corridor Coalition.* Springfield, Virginia. September 2003.

Consolidated Rail Corporation Website. Philadelphia, Pennsylvania. www.conrail.com.

Department of Motor Vehicles. *Summary Information on Vehicle Dimensions and Weights.* New York DOT. Albany, New York. 2004.

Federal Highway Administration, *An Initial Assessment of Freight Bottlenecks on Highways,* October 2005.

Federal Motor Carrier Safety Administration Analysis and Information Online Website. *Crash Profiles Online.* U.S. DOT. www.ai.volpe.dot.gov.

Fekpe, E.S.K. and Alam, M. *I-90 / I-94 Corridor Study*. FHWA, U.S. DOT. Washington, DC. October 1996.

Freight Management and Operations. *National Highway System (NHS) Connectors.* Office of Operation, FHWA, U.S. DOT. ops.fhwa.dot.gov/freight/freight_analysis/nhs_connect.htm.

General Assembly of State of New Jersey. *P.L. 1999, Chapter 348, Assembly No. 3540.* Trenton, New Jersey. 2000.

Harvey, Thomas N. et al. I-80 Corridor Study for the FHWA Comprehensive Truck Size and Weight Study. FHWA U.S. DOT. Washington, DC. December 1996.

Illinois State Police. *Understanding the Illinois Size & Weight Laws.* Illinois DOT. Springfield, Illinois. 2001.

Illinois Tollway Website. Downers Grove, Illinois. www.illinoistollway.com.

Indiana Department of Transportation. Indiana E-W Toll Road Website. Indianapolis, Indiana. www.in.gov/dot.

Maritime Department. *Massport's Foreign Trade Zone: Your Import/Export Advantage*. Massachusetts Port Authority. East Boston, Massachusetts.

Massachusetts Port Authority Website. East Boston, Massachusetts. www.massport.com.

Massachusetts Turnpike Authority. Boston, Massachusetts. www.massturnpike.com.

Matteson, Anne and Blower, Daniel. *Trucks Involved in Fatal Accidents Factbook 2000.* Center for National Truck Statistics, University of Michigan Transportation Research Institute. Ann Arbor, Michigan. July 2003.

Motor Carrier Division. *Motor Carrier Height and Weight Restrictions*. PennDOT. Harrisburg, Pennsylvania. http://www.dot.state.pa.us/.

Motor Carrier Division. *Truck Driver's Guidebook*. Michigan State Police. Lansing, Michigan. pp. 30-41.

National Center for Statistics & Analysis. *Traffic Safety Facts 2002*. U.S. DOT, National Highway Traffic Safety Administration. DOT HS 809 618. 2004.

National Center for Statistics & Analysis. *Traffic Safety Facts 2002*. U.S. DOT, National Highway Traffic Safety Administration. DOT HS 809 620. January 2004.

New York City Economic Development Corporation. Cross Harbor Freight Movement Project Website. New York, New York. www.crossharborstudy.com.

New York State Thruway Authority Website. Albany, New York. www.thruway.state.ny.us.

Norfolk Southern Corporation Website. Norfolk, Virginia. www.nscorp.com.

Office of Code Revision Indiana Legislative Services Agency. *Summary of Indiana Size and Weight Laws under TITLE 9 Article 20.* Indiana General Assembly. Indianapolis, Indiana. 2004.

Office of Highway Policy Information. *Highway Statistics 2002*. FHWA, U.S. DOT. 2003.

Office of Licensing and Commercial Standards. *Truck Drivers Guide Book.* Ohio State Highway Patrol. Columbus, Ohio. 2004. pp. 28-38.

Ohio Turnpike Commission Website. Berea, Ohio. www.ohioturnpike.org.

Port Authority of NY & NJ. *Fact Sheet: Foreign-Trade Zone No. 49.* New York, New York. 2002.

Port Authority of NY & NJ. *Fact Sheet: Port Inland Distribution Network.* New York, New York. 2003.

Port Authority of NY & NJ Website. New York, New York. www.panynj.gov.

Seaport Advisory Council Website. Commonwealth of Massachusetts. www.mass.gov/seaports.

University of New Orleans – National Ports and Waterways Institute. *High Speed Ferry and Coastwise Vessels: Assessment of a New York/Boston Service.* Center for the Commercial Deployment of Transportation Technologies. May 2003.

APPENDIX A. ONGOING AND PLANNED IMPROVEMENTS IN THE CORRIDOR

This appendix presents a summary of transportation deployments currently being built or planned in the next 20 years in the corridor States.

Highways

For highway improvement projects, the information is derived from long-range plans for States, Metropolitan Planning Organizations (MPOs), and other planning organizations. The intent is to identify infrastructure improvements that might potentially affect freight transportation along the corridor. The focus is on information that is available in the public domain, e.g., websites. The relevant sources of information were identified and the lists of planned improvements in the next 20 years were tabulated. This list contained in Table A-1 was tabulated prior to the passage of ISTEA-LU. For the most up-to-date listing of projects the reader is prompted to go to the following web sites:

- ***Illinois***
  2004-2006 Statewide Transportation Improvement Program
  www.dot.state.il.us/opp/stip2004_06.html

- ***Indiana***
  http://www.in.gov/dot/pubs/transportimprove/index.html
  1995 Statewide Long-Range Multimodal Transportation Plan and 25-Year Transportation Plan www.in.gov/dot/pubs/longrange/

- ***Michigan***
  MDOT 2004-2008 Five-Year Transportation Program and 2004 – 2006 State Transportation Improvement Program www.michigan.gov/mdot/0,1607,7-151-9621_14807---,00.html

- ***Ohio***
  ODOT Statewide Transportation Improvement Program
  www.dot.state.oh.us/planning/File%20Directory/STIP.htm

- ***Pennsylvania***
  Statewide Transportation Improvement Program
  http://www.dot.state.pa.us/internet/secinet.nsf/frmPage2GeneralInformation?OpenFrameSet&Frame=contents&Src=_j5tkmst35e9n6at1fedim6qbeclq2srjjconkgrrdcl862pr5ah4l0fqfe1imshjfe9micgblehnkcsj1dlim80

- ***New Jersey***
  FY 2003 – 2005 Statewide Transportation Improvement Program
  www.state.nj.us/transportation/capital/stip/

- ***New York***
  Statewide Transportation Improvement Program www.dot.state.ny.us/progs/stip.html

Table A-1 summarizes planned improvements along the corridor.

Table A-1. Corridor Improvement Projects

State	Project Location	Project Type	Project Initiation/Duration
Pennsylvania	I-80/Yarnell-Bellfonte	Highway Reconstruction	Period 1 – First Four Years (2004 – 2008)
	PA 26/I-80 Interchange	Highway Reconstruction	
	I-80 Exits 298/299	Safety Improvement	
	US 209/I-80 Bridge	Bridge Restoration	
	Clarion I-80 Gap Compan.	Highway Restoration	
	Clarion I-80 Gap	Resurf, Preventive Maintenance	
	I-80 Bridges	Remote Sensing Bridge Restoration	
	I-80 EB Beaver Creek Bridge	Bridge Restoration	
	I-80 WB Beaver Creek Bridge	Bridge Restoration	
	I-80 Bridges	Bridge Parapets	
	I-90 Bridges(6) ELK&SO CK	Bridge Replacement	
	I-90 6 Mile CR BR EB/WB	Bridge Replacement	
Ohio	I-71/90 Cleveland	ITS	2005 – 2010
	I-90 between SR 306 and SR 615	Add Lanes	2005 – 2010
	I-90 between SR 2 and SR 57	Add Lanes, Access Management, and Signal System	2005 – 2015
	I-90 between SR 57 and SR 611	Possibly Add Lanes (Recommended Study)	2005 – 2015
	I-271 Bedford Heights Corp Line and between I-480 and US 422	Add Auxiliary Lanes	2005 – 2015
	I-271 between SR 6 and I-480	Add Lanes and ITS	2005 – 2025
	US24 between Indiana State Line and SR 15	Construct new 4 lane controlled access highway	2005 – 2010
	US 24 Defiance to Napoleon	Construct new 4 lane controlled access highway	2005 – 2010

Table A-1. Corridor Improvement Projects (Continued)

State	Project Location	Project Type	Project Initiation/Duration
New Jersey	I-80 between Pallisades to I-95	Roadway rehabilitation and operational improvements for the I-80 and I-95 (local)	2003 – 2005
	I-80 Route 17 to Kennedy Avenue	Westbound local lanes from Route 17 to vicinity of Kennedy Avenue off ramp, rehabilitation and operational improvements MILEPOSTS: 65.00 - 66.50	2003
	I-80 Paterson Interchange Improvements	Interchange Improvements	
Illinois	I-80 Lasalle ILL 351 Interchange	Ramp extensions interchange maintenance Bridge Replacement Lighting Miles = 0.50	2005
	I-80 Grundy Minooka Interchange	Maintenance Interchange Reconstruction Land Acquisition Miles = 0.44	2005
	I-80 At I-55 (Bridges 009-0042, 099-043)	Interchange reconstruction, bridge widening, lighting	2005
	I-80 East of Tollway Oasis to West of Ill 83	Additional Lanes	2005
	I-80 Ill 83 to Wentworth Avenue	Highway Reconstruction	2005
	I -80 West of Ill 83 to Burnham Ave (EB and WB outside lanes)	Additional Lanes	2005
	I-90 at Nagle Avenue	Bridge new deck, intersection improvement, modernize traffic signals, retaining wall	2005
	I-90/I-94 47th St to 63rd	Reconstruction, ramp repair, add ramps, retaining wall	2005
	I-90/94 Dan Ryan Expressway at 57th	Bridge Replacement	2005

Port and Intermodal Rail Capacity to Increase

With the increasing demand for freight movement, there is the need to improve the capacity of existing intermodal facilities. This is important because intermodal rail development is a key factor in the operation of ports. The following are some of the improvement plans directed at increasing the capacity of the intermodal facilities serving the Port of New York and New Jersey:[7]

---

[7] Intermodal Rail Capacity to Increase. PortViews. A newsletter for port tenants and users. Vol. 2, No. 3, December 2003.

- Two new on-dock rail terminals are now under construction at the port and a third is in preliminary design.

- ExpressRail, the port's original on-dock rail, is operating at full capacity. It is replaced by a brand new ExpressRail and will ultimately have a capacity of up to 1 million container lifts per year.

- A new rail overpass and lead track into the new ExpressRail will eliminate a grade crossing on the busy McLester/Corbin Street corridor at Port Newark/Elizabeth. This improvement will help speed both truck and rail moves through the facility.

- In Staten Island, NY, the location of the Howland Hook Marine Terminal, work is under way on a new on-dock facility. Both phases of the development are expected to be completed in 2005. When completed, the on-dock terminal will have a capacity of approximately 250,000 container lifts per year.

- The Port Authority will build a new direct connection between the Staten Island Railroad and Conrail just across the Arthur Kill from Howland Hook in New Jersey. This will give Howland Hook access to the NS and CSX freight networks when the connection is complete.

- At Port Newark, the location of P&O Ports' Port Newark Container Terminal (PNCT), a three-acre "interim" intermodal rail terminal opened in October 2002. This facility was designed to provide lines calling PNCT with direct access to intermodal rail without the need to dray to ExpressRail.

APPENDIX B. OTHER STUDIES WITHIN THE NEW YORK-CHICAGO CORRIDOR

This appendix provides exerts from previous studies of the corridor including State, county, regional plans, and studies. The information is organized as follows:

Report:
Sponsors/Partners: (if any)
Authors:
Date:
Description/Summary:

Report/Study: ***Chicago Regional Environmental And Transportation Efficiency Project (CREATE).*** http://ncppp.org/cases/create.html

Project Location: Chicago, Illinois

Authors: The National Council for Public-Private Partnership

Date: 2003

Partners:

- Association of American Railroads
- Chicago Department of Transportation
- State of Illinois Department of Transportation
- Burlington Northern Santa Fe
- Canadian National
- Canadian Pacific
- CSX
- Norfolk Southern
- Union Pacific

Project Summary:

The Chicago Regional Environmental and Transportation Efficiency Project (CREATE), a public/private partnership, is intended to improve passenger rail service, reduce delay to traffic, ease traffic congestion, increase safety and provide economic, environmental, and energy benefits for the Chicago region. The project will maximize the use of five rail corridors for a faster and more efficient rail network, 25 at-grade crossings by creating grade separations that separate motorists from trains, and create six rail-to-rail "flyovers" – overpasses and underpasses that separate passenger trains from freight trains.

Study: ***Upper Midwest Freight Corridor Study***
http://www.uppermidwestfreight.org/index.html

Date: 2003-2005

Sponsors:

- Midwest Regional University Transportation Center (University of Wisconsin-Madison)
- Illinois Department of Transportation
- Indiana Department of Transportation
- Intermodal Transportation Institute (University of Toledo)
- Iowa Department of Transportation
- Minnesota Department of Transportation
- Ohio Department of Transportation
- Urban Transportation Center (University of Illinois at Chicago)
- Wisconsin Department of Transportation

Project Summary:

The study has researched several aspects of regional freight transportation including capacity, performance measures, administrative issues, demand/usage, and best practices. The corridor is defined by Interstate highways 80, 90, and 94 and is multimodal in nature. It acknowledges the assets this region has in its rail network, Great Lakes, pipelines, inland waterways, and airports.

The study officially began work in August 2003 and was completed in 2005. The study has its primary roots in the efforts of the Midwest Regional University Transportation Center (MRUTC) that started in 2001. The study is being funded from several sources. Six States in the region, through their Departments of Transportation, have contributed to a pooled fund to finance the majority of the work. These States include Illinois, Indiana, Iowa, Minnesota, Ohio, and Wisconsin. Each State contributed $60,000 to the pooled fund which is administered by the Ohio Department of Transportation. The research centers working on the study have also contributed funds for faculty and staff, student appointments and tuition costs, and various facilities and supplies.

The I-80/90/94 corridor and those major routes that influence the travel on it defined the study boundaries. The study focused on inventorying and characterizing existing freight transportation in the Upper Midwest Region including performance metrics, capacity, administrative issues, and usage. The research was conducted through a series of workshops, interactions with the participants, interviews and surveys of freight stakeholders, a review and synthesis of the literature and available data, and data analysis and interpretation. The study also developed infrastructure in the form of websites, an information clearinghouse, data catalogues, databases, and mapping and data manipulation tools to support the research. The study participants include researchers and representatives of the public and private sectors.

Freight volumes correlate very closely with other measures of economic activity. Because it tracks so closely with broader economic indicators, the capacity to move freight efficiently is an important ingredient in economic health.

Based on more recent projections of these and other economic measures, the study recommends planners modify the year 2000 to 2020 projections of freight growth to about 50 percent. This simply reflects the economic downturn earlier in this decade. However, even this modest growth will provide a major challenge to public and private infrastructures. Trade within the seven

States and two provinces of the region is significant and the ability of the region to prosper depends upon the ability of the regional transportation system to accommodate the movement of goods. The experience of other regions supports the fact that regional activity and cooperation is important in influencing federal policy and in securing federal funding.

While both freight and personal travel are projected to grow significantly in the near future, some of the region's critical freight transportation links are currently being used at levels that exceed their designed capacity. Researchers found that traffic on the corridors waterways experienced delays of many hours at the antiquated system locks. Overall, air capacity remains available, but the focus of the air network on key hubs, like Chicago O'Hare, threaten even that vital carrier of high-value/low-weight cargo.

The market for each mode and for intermodal service tends to be well defined by economic and service factors. Low-value/low-service goods move by water or rail, while high-value/high-service goods tend to move by truck or air. Intermodal tends to serve a niche market defined by auto-related products and destinations in the West and Southwest. Intermodal (truck-rail) is a growing, but still minor part of the overall freight picture in the region. Under current public and private policies and practices, it will likely not become a major component of regional freight movements. Size and weight regulation of trucks moving through the region tends not to be a major issue. U.S. Federal rules provide uniformity on designated Federal routes and provincial rules are more lenient than any U.S. rules. For those truckers making pick-ups or deliveries in some States of the region, lower State size and weight rules may penalize efficiency.

Report: ***The Warehousing of Import and Export Goods in the United States***

Authors: Cushman & Wakefield's (C&W) National Industrial Research Team, Dallas, Texas

Date: September 2003

Project Summary:

The intent of this paper is to evaluate the relationship between the trade industry and its use of the industrial real-estate market, specifically warehouse/distribution and manufacturing facilities. Comprising more than one-third of the U.S. economy, the trade industry has been the driver of the demand for industrial space by users throughout the supply chain and can be used to predict real-estate cycles and health. Driven by domestic and foreign corporate, as well as individual consumers, the demand for U.S. industrial real-estate by import and export companies has reportedly softened the negative effects of the technology fallout. The content of the paper describes:

- the operations of receiving and shipping goods through three of the United State's top ports,
- what domino effect occurs when major ports experience a "break down" in operations,
- the major import/export companies and their impact on our domestic economy,
- the use of Foreign Trade Zones (FTZ) as a means to cut the costs associated with physical inventory,

- the location and accommodation of industrial warehouse facilities for the storage and stockpiling of goods, and
- commercial real-estate trends and solutions relating specifically to importers and exporters.

Report: ***Comprehensive Rail Freight Study and 2003 Pennsylvania State Rail Plan***

Sponsors: Pennsylvania Department of Transportation

Authors: R.L. Banks & Associates, Inc., Washington D.C. and Linare Consulting, Pittsburgh, Pennsylvania

Date: June 16, 2003

Project Summary:

This is a comprehensive update of Pennsylvania's 1996 State Rail Plan, complying with Federal Railroad Administration requirements, and with Pennsylvania's Rail Freight Preservation and Improvement Act of 1984 as amended.

Since 1996 there have been significant changes in the Commonwealth's rail system and in Federal rail programs. For example, the acquisition of Conrail by CSX and Norfolk Southern was approved by the Surface Transportation Board on June 8, 1998, and one year later operations began under the new owners. There also have been a number of changes in Pennsylvania's smaller railroads since 1996, not the least of which were those resulting from the Conrail line sale program that was underway but halted with the Conrail split. Pennsylvania has 5,145 miles of railroad operated and 69 freight railroads, more railroads than any other State.

Pennsylvania's core or strategic rail lines include some of the highest volume in the nation, such as the former Pennsylvania Railroad main line – now Norfolk Southern – connecting Philadelphia, Harrisburg, and Pittsburgh, and extending ultimately to Chicago. This line carries over 120 million gross tons (MGT) annually. Other very highly trafficked rail lines in Pennsylvania include CSX's east-west line through Erie, at 113 MGT; CSX's line through Connellsville, Pittsburgh and New Castle, 100 MGT; and Norfolk Southern's Reading-Bethlehem- Easton-New Jersey line, 100 MGT. Another important trunk line is Amtrak's Northeast Corridor, a portion of which passes through southeast Pennsylvania, including Philadelphia.

This State Rail Plan addresses key issues facing the railroad industry over the coming five years and discusses specific needs, challenges, and opportunities specifically relevant to the Commonwealth of Pennsylvania's transportation system. It also addresses ways by which Pennsylvania can influence the optimum development and use of its freight rail system in a manner which best serves the interest of Pennsylvania's citizens.

The following summarizes the most significant conclusions of this 2003 State Rail Plan:

- Pennsylvania's railroads require an annual expenditure of approximately $135 million to keep track and bridges in a State of good repair. The railroads themselves provide the great majority of these funds. Pennsylvania's railroads as well as metropolitan planning organizations, local development districts, and public rail authorities have expressed the view that more funding is required.

- Many of Pennsylvania's small railroads require upgrade of infrastructure (track and bridges) in order to accommodate 286,000-pound railcars, which recently became the new inter-line standard on the railroad system of the United States.

- Pennsylvania should consider additional assistance in dealing with at-grade highway-railroad crossings that are problematic for railroads, especially small railroads, which view maintenance of traffic control devices and crossing surfaces as a financial burden, especially where crossing wear and tear is a function of heavy highway use, as opposed to rail use.

- The U.S. Department of Transportation predicts an approximate doubling of surface transportation volume over the next 20 years. The report recommends that Pennsylvania examine rail "choke points" and other hindrances to efficient flow as well as opportunities to support truck-rail intermodal facilities, double-stack clearance where appropriate, and other projects which would improve rail and truck-rail capacity.

- PENNDOT recommends the formation of a special task force under the aegis of the Governor's RFAC specifically to address rail's contribution in mitigating the anticipated 20-year congestion issue. The agenda of this task force, which should include representatives of the railroads, planning organizations, and appropriate PENNDOT agencies, could include identification of the most cost effective projects to enhance rail flows and stimulate more use of rail, including rail intermodal; determination of public-private cost sharing responsibilities; and recommendations for rail solutions in a report to the Legislature.

- The American Association of State Highway and Transportation Officials (AASHTO) "Freight-Rail Bottom Line Report," released January 2003, urges a public-policy-driven expansion of the freight rail system supported by public sector investment, if the system is to maintain its share of the forecast tonnage and help relieve pressure on the highway system.

Report: ***Intermodal Productivity and Goods Movement – Phase II: Land Access to Port and Terminal Gate Operations***

Authors: University Transportation Research Center, City College of New York, New York, New York

Date: October 2002

Project Summary:

This project analyzes productivity issues at the Port Authority's New York/New Jersey intermodal transfer facilities linking port and surface transportation. Because of the complexity and variety of port issues involving the private as well as public sectors, the project concentrates on three critical areas and is divided into three phases:

- Phase I: Crane Performance
- Phase II: Land Access to Port and Terminal Gate Operations
- Phase III: Logistics Operations of Marine Container Terminals.

The overall objective of this project is to find ways to improve the efficiency of cargo flow through the facility in order to maintain regional competitiveness.

Phase I of this project focused on the sea to shore cargo transfer issues such as strategic analysis of port development, crane productivity, and investment options in capital improvement. Based on the regional economic characteristics and cargo distribution patterns, this phase of the project, Phase II, focuses on land access to the port and gate operations.

Phase II centers on the surface and infrastructure access investments and procedures (including electronic) needed to improve freight movement into and out of the port to alleviate congestion. This phase is particularly important if the port is expected to become a hub port and handle the 5.5 million containers or more annually (more than double the 1995 volume) by the year 2015, as predicted. The Master Plan expects the port to handle 4.58 million TEUs by 2010, assuming 45-foot depths, and 5.44 million TEUs if the channels can be deepened to 50 feet. At the present time, only about 8 percent of the cargo that moves by truck through the Port of New York and New Jersey has its origin and destination beyond a 125 mile radius of the Port of Elizabeth – Port Newark Marine Terminal complex.

For the projected increase in container activity, including longer inland distribution distances, efficient port operation is essential. The terminal operator must also focus on surface infrastructure access so as to enable a smooth flow of containers into and out of the terminal. This study's preliminary analysis presents operation procedures based on the data provided by the terminal operators and then determine the appropriate procedures and infrastructure requirements for efficient operations to be implemented in a specific time period.

In this phase, the study analyzes the infrastructure accessibility to the gate and gate operations subject to engineering constraints and other limitations. First, the road capacity at the various facilities are determined, followed with a gate operations analysis and its contribution to congestion. The most demanding facility is the Port's Newark/Elizabeth Marine Terminal complex. The main area in Phase II of the study includes the intermodal links primarily and the truck with respect to the terminal gates and the port. A detailed study of the present terminal gate structure/characteristics such as gate hours, gate variation, traffic flow, labor agreements, design, procedure, etc., is provided. The goal of the analysis is to reduce the queuing length at the terminal gate itself.

To evaluate and improve on operational performance, the research team starts with a description of regional economic characteristics, followed by the analysis of the existing facilities and operations procedures and the calculations of costs associated with gate congestions. Lastly, the team recommends the combination of extended gate hours, physical expansion, and phased-in implementation of new technology to improve productivity.

Report: ***New York in the New World Economy: The I-90 Corridor Study***

Authors: University Transportation Research Center, City College of New York, New York

Date: December 2002

Sponsors:

- Resource and Risk Management Bureau
- New York Department of Transportation

Project Summary:

The I-90 corridor in Upstate New York is a classic example of the de-industrialization of the Northeastern United States. With few exceptions, all counties along the corridor have experienced a marked decline in manufacturing employment over the past three decades. While the service and FIRE have helped to absorb some of this decline in employment, the loss of manufacturing represents a decline in the economic "base" of the I-90 corridor. The types of products and jobs created by manufacturing employment are those that are by-and-large important to successful competition in the new global economy. Part of the solution to this economic malaise and the return of Upstate New York to competitiveness involves establishing better links between upstate regions and the global flows of goods and services (e.g., the NAFTA corridor). At the same time, high quality linkages must be established between the various economic centers of activity in the I-90 corridor. These linkages must simultaneously serve the needs of logistics firms and the needs of commuters. That is, the growth of local economic conditions must occur at the same time as increased ability to compete on the global scale. Transportation infrastructure is a crucial component of these linkages.

The study concluded with the following issues and opportunities for improvement of the corridor with the main need as a more efficient simultaneous movement of freight and commuters:

- Congestion along I-90, especially at key interchanges and exits in metropolitan areas, along with security at toll plazas was the main highway issue. In addition to increased capacity, opportunities for improvement lay with ITS solutions, namely rapid toll collection, express freight on-ramps, and the re-evaluation of toll plaza locations and collections.

- Rail concerns encompassed the under-utilization of capacity and lack of world-class facilities for both passengers and freight. The study suggests high-speed passenger rail service connecting metropolitan areas as well as an upgrade of rail network, including crossings, double-tracks, and double stack.

- In terms of border crossings, chief problems identified were security delays and congestion. These could be relieved with improved security checkpoints, increased capacity and throughput, and the enhanced use of ITS.

- The study also identified the need for more efficient connections between highways, rail, and local roads along with the enhanced use of intermodal freight.

Report: ***A Transportation Profile of New York State***

Authors: Planning and Strategy Group, New York State Department of Transportation, Albany, New York

Date: May 2004

Project Summary:

This report provides reference for New York State transportation statistics with a focus on demographic and related travel measures. Most of the information presented was obtained from the 2000 Census, the 1997 Commodity Flow Survey, the 2001 National Household Transportation Survey (NHTS), the 2000 Transborder Surface Freight Transportation Data, and the 2000 Highway Statistics published by the Federal Highway Administration. Coverage includes statistics related to population and employment, highways and vehicles, and personal travel, public transportation, air and rail travel, and freight movement.