Investing in Mobility

FREIGHT TRANSPORT IN THE HUDSON REGION

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THE EAST OF HUDSON
RAIL FREIGHT OPERATIONS
TASK FORCE

Investing in Mobility

FREIGHT TRANSPORT IN THE HUDSON REGION

Environmental Defense and the
East of Hudson Rail Freight Operations Task Force

On the cover
Left: Trucks exacerbate crippling congestion on the Cross-Bronx Expressway (photo by Adam Gitlin). Top right: A CSX Q116-23 intermodal train hauls double-stack containers in western New York. (photo by J. Henry Priebe Jr.). Bottom right: A New York Cross Harbor Railroad "piggypacker" transfers a low-profile container from rail to a trailer (photo by Adam Gitlin).

Environmental Defense is dedicated to protecting the environmental rights of all people, including the right to clean air, clean water, healthy food and flourishing ecosystems. Guided by science, we work to create practical solutions that win lasting political, economic and social support because they are nonpartisan, cost-effective and fair.

The East of Hudson Rail Freight Operations Task Force is committed to the restoration of price- and service-competitive freight rail service in the areas of the New York metropolitan region east of the Hudson River. The Task Force seeks to accomplish this objective through bringing together elected officials, carriers and public agencies at regularly scheduled meetings where any issue that hinders or can assist in the restoration of competitive rail service is discussed openly. It is expected that all participants will work toward the common goal of restoring competitive rail freight service East of the Hudson.

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Foreword

Environmental Defense and the East of Hudson Rail Freight Operations Task Force (Task Force) embarked on writing this report 18 months ago. It seemed to us that environmental and civic groups interested in transportation had paid far less attention to freight transport planning issues than to highway and transit planning issues. Indeed, environmental organizations have published few studies on regional freight mobility. Yet, it is evident that the New York metropolitan region is highly dependent on trucks for moving freight, that truck traffic has been growing steadily, and that, therefore, truck traffic has been making an increasing contribution to highway congestion that is more and more endemic in the region. In general, the whole problem of regional freight mobility in the New York metropolitan region, perhaps in other metropolitan areas as well, has been under-appreciated. For these reasons, we deemed it timely to prepare a report that describes the region's freight mobility challenge and proposes a framework for assessing alternative investments in freight rail, highway and transit capacity that might improve the region's ability to deal with growing highway congestion in response to increased passenger and goods transport demand.

The authors of this report include Stergios Athanassoglou, a former Environmental Defense research intern, now a doctoral student in the Department of Industrial Engineering and Operations Research at Columbia University, William B. Galligan, chief of staff of the Task Force that Congressmen Jerrold Nadler and Christopher Shays co-chair, Adam Gitlin, a research fellow at Environmental Defense, Alexander H. Jordan, Daniel Mattingly, a 2003 summer intern at Environmental Defense, Constantine Sidamon-Eristoff, managing director of the Task Force, and James T. B. Tripp, Environmental Defense general counsel. Andrew Darrell, director of the Living Cities Program, and Michael Replogle, transportation director, both at Environmental Defense, Alex Brown, formerly at Cambridge Systematics, and individuals at NYMTC, the Port Authority and EDC have reviewed sections of this report for technical accuracy. We very much appreciate their assistance.

While the East of Hudson Rail Freight Task Force and Environmental Defense have sponsored the preparation of this report, the corporate and governmental entities represented on the Task Force have not individually endorsed the report and its findings.

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Executive summary

Highway congestion in the New York metropolitan area is escalating. Slow traffic frustrates commuters, puts New York's businesses at a competitive disadvantage, and leads to unnecessary air pollution and emissions of greenhouse gases. Congestion is not only a multibillion dollar drain on the area's economy; it is also a health risk, as smog and fine particulates from idling trucks and cars contribute to the region's high asthma rates among children.

Over the next 20 years, traffic on the region's highways will get much worse if truck and car traffic increases at the projected rates, among them an increase in truck vehicle miles traveled of over 200 billion. Historically, state transportation agencies have tried to solve the traffic problem in part by building more highways, but despite their investment of tens of billions of dollars over the last 20 to 30 years, traffic conditions are much worse than they were two decades ago. This is so even though New York, Connecticut, and New Jersey have one of the most extensive mass-transit systems in the world and during this period have invested tens of billions of dollars in improving this system.

While these huge sums have been invested in encouraging people to shift from cars to transit, however, state transportation agencies have not taken a comparable look at alternative ways of moving goods through the region other than by truck in more than a quarter of a century, although, fortunately, they have very recently begun to pay more attention to this issue. As a result, the contribution of trucks to highway congestion has risen. In general, the region has under-appreciated the contribution of freight movement to regional highway congestion and the importance of improving alternatives to trucks as part of a regional mobility strategy. This is so particularly in the East-of-Hudson subregion. This must change. It is time to consider very seriously alternative freight transport options, first and foremost, freight rail.

The question therefore is whether we can help mitigate the region's worsening congestion by increasing the diversity of the freight transportation system. To do this would require a radical shift in transportation planning, in looking at alternative ways of not only moving people but, just as important, the region's goods. The question facing policymakers, business leaders, freight transportation advocates, and environmentalists is not *whether* to invest but *how much* to invest in each component of New York's freight transportation network: railroads, waterways, and highways.

This report discusses regional freight transport and recommends that we address the region's worsening congestion problems by shifting a significant portion of the goods shipped to, from, and through the region from highway to rail. It suggests that such a shift can be cost-effective, practical, and good for business. These measures, along with major investments in the region's transit system that are far advanced in the planning stage, should be coupled with roadway congestion pricing and other incentives designed to improve mobility and air quality. Increased investment in rail, as well as transit, with the extensive use of roadway congestion pricing, will greatly improve mobility and provide enhanced choice for shippers, with huge benefits for the economy and the environment.

Freight rail can be about half as expensive and is as much as twice as clean as truck transport for moving many kinds of goods. Unfortunately, owing to its geography, historical circumstances, changes in economic conditions, and inadequate attention to freight movement in transportation planning, New York City and the rest of the East-of-Hudson subregion have been poorly served by freight railroads—although the region West-of-Hudson has been reasonably well served.

In order to move more freight on trains, particularly on the east side of the Hudson River, the region's freight rail infrastructure must be improved dramatically. Even though the region has invested tens of *billions* of dollars over the last 20 years in its expansive transit system and is poised to spend a comparable amount over the next 20 years, the amount of money that it has invested in its freight rail system is measured in tens of *millions* of dollars. This report concludes that a very significant increase in freight rail investments is warranted.

In light of the growing congestion problem we face and the increasing role of trucks in contributing to that congestion, this report focuses on the freight transport component of our congestion problem and the viability of large investments in freight rail to improve mobility. This report also synthesizes and makes digestible the vast amounts of information available on freight movement.

Freight rail can have decided advantages over trucks in terms of energy efficiency, emissions and cost for certain freight movements, just as transit in this metropolitan region can have great advantages over driving. With the right investments, shippers currently transporting freight by truck should gain significant mobility benefits from an improved freight rail system.

Reducing congestion is one matter; maintaining less congested conditions is another. Unfortunately, when better freight rail or transit frees up roadway capacity and improves mobility, more trucks and cars are attracted to these less congested conditions. This is in part because driving—and therefore the pollution and congestion that it causes—is often perceived as a "free" option. One feasible way for cars and trucks to derive the full benefit of investments in transit and freight rail is for the region to implement roadway-pricing incentives that create a truly competitive market among freight options. We therefore advocate a concerted strategy of freight rail as well as transit investments, coupled with a comprehensive congestion-pricing strategy that would apply to the major roadways as well as the currently tolled bridges and tunnels.

1. Accommodating more freight traffic while improving mobility

Highway mobility may be a problem invisible to many citizens, but congestion costs the New York City region, conservatively, $7.66 billion each year just in wasted fuel and lost work time. Congestion harms every area of the economy. By some estimates, traffic moves almost 50 percent more slowly than it would if the highway system worked as designed. Shipping by truck is slow and costly because the highway system is not able to handle the demand for freight traffic, putting New York City and the East-of-Hudson subregion's businesses at a competitive disadvantage, with needlessly high transportation costs.

The shipment of goods is a massive part of our economy. Each year the New York City region handles about $1.44 *trillion* worth of freight. In the region as a whole, trucks transport the great majority of goods, around 80 percent, while freight rail handles a small sliver, less than 6 percent, a fraction that is two-and-a-half times smaller than the national average. This is so even though the kinds of goods that traditionally move by freight rail—low-value bulk goods like fuel, lumber, paper, pulp, scrap metal, chemicals, and building materials-constitute about half the region's flow of freight.

For the economies of New York City, the lower Hudson Valley, Long Island, and southwestern Connecticut, moving goods across the Hudson River is critical. The area's number one trading partner is itself. For businesses to the west of the River, this usually means shipping goods across New York Harbor and into New York City, Long Island, and southwestern Connecticut. All the other top five trading partners are to the west of the Hudson—upstate New York, the Midwest, the mid-Atlantic and the Southeast—which means that shippers in the region's hub, New York City, must receive and send goods across the Hudson River. International freight, which is largely sea based, accounts for just 12 percent of the region's freight flow.

Since the Hudson River is such a critical boundary, this report divides the metropolitan area into the East-of-Hudson and West-of-Hudson subregions. West-of-Hudson includes northern New Jersey and parts of downstate New York. East-of-Hudson includes New York City, the lower Hudson Valley east of the river, Long Island, and Connecticut. Each subregion handles a nearly equal amount of freight, but a closer look shows that the East-of-Hudson subregion uses freight rail hardly at all. Less than 2 percent of goods in the region moves by train, a figure that is surprisingly low given the kind of freight that the region handles. The western part of the metropolitan area moves about 9 percent of its freight by rail, a figure somewhat lower than the national average of 16 percent. In short, a broad view of the region's freight system reveals that remarkably little freight is moved by rail, particularly to the east of the Hudson River subregion.

Much of the region's traffic problem is the result of congestion caused by the overwhelming reliance on trucks to move freight. During the morning rush on the Cross Bronx Expressway, for example, 72 percent of the vehicles on the road are commuter cars. But because each truck occupies as much road space as about four cars, during the morning rush, trucks—accounting for less than a third of the vehicles on the road—actually occupy 60 percent of the available road space.

Over the next 20 years the regional freight transportation network will face a Herculean test. Projections made after September 11 suggest that by 2025 New York's transportation system must cope with 50 to 70 percent more freight, not to mention 30 to 40 percent more car miles traveled. Major highways, already choked with traffic, will have to accommodate an estimated 48 percent increase in truck volume at the same time that car traffic is expected to grow. Despite extensive investment, the highway system is more congested today than it was two decades ago. Even with continued expansion, congestion on the region's roadways—already the source of pollution, frustration, and billion dollar losses in productivity—will likely get worse without a more diverse regional transportation system.

Our goal therefore is to create a freight rail system in the region that, coupled with transit improvements, increased barge transport and roadway pricing, would ensure that freight mobilityis substantially better by 2025 than it is today and that air pollution associated with freight transport drops dramatically. This is an ambitious goal. This will entail more than doubling the regional freight rail mode share from 6% to 16%, today's national average, by 2025, and shifting a significant portion of truck trips to low-use hours. This change in mode split will require steady improvements in freight rail services that cross the Hudson River at Selkirk and enter the downstate New York region via the Hudson Lines. But it will require very dramatic improvements in those services coming from the south that could benefit from an efficient freight rail connection across the Harbor in the urban core.

2. A deficient East-of-Hudson freight rail network

West of the Hudson River, the freight rail system is reasonably well developed. This subregion has a modern system of rail yards and terminals and access to the major national rail corridors. Most of the tracks have height clearances and weight ratings that can accommodate the large, efficient, and sought-after freight trains that stack two freight containers, one on top of the other, on every flatcar. It also has many dedicated freight rail lines.

By contrast, rail moves only 1.68 percent of the freight in the East-of-Hudson subregion. The East-of-Hudson rail system is poorly integrated not just with the national system but also with the West-of-Hudson rail system right across the river. In order to move freight across the Harbor and into New York City, rail operators have two options: they can use the overland crossing near Albany, 140 miles north of the City, or they can use the Cross-Harbor Railroad float system. Both options have drawbacks. The carfloat service, which moves trains by barge, is slow, small, and inefficient. It is seldom used. But using the overland crossing requires a tremendously circuitous trip for shipments from or heading to the south of the region. In order to revitalize freight rail the region must be able to move a large number of trains across the Hudson River efficiently.

In the eastern subregion, most of the rail infrastructure was built early or before the 1900s. Weight restrictions and low clearances mean that, in many cases, cheap and efficient heavy-load trains are barred; and cramped rail yards, too few in number, leave little unloading and transloading space. In addition, the subregion's extensive passenger rail system does not share its tracks with freight rail as much as it could. To attract more rail freight customers, therefore, the region must improve the rail infrastructure East-of-Hudson. This will require substantial public investment.

State agencies have begun to see the merits of freight rail. The New York State Department of Transportation and the Port Authority recently initiated a $40.2 million program to improve the regional rail network. The agencies plan to raise clearances on the Hudson Line, upgrade track and yard capacity in Brooklyn and Queens, and improve track safety. Other projects—by the state of New Jersey, Metro-North, and others—will also improve regional freight rail service. The Port Authority has embarked on the second phase of its freight rail investment study. The New York Metropolitan Transportation Council (NYMTC) is completing a freight transport study that will propose a range of investment options. While these plans suggest a growing consensus that public money should be spent on freight rail, none of these projects will lead to kind of revitalization we propose. The public agency that has been thinking in the boldest terms about revitalization is the City's Economic Development Corporation through the Cross-Harbor Freight Movement Project.

3. Setting goals and criteria for freight transport investments

Mobility in the Hudson River region can be improved in many ways, even when we consider only those directed at freight transport. With the region's myriad interests in mind, we propose six criteria according to which the region should evaluate prospective freight transport investments. They are (1) the impact on congestion reduction; (2) the effect on the surrounding land and communities; (3) the anticipated changes in energy efficiency and air quality; (4) the macroeconomic repercussions, particularly with respect to employment; (5) the costs, both fixed and variable; and (6) the extent to which the region's security concerns are satisfied. Overall, investments in freight rail are capable of satisfying these criteria, perhaps better than investments in highway capacity are.

4. Evolving freight rail technology and expansion opportunities

The time has come to abandon antiquated notions of freight rail as being necessarily slow, unreliable, and useful only for long, time-insensitive hauls of large amounts of heavy commodities. Modern technologies must be developed and adopted, and operational strategies must change to make the best use of these technologies maintaining and increasing the competitiveness and convenience of freight rail.

The railroads are aware of the problems with their speed and dependability and should begin to place greater emphasis on addressing them. As a general rule, freight trains can move much faster than they do today. In most cases, trains average 10 mph more if their freight is intermodal. This is not simply good fortune. It is good planning. Yet the advantages of intermodal service are far from fully realized. To improve service, freight rail carriers in the region must modify their operations in several ways, with technological change going hand in hand with changes in institutional thinking about which routes have the potential to be profitable.

The freight railroads need to continue to increase their use of precise scheduling of freight trains, especially in or near urban areas. Irregular dispatching disappoints many current customers and turns away potential customers, particularly those for shorter hauls, who see many advantages in freight rail but cannot afford the vagaries of freight rail delivery. The railroads must work closely with passenger carriers to schedule service on passenger rail tracks during off-peak hours. This can be done only by also meeting the preceding requirements. In this effort, some international examples are worthy of emulation.

As we explore in chapter 4, advanced intermodal technologies will make it easier to move freight in efficient combinations of trains and trucks, helping them explore markets from which current operational practices exclude them and new ones that they have never served. This is particularly true for geographical and product markets that require frequent, punctual trips with fewer cars than are hauled by most freight trains today. Some advances that allow trucks to drive onto cars with extremely low clearances, such as the Iron Highway, have been developed by the American railroad industry, and should be more widely used and improved. Another innovative service allows shippers simply to attach rail wheels to the bottom of specially designed trailers, eliminating the need for a rail car. Both these services could be a tremendous boon to trucking companies that want to avoid the horrendous traffic in the metropolitan area by putting their vehicles on rail for a short distance.

Revitalizing the float system in the New York Harbor will also give shippers more options, increasing the efficiency of freight transport and distribution. If the region invests in the system, it will not be as slow or undependable as it is today. The current system, which is relatively new but is based on turn-of-the-century engineering, should be modernized to incorporate 21st century technology. If modern ferries can be efficiently run over distances of hundreds of miles, as they are in Alaska and eastern Europe, they certainly can be run just as efficiently across New York Harbor.

Over the next 20 years it seems unlikely that rail will lose its edge as the most environmentally friendly means of transport. Even now, ton for ton, locomotives emit only a third of the particulate matter and nitrogen oxides that trucks do. New EPA standards will make new and upgraded locomotives even more efficient.

While train engineering has been developing, the carriers have sometimes neglected to keep up with customer service. If more freight rail carriers use global positioning systems and freight rail logistics become more computerized, freight rail will become more responsive to its customers' needs. In coordination with changes in its dispatching practices, these advances can help freight rail reenter short-haul markets, so that it does not continue to lose market share as profitability demands drive it to refuse anything but long, time-insensitive trips.

5. A downstate cross-Hudson rail link and better freight rail infrastructure

In order for technologies to be used properly and for institutional changes in operational strategies to have the greatest impact on freight rail's market share and profitability, its basic infrastructure must be brought up-to-date. As we describe in chapter 5, we consider a number of changes in the region's physical infrastructure that should improve the East-of-Hudson freight rail network and connect it better to the national network. These include a cross-harbor tunnel and revitalization of the cross-harbor float system.

For these connections to offer rail carriers the maximal shipping flexibility and freight rail economies of scale, vertical clearances must be raised in some places, and weight restrictions must be lifted. Existing yard space must be used more efficiently, and new yard space must be found. Currently, there are too many limitations on what kind of, and how, freight can be moved into the East-of-Hudson subregion. Some of these limitations result from track infrastructure that must be improved to allow for efficient freight rail movement.

The railroads must also take advantage of existing passenger rail infrastructure. Although their ability to do this is largely dependent on instituting the technological and institutional changes just described, the railroads themselves must take the initiative to expand their opportunities to use shared tracks.

6. A regional mobility plan

When we consider freight investment in the context of improving regional mobility, several investments become clearly desirable to increase freight movement in and through the Hudson region . The Hudson region should build a cross-harbor tunnel. If such a tunnel were accompanied by the proper infrastructure improvements elsewhere in the region, the two sides of the Hudson River would be efficiently connected, and freight could move easily through the Hudson region. Construction of the Phelps Dodge Terminal in Maspeth, Queens, is essential to this effort. Certain other yards, discussed in detail in the report, must be used more efficiently and, in other cases, expanded to accommodate the increase in rail freight traffic that an improved infrastructure, modern technology, and changes in institutional thinking will bring. At the same time, the private freight railroads and transportation agencies must continue to improve rail infrastructure and services to and through the downstate region from the Selkirk crossing to the north.

One of the principal goals of this report is to demonstrate that investing in improving the freight rail system is very much in the region's interest and may satisfy the criteria described in chapter 3 better than large-scale investments in expanding highway capacity. These investments would reinforce the benefits of many of the transit investments that the region is now considering, such as the Access to the Region's Core and the East Side Access for the Long Island Railroad projects.

The Metropolitan Transportation Authority (MTA), NYMTC, the Port Authority and New Jersey Transit use transportation models to estimate the number of auto trips that a major transit project is capable of diverting from congested roadways. For the East Side Access project, the MTA estimates a diversion of over 11,000 automobile trips per day, 24,000 daily hours of travel saved, and the elimination of over 340,000 daily automobile vehicle miles traveled (VMT) in 2010. For the Access to the Region's Core project, the North Jersey Travel Demand Forecasting Model and the MTA Regional Transit Forecasting Model estimate that, depending on the alternative adopted, 4,200 to 9,400 daily automobile trips will be diverted.

Cambridge Systematics' most conservative estimates predict that the New Jersey tunnel would yield a reduction in daily truck VMT of 156,000 miles, with 2,796 fewer daily truck trips, many going through some of the most congested choke points of the region, eliminated. Since a truck occupies approximately four times the roadway space that a car does, this is akin to a reduction of over 10,000 daily car trips. While the trips diversions for the freight rail tunnel and the two transit projects are not fully comparable, they do suggest that, insofar as trip diversions and reduced vehicular VMT are criteria in the region's transit investment decision-making process, large scale freight rail improvements that include the tunnel meet the threshold for serious consideration.

The combination of diverting the movement of freight from truck to rail and diverting the movement of passengers from cars to public transit will help the region's mobility by taking large numbers of vehicles off the road. However, freeing up capacity on the region's highways will not by itself relieve congestion. In such heavily populated areas, expanding highways simply encourages more people to take to the road. The Hudson River region must take measures to keep new trucks and cars from clogging those roadways again.

Properly implemented, one of the best possible ways to do this is to establish a regional congestion-pricing scheme. Charging drivers a fee for using congested roads will encourage individuals to use mass transit, and shippers to use rail. It will make users of the region's roadways pay for their maintenance, ease the congestion already afflicting them, and slow the rate at which new vehicles exhaust the roadway capacity created by the investments just described. Time-of-day tolls also will shift some traffic, including truck movement, to off-peak hours, reducing congestion even further. The Port Authority has already instituted a form of congestion pricing on their facilities, it should certainly be strengthened for trucks and shippers, and further modification for cars should be thoroughly analyzed.

Reducing congestion will improve regional mobility, but its benefits will not end there. These reductions will translate into better air quality through fewer emissions of volatile organic compounds, nitrogen oxides, particulate matter, and other pollutants, both because the number of vehicles in the regional road network will be smaller and those still on the roads will be moving faster, thereby cutting back on their individual emissions. These reductions mean better air and better health, most notably for children and the elderly, with lower rates of asthma, cardiopulmonary disease, and early mortality.

7. Financing and planning

The federal government discriminates against freight rail. Truckers pay a diesel tax, and in return the government sinks massive amounts of money into highways. Although the freight rail companies pay the same diesel tax, earmarked for highway improvements, the government does not subsidize freight infrastructure as heavily. Because of the tax code, furthermore, rail freight companies end up underwriting their competitors. Even though trucks will continue to play a central role in moving goods in and through the region, the truckers are not benefiting from a system that almost exclusively subsidizes highway expansion and makes congestion worse. Just as governments must continue to invest in roadways, they should increase their investment in freight rail. This will benefit not only rail carriers but also road users, including truck drivers.

The federal government has an interest in efficiently moving goods through a densely populated urban area like metropolitan New York. Aside from promoting interstate commerce, freight rail improvements would protect the government's investment in the interstate highway network. Funding for major freight rail improvements in the metropolitan area, including the tunnel, should be included in the reauthorization of the Transportation Equity Act for the 21st century (also known as the TEA 21 surface transportation bill) either through a freight rail title or through a special provision with federal support for rail projects of national significance. Some funds could come from the state government, local agencies, and congestion toll receipts, since drivers and truckers would gain from the better freight rail system. Finally, the tunnel-use fees, which initially should be low in order to encourage business, could help pay for the tunnel over the long term.

While a new agency need not be created to oversee the system, existing agencies should pay closer attention to freight transportation than they do today. The Port Authority, which has recently provided millions of dollars for freight rail improvements and has conducted studies to evaluate further investment, should move in this direction. But the New Jersey and New York Departments of Transportation, the Port Authority, the New York Metropolitan Transportation Authority and the City's Economic Development Corporation must all work together to improve rail freight and, more generally, mobility in the Hudson River region. To some extent, they already have begun to do this by commissioning studies and cooperating to make small-scale freight rail improvements. However, freight trains must be able to run without interruption through New Jersey, under the Hudson River, into Brooklyn and downstate New York, and on to Connecticut or Long Island. To make this possible, all these agencies must make freight rail a priority.

Freight trains that run through the East-of-Hudson subregion must use the tracks of a more than one carrier. Gaining access at prices that encourage competition often is difficult. An oversight body would enable safe and timely dispatching and make sure that freight carriers are treated equitably. This body could be a government agency or a mix of public and private agencies charged with partial or total control of track usage and maintenance East-of-Hudson.

Conclusion

The time has come for innovative thinking about the future of freight movement in the New York metropolitan region. The region's economy and environment will face a crisis as freight traffic increases over the next 20 years. A regional mobility plan composed of the investments and initiatives proposed in this report will improve its functioning and attract shippers to freight rail. Moving freight into trains and moving trucks off the region's crowded roadways will save billions of dollars in lost time and costly highway investments and will provide better air quality.

PART A

An overview of freight transport in the Hudson region

CHAPTER 1

Growth in highway freight traffic

The impetus to do something about the New York City region's freight transport system is the congestion it is experiencing now and will likely encounter in the coming years. This congestion is damaging both the economy and the environment of the metropolitan region consisting of New York, New Jersey, and Connecticut. To give readers a better sense of the region's congestion problem, this chapter provides a detailed outline of today's freight market. It describes the type and volume of freight moved through the area, how it is transported, and where it goes. Since most of the region's goods are loaded onto trucks and driven along the area's highways, this chapter focuses on truck-based freight traffic. We should note, however, that the freight rail system, particularly in the subregion east of the Hudson River, is underutilized.

As the economy expands over the next two decades, more goods will flow through the region, putting pressure on its congested and strained transportation network. The exact size of the increase in freight traffic is an open question, but there is general agreement that it will be huge. The Taub Urban Research Center's 1998 study offers a low-end estimate of a 23 percent increase in volume. But without significant improvements in the area's infrastructure, even that increase would cripple the region's highway network. When coupled with the projected increases in passenger vehicle traffic, the New York Metropolitan Transportation Council's (NYMTC's) consultants predict a 47 percent increase in tonnage, and the New York City Economic Development Corporation's (EDC's) analysis, the most recent of the three, sees a 70 percent increase. A 70 percent increase in freight volume means that the roads will have to accommodate 48 percent more trucks. By 2020, the American Association of State Highway and Transportation Officials (AASHTO) predicts a national rise of 220 billion to 276 billion truck vehicle miles traveled (VMT), with subsequent additional highway user costs as high as $492 billion.

Are the region's highways capable of handling such an increase in traffic? The importance of the highway system to the region's economy and quality of life cannot be overstated. By all accounts, approximately 80 percent of the total volume of goods is transported throughout the region via truck. The network's most popular bridge and tunnel crossings and highways already are congested and have a heavy burden of truck traffic: on some routes, trucks use 60 percent of the road space during rush hour. Two decades ago, the region's roads were faster and more efficient than they are today. And if the past is any guide, multibillion-dollar improvement efforts may not be capable of alleviating the heavy congestion of the region's major roadways.

In sum, the region's roadways already are strained by the enormous number of freight and cars that move through the region. As the economy grows and the freight traffic increases, New York faces a major challenge to regional mobility and thus a huge challenge to the region's economic and environmental well-being.

Sections 1.1 and 1.2 give a broad overview of freight movement in the New York metropolitan area. Section 1.3 looks at freight movement on a smaller scale, in the subregions east and west of the Hudson River. Section 1.4 examines and compares forecasts of the growth in highway traffic, and section 1.5 considers the current highway infrastructure and its ability to handle this growth.

1.1 The region's boundaries

How does our report define the "New York metropolitan area"? Because the main studies of New York's transportation system do not select the same boundaries, we must be careful when making direct comparisons.

Originally, the New York City Economic Development Corporation's Major Investment Study (MIS) included 30 counties in northern New Jersey, downstate New York, and southwestern Connecticut. To accommodate the Environmental Impact Statement's (EIS) modified study area, EDC included Litchfield and New Haven counties in Connecticut and excluded Mercer County in New Jersey. Nevertheless, its focus service area for a cross-harbor tunnel is the New York City metropolitan area, rather than the entire Northeast (see Figure 1-1).

The NYMTC study area is made up of Staten Island, Rockland, Putnam, Westchester, Suffolk, and Nassau, as well as Queens, the Bronx, Brooklyn, and Manhattan (see Figure 1-2).

We divided the Hudson region—not to be confused with the "metropolitan region" discussed earlier—into two zones: East-of-Hudson and West-of-Hudson. The East-of-Hudson subregion encompasses the counties in downstate New York and southwestern Connecticut that are east of the Hudson River, and the West-of-Hudson subregion covers the counties in northern New Jersey and downstate New York west of the Hudson River.

FIGURE 1-1

EDC Cross Harbor Freight Movement Project EIS internal study area

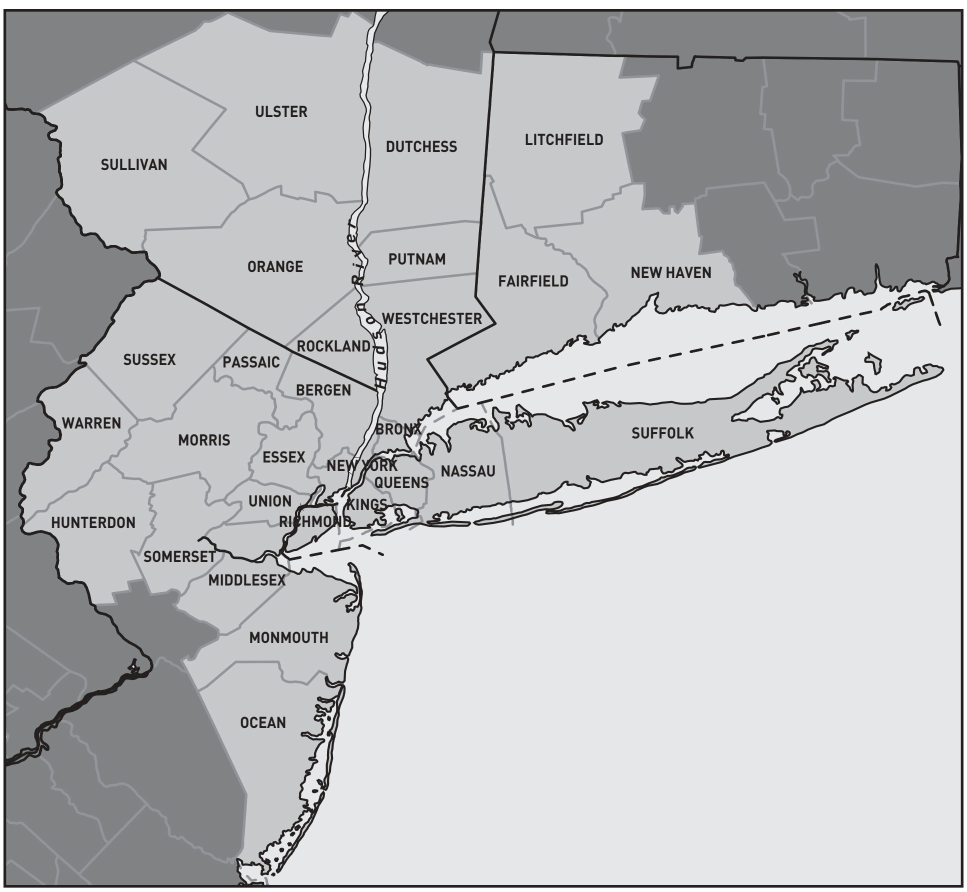
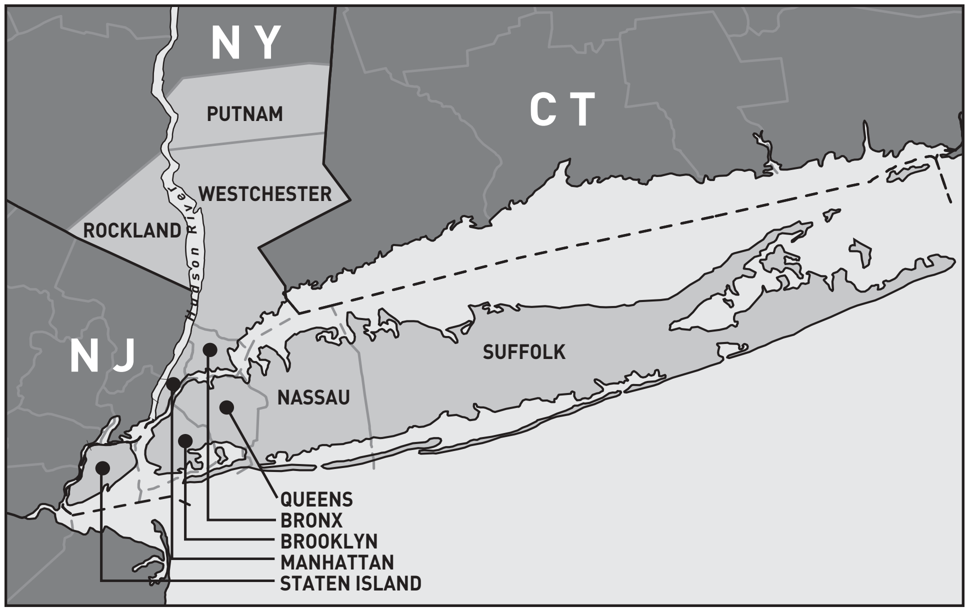


FIGURE 1-2
The NYMTC region



Unless otherwise specified, in this report, “the region,” “New York region,” “New York area,” and “metropolitan area” all refer to the boundaries set by the EIS. The area east of the Hudson is called the “East-of-Hudson subregion,” and that west of the Hudson, the “West-of-Hudson subregion.”

1.2 A regional perspective on moving goods

The majority of the high volume of freight moved through the Hudson region moves within the region itself or is exchanged with trading partners west of the Hudson River (see Tables 1-1 and 1-2).[1]

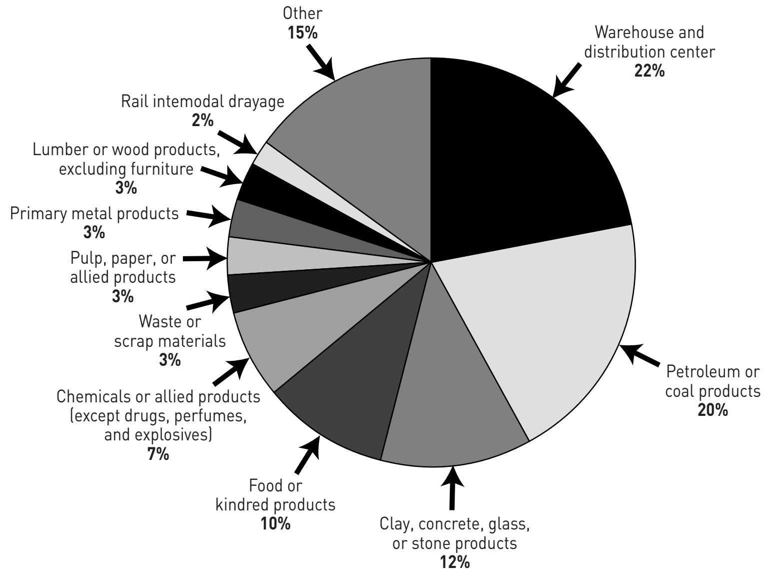
Together, these six regions account for about two-thirds of the flow of freight in the New York area.[2] Interregional flows account for 58 percent of the overall tonnage; intraregional flows for 23 percent; through-trips for 7 percent; and international freight for 12 percent.[3] In other words, a great majority (93 percent) of the freight flowing through the area has an origin or an end point in the region, and only a small portion of goods are exchanged internationally.

TABLE 1-1
The Hudson region’s major trading partners

Trading Partner	Tonnage (millions)	Value ($billions)
Hudson region	164.8	318.6
Northern New York State	67.2	96.3
Midwest	51.0	235.7
Southern New York State	37.8	84.6
Delaware Valley—New Jersey	36.0	57.3
Southeast	34.7	158.1

Source: EDC Cross Harbor Freight Movement Project Commodity Flow Analysis

FIGURE 1-3
Cross Harbor Region top commodities by weight



Source: EDC Cross Harbor Freight Movement Project Commodity Flow Analysis

MAIN COMMODITIES

Heavy, low-value goods dominate the freight tonnage moved in this region. Traditionally, this kind of freight is well served by cheap, high-volume forms of transport, such as rail and water, instead of relatively expensive trucking (see Figure 1-3).[4] Nevertheless, trucking is still the region's dominant mode of transportation.

Overall, warehoused goods, fuel (i.e., petroleum and coal), building materials, chemicals, and food products dominate the movement of freight in the region, accounting for about 70 percent of all freight exchanges by tonnage. The fact that many major inbound commodities also are major outbound commodities demonstrates that the region is an important distribution center.

1.3 The movement of regional goods East-of-Hudson versus West-of-Hudson

The East-of-Hudson subregion is one of the nation's most densely populated urban areas, generating a tremendous demand for goods.[5] Even though its economy now is primarily service based, its commodity mix suggests that manufacturing and light industrial development remain important to the subregion. More than half of all its freight is moved across the Hudson River.

The West-of-Hudson subregion is a major warehouse and distribution center for a great number of goods that either originate in or are consumed by the East-of-Hudson subregion.

The two subregions move nearly equal amounts of freight in both weight and value, and they also trade extensively with each other, as approximately 15 percent of the freight flow is intraregional (see Table 1-2, page 6).[6] Their respective trading partners are determined in large part by geography and the connectivity of subregional freight networks, with the East-of-Hudson subregion trading extensively

TABLE 1-2
Hudson regional and subregional freight hauled in 2000[a]

Movement	Tonnage (millions)	Value ($billions)
HUDSON REGION		
Intraregional	164.8	318.6
Imports into the region	236.4	699.9
Exports out of the region	181.0	422.4
Total	**582.2**	**1,440.9**
EAST-OF-HUDSON SUBREGION		
Intraregional	48.6	113.0
Imports into the region	154.0	419.9
Exports out of the region	112.4	275.1
Total	**315.0**	**808.0**
WEST-OF-HUDSON SUBREGION		
Intraregional	69.7	127.8
Imports into the region	128.9	357.6
Exports out of the region	115.0	225.0
Total	**313.6**	**710.4**

[a] The value dollars in this report have been calculated using the U.S. Department of Transportation's 1993 national Commodity Flow Survey. The values also have been adjusted to 2000 dollars using data from the Bureau of Economic Analysis. (The figures were adjusted to 2000 dollars because the study used the 2000 TRANSEARCH database.)
Source: EDC Cross Harbor Freight Movement Project Commodity Flow Analysis

in the north and east, and the West-of-Hudson subregion trading heavily with regions west and south of it (see Tables 1-3 and 1-4).

MAIN COMMODITIES

East-of-Hudson. Despite the area's transition to a service economy, low-value bulk goods still hold a significant share of the freight market. In other areas of the country, these kinds of goods often move by freight rail. Fuel, lumber, paper, paper pulp, scrap metal, chemicals, primary metal products, and building materials make up 57 percent of the subregion's freight volume.[7]

Four kinds of goods—fuels,[8] building materials,[9] warehoused goods, and food products—dominate the subregion's freight movements. Together they account for nearly two-thirds (64 percent) of all freight tonnage. Fuel is the top commodity by weight (22 percent of the total freight), but it is not in the top 10 commodities by value. Building materials, warehoused goods, and food are

TABLE 1-3
The East-of-Hudson subregion's major trading partners

Trading partner	Tonnage (millions)	Value ($billions)
Northern New York State	52.7	80.6
East-of-Hudson subregion	48.7	113.1
Southern New York State	29.5	66.3
Eastern Connecticut and Rhode Island	23.6	31.6
Midwest	19.5	97.2
Southeast	15.0	81.2

Source: EDC Cross Harbor Freight Movement Project Commodity Flow Analysis

TABLE 1-4
The West-of-Hudson subregion's major trading partners

Trading partner	Tonnage (millions)	Value ($billions)
West-of-Hudson subregion	69.7	127.9
East-of-Hudson subregion	46.4	77.6
Midwest	31.5	138.5
Delaware Valley--New Jersey	28.2	46.7
Southeast	19.7	76.9
Mid-Atlantic	17.5	29.9

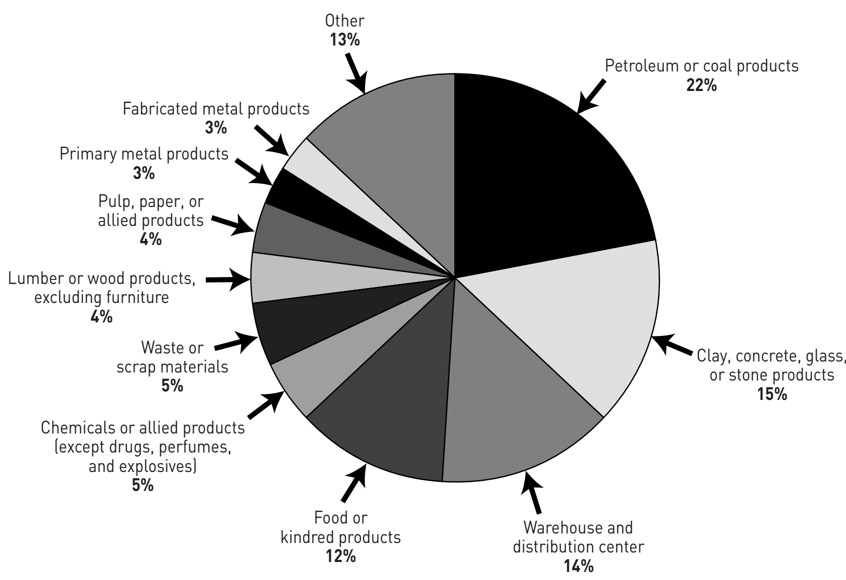
Source: EDC Cross Harbor Freight Movement Project Commodity Flow Analysis

nearly equal (15 percent, 14 percent, and 12 percent of tonnage, respectively) (see Figure 1-4).

By value, machinery accounts for more than 20 percent of the subregion's freight flow ($162 billion), followed by warehoused goods and apparel (each about 10 percent of value, or $80 billion each). The subregion's high value-added manufactured goods are represented by instruments, photographic goods, optical goods, clocks, and watches and account for 6.6 percent of the total value.

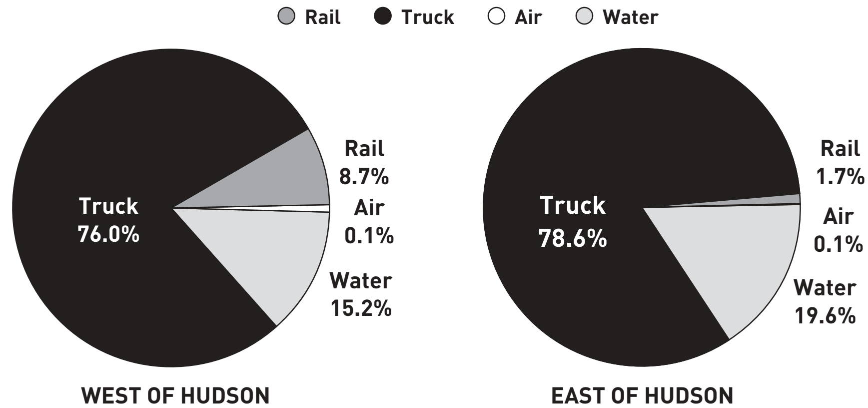
Exports of waste or scrap materials, excluding municipal solid waste, account for 5.9 million tons, making them the sixth largest commodity by weight (5.22 percent of the total tonnage). In its 1999 waste export plan, New York City's Department of Sanitation estimated that approximately 5.6 million tons of municipal solid waste are exported annually. If we add that figure to the exports of other waste and scrap materials, we get a total export tonnage of about 11.5 million tons, making waste or scrap materials the subregion's fourth largest export.

FIGURE 1-4
Top commodities move in the East-of-Hudson Region—by weight



Source: EDC Cross Harbor Freight Movement Project Commodity Flow Analysis

FIGURE 1-5
Mode splits by tonnage hauled, 2000



Source: EDC Cross Harbor Freight Movement Project Commodity Flow Analysis

Waste materials are generally considered an ideal candidate for rail transport, as they are a low-value bulk good that is not time sensitive.

West-of-Hudson. Warehoused goods, fuel, building materials, and food products dominate the subregion's freight movements, accounting for about 66 percent of all its freight exchanges. Approximately 45 percent of all imports to this subregion are building materials, warehoused goods, and food products. Warehoused goods are the leading commodities by both weight (83 million tons) and value ($146.4 billion). Machinery and transportation equipment account for approximately $199 billion (28 percent of the total value of the freight movements), with more than half that figure ($101 billion) being machinery.

MODE SPLITS

In tonnage and in value, trucking is still dominates the freight transport market on both sides of the Hudson. Comparing mode splits of the Hudson subregions highlights this dependency on trucks, and the greater importance of freight rail West-of-Hudson than East-of-Hudson (see Figure 1-5). This difference and the reasons for it will be discussed in greater detail in chapter 2. It is clear that the East-of-Hudson subregion is not efficiently connected to the rest of the national rail network, as much of the freight is offloaded from rail in northern New Jersey and then trucked to destinations east of the Hudson.

1.4 Predicted growth in freight traffic

If the Hudson region grows at a moderate pace over the next two decades, the volume of goods that the area handles will soar. The size of this increase is of interest to infrastructure planners, who need a reasonably precise estimate to make decisions about expanding highways, upgrading bridges, addressing bottlenecks, and planning transit or rail improvements.

Unless the region refocuses its priorities, most of the extra freight will end up on tractor-trailer trucks. The next subsection examines the freight market forecasts prepared by EDC and NYMTC.

REGIONAL ECONOMIC FORECAST FOR 2020

- *Population growth.* Over the next 20 years the population of the New York-northern New Jersey area is projected to grow at 0.2 to 0.3 percent annually.[10] During this time, the population of the East-of-Hudson subregion will grow by 5 percent, and that of the West-of-Hudson subregion, by 7.5 percent.
- *Income growth.* Income in the area is predicted to grow at a robust 5.2 percent annual rate for the East-of Hudson subregion and 4.6 for the West-of-Hudson subregion.
- *Economic activity.* The combination of low population growth and high income growth for the region will result in an economically dynamic environment. Manufacturing employment is projected to decline by 2.1 percent in the East-of-Hudson subregion and 1.0 percent in the West-of-Hudson subregion. This is consistent with the recent decline in manufacturing activity East-of-Hudson. In contrast to manufacturing, services are estimated to grow at a 1.5 percent annual rate across the region, a significant portion of which will be in warehousing services for transportation.

THE EDC STUDY AREA'S FREIGHT FLOW FORECASTS FOR 2025

These projections were made on the assumption that no changes or improvements will be made in the existing freight transportation network.[11]

Tonnage. In 2025, the total tonnage is projected to reach 989.3 million tons annually, with an estimated value of $2.5 trillion. These numbers represent a 70 percent increase in total tonnage and a 79 percent increase in total value.

Modal split. Without substantial investments in rail and marine operations, the modal split in the region will widen. Truck tonnage is forecast to increase from 79.4 percent to 85.7 percent, while rail's share will decrease from 5.6 percent to 4.7 percent. Marine movements will decline from 14.9 percent to 9.3 percent (see Figure 1-6). Accordingly, the congestion, air quality, and economic development impacts of this imbalance may be severe.

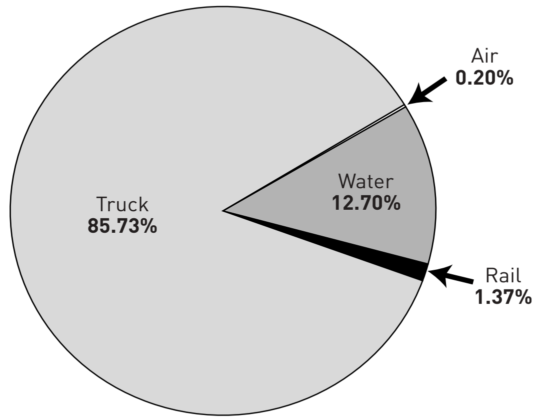
Traffic increases by mode. Using EDC's estimates, in 2025, 385 million additional tons of freight will travel by truck, 5.3 additional tons by water, 13.8 by rail, and 0.81 by air. The total tonnage in 2025 by mode would then be 847.8 million tons by truck, 46.5 by rail, 92.0 by water, and 3.0 by air.

Traffic increase by subregion. The projections for each of the two subregions suggest an increase of 211.9 million tons in truck tonnage in the East-of-Hudson subregion and 194.6 million tons in the West-of-Hudson subregion.[12]

THE NYMTC STUDY AREA'S FREIGHT FORECAST FOR 2025

Tonnage. In the NYMTC study area, commodity flows are expected to grow at an annual rate of 1.4 percent. If they were to do so, the volume of freight would rise by 47 percent, from 333 million tons in 1998 to 490.5 million tons annually in 2025.[13]

FIGURE 1-6
2025 East-of-Hudson mode split—EDC



Source: EDC Cross Harbor Freight Movement Project Commodity Flow Analysis

Mode split. The mode split in 1998 will likely persist through 2025. The shares for truck, rail, and air will rise to 80.9, 0.9, and 0.2 percent, respectively (up from 80.7, 0.8, and 0.1). The marine share will likely fall from 18.3 to 18.0 percent.

Freight volume increases by mode. The volume of rail freight is predicted to increase by 59.3 percent, from 2.8 million tons in 1998 to 4.3 million tons—still a very low market share. The volume of truck freight will grow by 47.6 percent, from 268.9 million tons to 396.9 million tons. Airfreight's minuscule tonnage will increase by 109.1 percent, from 400,000 tons to 900,000 tons. Domestic water freight will grow by 45 percent, from 61 million tons to 88.4 million tons, although its share of the overall market will nevertheless drop.

Main commodities. Despite painful losses in the manufacturing sector, the fastest-growing commodities for the NYMTC study area (by tonnage) continue to be bulk goods, which often move by rail (see Figure 1-7).

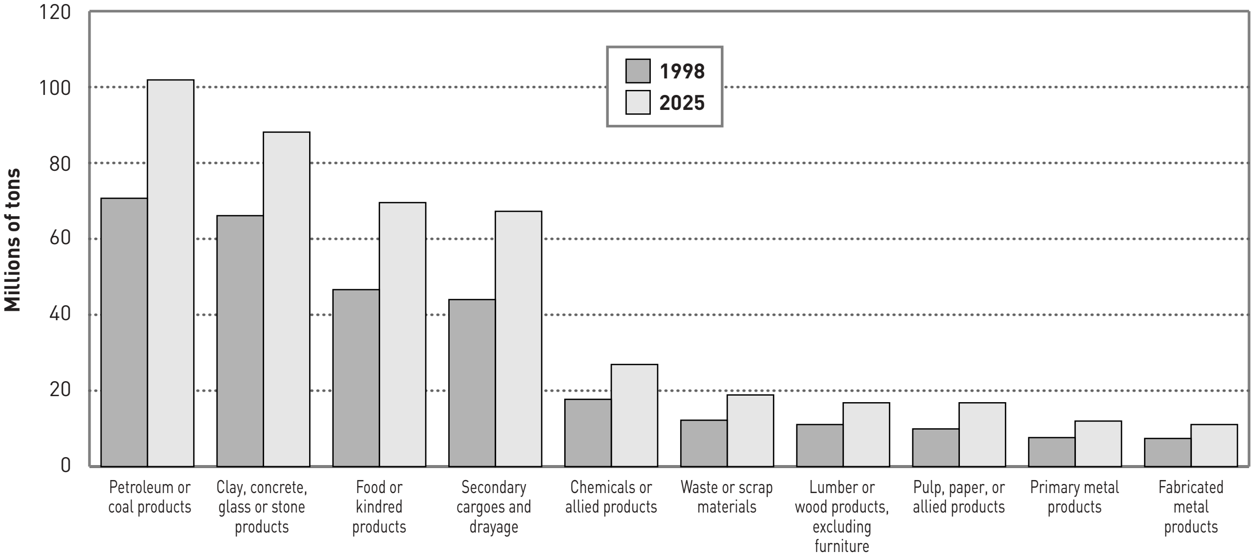
A COMPARATIVE ASSESSMENT OF THE TWO STUDIES

Next we compare the NYMTC and EDC forecasts, particularly for the East-of-Hudson subregion. The two analyses set different baseline years (NYMTC uses 1998; EDC uses 2000) and geographic boundaries. The NYMTC study includes Rockland County but excludes Dutchess County in New York and Fairfield, Litchfield, and New Haven counties in Connecticut. Otherwise, the studies cover the same area and counties. In order to compare them, this report uses only those figures from the areas covered by both studies.

To ensure an accurate comparison, we did not count freight moving between the excluded counties or between the excluded counties and other regions of the country, but we did count freight flowing between the excluded counties and the New York region. Since NYMTC did not provide detailed figures for Rockland County, this analysis excludes that county completely.[14]

Because the new data set does not significantly affect the modal splits, our analysis assumes that they remain the same.

FIGURE 1-7
Top 10 regional (NYMTC) commodities in 1998 and 2025



Source: NYMTC Regional Freight Plan—Task 4

Some of the principal differences between the two studies' findings of relevance to our report are displayed in Table 1-5, page 12.

The differences between the two reports are not trivial. EDC's estimate of trucking's share is 2 percentage points higher than NYMTC's, which distributes that additional 2 percent evenly to rail and marine modes. The modal splits for 2025 diverge even more, with EDC expecting an even greater truck share and a much smaller marine share than NYMTC does. Nonetheless, both forecast a higher truck share in 2025 than in the base year: 85.7 percent and 80.9 percent, for EDC and NYMTC, respectively. In addition, EDC predicts 150 percent more truck trips than NYMTC does (see Figure 1-8).

According to Cambridge Systematics, the differences in the two analyses are attributable to the baseline years used. The lower baseline tonnage and the different mode split in EDC's 2000 data set are the result of more direct reporting of commodity movements by rail and highway carriers to Reebie Associates, the consulting firm employed by EDC. The divergence in the 2025 growth forecasts reflects different regional economic outlooks in the fall of 2000 and the fall of 2001. The NYMTC study's predicted growth rate reflects the then accepted view that the explosive economic expansion of the 1990s would taper off smoothly over the next 25 years. The EDC study was completed after the September 11, 2001 attacks and during a period of continued national economic cooling. Its forecasts echo the widely held view that owing to extensive rebuilding efforts, the New York metropolitan region will expand faster than previously envisioned. The fact that NYMTC and EDC ultimately predict the same total adjusted tonnage for 2025 is coincidental.

Despite these differences, the reports offer similar forecasts: a huge increase in goods moved in the region, a mode split overwhelmingly in favor of trucks, and a correspondingly substantial rise in truck tonnage and trips. Our report takes this as a given. The question naturally arises as to whether the region is capable of accommodating such a huge growth in trucking activity.

TABLE 1-5
Notable differences between the EDC and NYMTC studies

East-of-Hudson Feature	EDC	NYMTC
Baseline year tonnage (tons)	278.6 million	320.6 million
Year 2025 tonnage (tons)	472.4 million	473.4 million
Projected percent growth in tonnage	69.6%	47.6%
Projected truck tonnage growth (tons)	185.9 million	124.3 million
ADDITIONAL ANNUAL TRUCK TRIPS		
Under maximum load[a]	4.7 million	3.1 million
Under average load[b]	10.6 million	7.1 million
YEAR 2025 TOTAL TRUCK TRIPS		
Under maximum load	10.1 million	9.6 million
Under average load	23.1 million	21.9 million
BASELINE MODAL SPLIT (BY TONNAGE)		
Truck	78.6%	80.7%
Marine	19.6%	18.3%
Rail	1.7%	0.8%
Air	0.1%	0.1%
YEAR 2025 MODAL SPLIT (BY TONNAGE)		
Truck	85.7%	80.9%
Marine	12.7%	18.0%
Rail	1.4%	0.9%
Air	0.2%	0.2%

[a] It is assumed that trucks carry the intercity maximum (without permit) of 40 tons.
[b] On average, trucks carry much less than the legal limit (including empty return trips, etc.). According to Cambridge Systematics, past experience has shown that 17.5 tons per truck is a broad-based average payload.

Sources: EDC Cross Harbor Freight Movement Project Commodity Flow Analysis and NYMTC Regional Freight Plan—Task 4

1.5 The highway system's ability to handle growth

New York City and the surrounding area cover 4,065 square miles and have a population of about 17 million people. The concentration of such a large population in a limited space leads to serious urban infrastructural challenges, with the urban mobility of 5.469 million peak-period road travelers among the most pressing.

Economic development has followed the motorways and is concentrated around their entrances and exits. The resulting diffused regional travel pattern is responsible for the congested condition of nearly two-thirds of all motorways during peak periods.

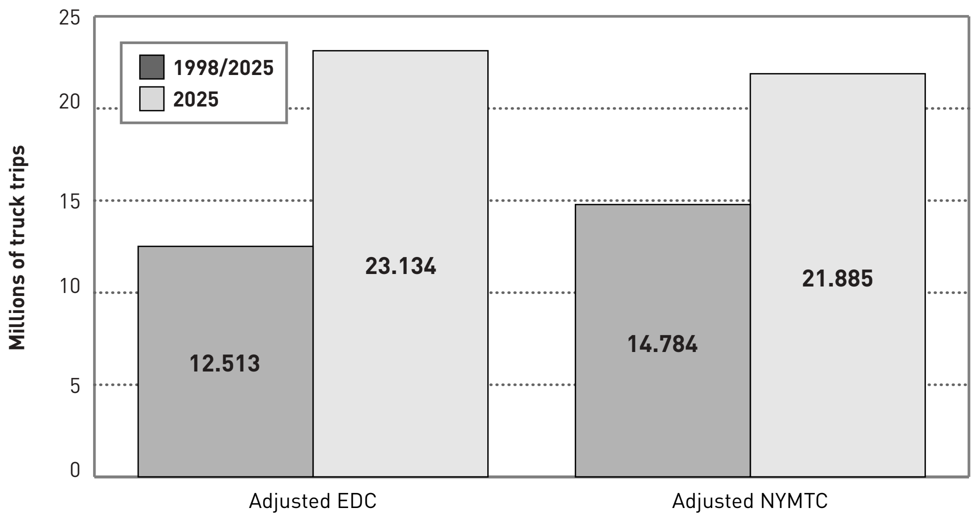
SEVERITY OF THE CONGESTION PROBLEM

The Texas Transportation Institute reported in its 2002 Urban Mobility Report some alarming statistics regarding congestion in the metropolitan area in 2000:

- The region's travel time index (TTI) is equal to 1.41, which means that because of congestion, a peak-hour trip in the region takes 41 percent longer than it would at free-flow speeds.
- The annual number of person-hours of delay is measured at 400,115, second only to that for Los Angeles. The annual delay per peak road traveler and per person is estimated at 73 and 23 hours, respectively.

FIGURE 1-8

Average number of total annual truck trips—adjusted comparison between NYMTC and EDC studies



Source: EDC and NYMTC

- A total of 658 million gallons of fuel are wasted each year. In other words, each peak road traveler consumes 120 gallons of excess fuel per year.
- The annual cost to the region due to congestion is $7.66 billion ($6.645 billion from delays and $1.015 billion from fuel). This translates into an annual congestion cost of $1,400 per peak road traveler and $450 per person.
- Thirty-five percent of daily and 69 percent of peak period travel occur in congested conditions.
- Fifty-five percent of freeway and 65 percent of principal arterial lane-miles are congested during the peak period.
- The growth of the average number of annual vehicle miles traveled (VMT) was measured at 2.5 percent.[15] This in turn implies that for freeways and principal arterial streets, 167 and 185 additional lane-miles, respectively, will be needed each year to prevent further congestion growth.
- Projecting to the year 2025 (and assuming a constant 2.5 percent annual VMT growth rate) a total of 5,704 and 6,319 additional lane-miles will have to be added to the current freeway and principal arterial road system, respectively, in order to maintain 2000 mobility conditions described by the regional roadway congestion index (RCI). Nevertheless, if we take into account the expansion of the region's urban boundaries and the corresponding increase in VMT for which it is responsible, we should assume a more conservative annual VMT growth rate. If the assumed growth rate is set at 1 percent, the previous numbers will change to 1,887 and 2,090 total additional lane-miles.

WORSENING CONGESTION

Even though the New York State Department of Transportation (DOT) spends about $15 billion a year on transportation, and the federal government spends several billion more, highways have become more congested in the last 20 years. This suggests that highway expansion by itself is not the solution and that the Hudson region should invest in finding innovative ways to reduce the amount of traffic on the road.

A brief consideration of recent data from the Texas Transportation Institute demonstrates that in every measurable way, congestion is becoming an increasingly urgent social and economic problem:

- The percentage of peak-period travel that occurs on congested roadways rose from 28 percent in 1982 to 69 percent in 2000.
- The percentage of travel *at all times* that occurs on congested roadways grew from 14 percent in 1982 to 35 percent in 2000.
- The annual delay per peak road traveler increased by 265 percent, from 20 to 73 hours in the past 18 years (see Figure 1-9).
- The region's travel time index climbed 25 percent, from 1.13 in 1982 to 1.41 in 2000 (see Figure 1-10).
- The percentage of the region's congested lane-miles of roadway rose from 30 to 55 percent for freeways and 55 to 65 percent for principal arterial streets.

The outlook for the next 20 years is even worse. NYMTC's Regional Freight Plan concluded that those areas predicted to experience the greatest increase in freight tonnage, such as New York County (with a projected 50.4 percent increase of 30.5 million tons), are in grave danger of truck gridlock.[16]

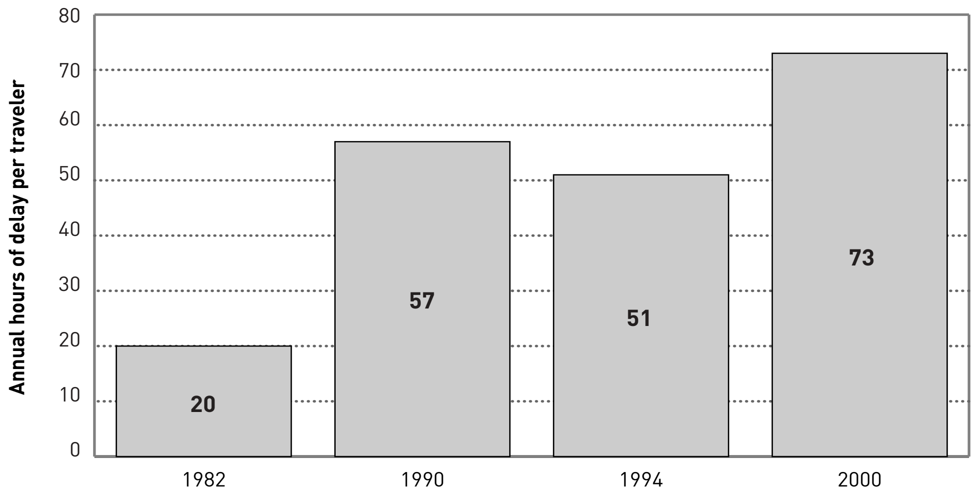
CHOKE POINTS AT RIVER CROSSINGS AND MAJOR CORRIDORS

The New York metropolitan region has an extensive and highly utilized highway network.[17] Even though the majority of vehicles that use it are not for freight, the network plays a crucial role in the movement of goods.

There are two main routes for transporting freight into New York City, Long Island, and the downstate New York counties (Westchester, Rockland, etc). The most popular option is the Northern Crossing of the Hudson River via the George Washington Bridge (GWB) and onto the Cross Bronx Expressway (CBX). This crossing is severely and chronically congested and is the only crossing over the Hudson River capable of accommodating 53-foot tractor-trailers. A second option is the Southern Crossing from northern New Jersey to Brooklyn via the Goethals Bridge and Outerbridge Crossing onto the Staten Island Expressway and the Verrazano-Narrows Bridge.[18] The Outerbridge Crossing is used mainly by small and medium-size trucks that service retail stores in Staten Island, Brooklyn, and southern Long Island. Trucks also use the Tappan Zee Bridge to get to and from downstate New York.

In both cases, the gateway corridor to the region is the I-95/New Jersey Turnpike. For the Northern Crossing, drivers often use U.S. 1-9. Congestion on the I-95/New Jersey Turnpike/U.S. 1-9 corridor is moderate, and it serves the many rail yards, intermodal terminals, warehouses, and manufacturing centers that ship goods across the Hudson River. Both routes continue in the East-of-Hudson area on various expressways: the Gowanus, Bronx-Queens, Van Wyck, Long Island, Major Deegan, and Cross Westchester, as well as the New England Thruway (I-95). For

FIGURE 1-9
Annual delay per peak road traveler, 1982–2000

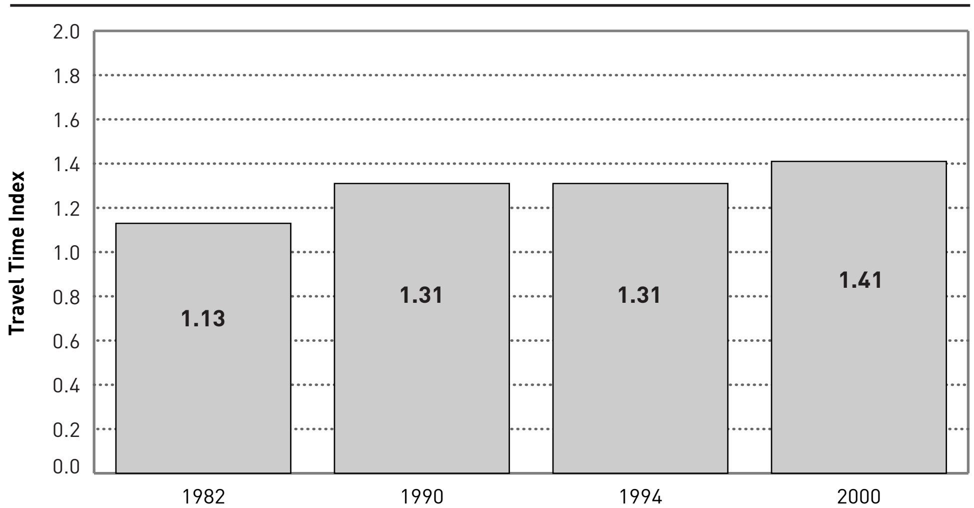


Source: Texas Transportation Institute, 2000 Urban Mobility Study

truckers, the Northern I-95/GWB/CBX crossing is a vital through route. Since it is the only Hudson River crossing that is suitable for 53-foot tractor-trailers, it serves a huge volume of truck traffic (approximately 27,600 truck trips per day).

Another important corridor for truck traffic is the Van Wyck Expressway, which is the primary link for airfreight into and out of JFK International Airport. The Van Wyck also connects the Triborough and Bronx-Whitestone bridges with the Long Island Expressway and New York State Route 27. It suffers from chronic and severe congestion, which hinders airfreight transportation. Since airfreight is time sensitive, truck operators need to factor in congestion and anticipate additional time delays. This necessity in turn increases shipper and labor costs and

FIGURE 1-10
New York region Travel Time Index (TTI), 1982–2000



Source: Texas Transportation Institute, 2000 Urban Mobility Study makes JFK less appealing as an airfreight distribution center, thereby shifting traffic to Newark International Airport to the west of the Hudson River.[19]

In general, the highways that accommodate through-traffic tend to have the highest truck volumes: the New England Thruway (I-95), Cross Westchester Expressway, New York State Thruway, and Cross Bronx Expressway. For intraregional truck trips, the Southern Crossing, Van Wyck, New York State Route 27, and Long Island Expressway are the main routes; and the East River bridges cater to suppliers who are situated in Brooklyn or Queens and do business in Manhattan.

CURRENT HIGHWAY IMPROVEMENTS

In order to deal with some of its major highway bottlenecks, the region has a number of highway improvement projects under way or in an advanced phase of study. The New York DOT's Region 11 office (which encompasses the five boroughs of New York City) has a number of projects completed or under way and a few in the planning stage.

The Bruckner/Cross Bronx Expressway Interchange Rehabilitation has consolidated several projects, rehabilitating portions of the CBX, Throgs Neck Expressway, and Hutchinson River Parkway, as well as the Bruckner Interchange, including 14 ramps and bridge structures. The project has improved overall road conditions, installed an intelligent transportation system (ITS), enhanced the adjacent landscaping, and eased congestion in the surrounding communities. The project's cost is estimated to be more than $200 million.

Other notable projects under way are the Long Island Expressway (LIE) Reconstruction Project, the Brooklyn Queens Expressway (BQE) Reconstruction Project, the LIE/Cross Island Parkway Interchange Improvements, and the Clearview Expressway/LIE Interchange Improvements.

- The LIE Reconstruction Project will rehabilitate the highway in Queens from the Queens-Midtown Tunnel to the Grand Central Parkway. It was originally scheduled for completion in the fall of 2003. As of December 2003, all components of the project with any impact on traffic (i.e., all components, excluding installation of the noise barrier and beautification measures) had been completed.
- The BQE Reconstruction Project will repair parts of the BQE between Broadway and Twenty-fifth Avenue. The vertical and horizontal alignments of the road as well as the derelict state of some 16 bridges will require that the BQE overpasses and adjacent streets be restructured. The lowering of two streets and the raising of the freight rail tracks will be necessary. The project's completion date is set for spring 2004.
- The LIE/Cross Island Interchange Improvements will address structural, operational, and safety deficiencies on a two-mile stretch of the LIE between Exit 29 (Springfield Boulevard) and Exit 32 (Little Neck Parkway). The project's completion date is scheduled for September 2004 and should cost about $130 million. The Clearview Expressway/LIE Interchange reconstruction project will cost $30 million, and all major construction components of the project have been completed.
- Other projects that are still in the planning stage and that will affect the movement of goods via trucks in the region include the Kosciuszko Bridge Project,

the Bruckner-Sheridan Interchange and Commercial Access to Hunts Point Peninsula Project, and the Bronx Arterial Needs Major Investment Study (see www.dot.state.ny.us/reg/r11/r11.htm for further details).

The New Jersey DOT-sponsored Portway project will have a large impact on the movement of goods in the region. It will consolidate a number of different projects with the goal of improving truck access to the major ports. Of the thirteen planned projects, two will be managed by the Port Authority, five are already under construction, and the final six are in the feasibility assessment stage (see www.transstreamnet.org/nchrp/state_projects/projects_nj1.asp for further details).

Even with these very expensive improvements, highway congestion will steadily worsen if truck and car traffic grow as projected.

1.6 Conclusion

Trucks comprise a high percentage of the total number of vehicles, including during peak hours, on chronically congested regional roadways, reaching 20, 30, or even 45 percent of vehicles in some cases. Trucks also carry about 80 percent or more of the region's freight. The total truck tonnage and trucks' modal share are projected to increase, signaling a huge growth in truck movements. In order for the region to maintain its current mobility condition, as measured by its roadway congestion index (RCI), it will have to build hundreds of additional lane-miles of roadway capacity.

Cost, land use, and environmental considerations suggest that the New York metropolitan region will be hard-pressed to "build its way" out of its congestion problems by expanding its highway capacity without also investing in major freight rail and transit improvements. Since 1982, congestion has been getting steadily and consistently worse. The region's TTI, the percentage of congested peak-period travel, and the annual delay per peak road traveler have risen by approximately 25, 146, and 265 percent, respectively.

Chapter 1 notes

[1] Unless otherwise noted, all the information in section 1.2 is from the New York City Economic Development Corporation's Commodity Flow Analysis for the Cross-Harbor Freight Movement Project's EIS.

[2] Other important trading partners are the mid-Atlantic region and other northeastern regions, the Southwest, southern New Jersey, northern New England, California, and parts of Canada.

[3] Data are from the EDC's MIS.

[4] A notable exception is warehoused goods, which generally have a high value and make up a large portion of the region's freight market. Goods in this category are moved from major distribution centers (indicating warehousing clusters) to retail locations (indicating commercial activity).

[5] All the information in section 1.3 is from the New York City Economic Development Corporation's Commodity Flow Analysis for the Cross-Harbor Freight Movement Project's EIS.

[6] Note that the East-of-Hudson and West-of-Hudson figures do not add up to the total for the whole region. If we make that calculation, we will end up double-counting the freight movements between the two subregions (interzonal). Instead, in order to get the total, we must add together the East-of-Hudson and West-of-Hudson figures and then subtract the interzonal movements.

[7] It is clear that marine modes transport primarily bulk commodities such as petroleum or coal products. On both sides of the Hudson, the disparity between the marine's modal share by weight and by value serves to illustrate this point.

[8] Petroleum and coal.

[9] Clay, concrete, glass, or stone products.

[10] The regional economic forecasts in this section were derived from the EDC's MIS. The commodity flow analysis for the EIS is *not* based on these figures. For the EIS, the Economic Development Corporation hired DRI-WEFA, an economic consulting and forecasting firm (since renamed Global Insight). These numbers predicted a temporary post-September 11 decline in activity, followed by a return to historical growth trends.

[11] All the regional commodity flow forecasts in this section were derived from the EDC's commodity flow analysis for the EIS.

[12] Recall that the East-of-Hudson and West-of-Hudson figures do not add up to the total for the whole region. If we make that calculation, we will end up double-counting the freight movements between the two subregions (interzonal).

[13] All the regional commodity flow forecasts in section 1.4 were derived from NYMTC's Regional Freight Plan—Task 4 and the EDC Cross Harbor Freight Movement Project Commodity Flow Analysis.

[14] This does not significantly change the overall picture, since Rockland moves relatively little freight, about 3 percent of the region's total tonnage.

[15] VMT and lane-mile increases include urban and land-size increases. These rates are much higher than the "true" increase rates, that is, those based on new travel or road construction. The rates shown are the average annual growth rates for freeways and principal arterial streets between 1995 and 2000.

[16] NYMTC, *NYMTC Regional Freight Plan: Task 4—Definition and Assessment of Needs* (Cambridge, MA: Cambridge Systematics, 2001), p. 8-8.

[17] Unless otherwise noted, all the information in this section is from NYMTC's Regional Freight Plan—Task 2.

[18] There are a few other Hudson River crossings, such as the Holland and Lincoln tunnels, but their dimensions and location are not convenient for heavy trucking operations. Trucks, which can satisfy the limiting weight and height criteria, do use these crossings but avoid doing so during peak commuting hours when the congestion is severe.

[19] JFK is still highly appealing to international carriers because of its stellar customs service. Many carriers fly into Newark and then truck their goods to JFK to clear customs.

CHAPTER 2

The current freight rail network

This chapter offers a broad explanation of the freight rail system so that residents can understand the importance of a revitalized system to their region's future.

Section 2.1 describes how the freight rail system in the New York metropolitan area is connected to the national network. Section 2.2 looks at the system West-of-Hudson, its major corridors, connections to the national network, passenger and freight rail operators, rail yards, and intermodal terminals. Section 2.3 discusses the features of the East-of-Hudson rail freight system, and section 2.4 examines the Hudson region's antiquated and in some cases problematic track systems with low clearances and low weight limits. Finally, section 2.5 describes the freight rail improvement projects already under way.

2.1 A system not adequately connected to the national network

The national freight rail network is an important part of the United States' national freight transportation system, for example:[1]

- Rail moved more than 40 percent of the intercity freight tonnage.
- In 2000, rail moved 16 percent of the total domestic freight tonnage. Trucks moved 78 percent.
- When measured in ton-miles, rail's total domestic share was 28 percent.
- Rail accounted for 6 percent of freight by value, indicating that rail transport is often used for low-value bulk commodities.
- Rail moved 2 billion tons of freight, valued at $600 billion, for more than 1.2 trillion ton-miles.

Railroads handle a huge volume of freight traffic in the Midwest and Southeast and also much of that on the Atlantic seaboard. But New England and downstate New York, particularly in the East-of-Hudson subregion and Long Island, have a very low volume of rail freight traffic.

Much of New York's and New Jersey's rail traffic passes through upstate New York and Pennsylvania, on one of two main through routes linking the New York metropolitan area to the Midwest and the West, one passing through New York State and the other through Pennsylvania. The first goes north to Albany, then turns west and continues onward to Buffalo, Cleveland, and Chicago. Historically this has been called the Water Level Route because it parallels rivers, lakes, and canals. The other route crosses into Pennsylvania from the New York metropolitan area southwest to Harrisburg, then west to Pittsburgh, Cleveland, and Chicago.

Of the two major routes linking New York with the national rail network, the New York State route allows the movement of rail freight going to or from the East-of-Hudson subregion because the metropolitan area lacks an efficient cross-harbor link. Such a link is required for an on-rail connection between the East-of-Hudson subregion and the Pennsylvania route without necessitating a circuitous movement via Selkirk, New York.

Freight traffic moving from East-of-Hudson to the Middle Atlantic and Southeast must pass through Selkirk, again because the harbor currently does not have an efficient, high-capacity option for moving rail freight.

2.2 Freight rail to the West: modern, efficient, and accessible

The West-of-Hudson subregion has an extensive, modern, and highly utilized rail freight network. According to the New York City Economic Development Corporation's (EDC's) Commodity Flow Survey (see chapter 1), in 2000, rail moved 8.65 percent of the subregion's total tonnage, or approximately 27.1 million tons. This section examines the West-of-Hudson rail system's connections to the national network, major corridors and rail lines, passenger and freight operators, rail yards, and intermodal terminals. Weight limits and vertical clearances are not discussed, since they are not significant problems west of the Hudson.

CONNECTIONS TO THE NATIONAL NETWORK

Four major corridors connect New Jersey to points west and south:

The *Southern Corridor* combines the parallel Chemical Coast and Lehigh Main lines and links the West-of-Hudson rail yards to Philadelphia and Harrisburg and from there to the rest of the national rail network. New Jersey Transit operates passenger service over some of these routes, but this does not severely constrain freight operations. Rail lines leading to Harrisburg with connections to Pittsburgh, Chicago, and points south are owned by Norfolk Southern (NS) and constitute its main freight gateway in the region. New Jersey has some passenger service (approximately 60 weekday passenger trains) on a five-mile segment between Aldene and Newark, shared by the NS and CSX Transportation (CSX) railroads.[2] The CSX West Trenton Line is also a part of this corridor and connects New Jersey to Philadelphia, Baltimore, and Richmond, with connections to Jacksonville and Chicago. There is no passenger service on this line in New Jersey east of the West Trenton station. The New York Susquehanna and Western Railway (NYS&W) has trackage rights on the former Lehigh and Hudson River Line between Campbell Hall and Warwick, where it connects with its own line.

The *West Shore Line Corridor* connects the major West-of-Hudson rail yards and warehouses with the freight rail route close to the Great Lakes known as the Water Level Route, which is CSX's main entrance into the West-of-Hudson subregion. The CSX River Line is the most important freight line in this corridor, since it connects northern New Jersey to Albany and the CSX Water Level Route—and therefore Buffalo, Cleveland, Chicago, and other points west. The route can also be used to link northern New Jersey by rail to the Boston metropolitan area in New England. The River Line provides frequent and consistent service to all major CSX freight facilities and terminals in northern New Jersey, especially North Bergen and Little Ferry. There are no passenger operations south of Albany on the River Line.

The *Southern Tier Line Corridor* is a competitive alternative to the Water Level Route/CSX River Line approach to the West-of-Hudson subregion. It is owned by

NS and links New Jersey to Buffalo with track on or close to New York State's southern border, with connections to Cleveland and Chicago along Lake Erie. The NYS&W and Canadian Pacific Railway (CP) have been granted trackage rights on the NS Southern Tier Route. Passenger service can be found east of Port Jervis, New York, and becomes denser east of Suffern, New York. The NYS&W has trackage rights on the Southern Tier Line from Binghamton to Campbell Hall, New York.

The *Northeast Corridor,* stretching from Washington, D.C., to Boston, is one of the country's busiest pieces of track and is used extensively by Amtrak and other local carriers for passenger and commuter operations.[3] In general, there is very little through-freight activity on this line, except for Amtrak's mail and express service. Nonetheless, it does connect northern New Jersey and the East-of-Hudson subregion to Philadelphia, Baltimore, Washington, and points south and west and could be an important freight corridor if the proper technology were adopted, integrating its scheduling with that of the passenger lines.

SHARED USE

Substantial portions of the Hudson region's track add options for railroads and the shippers that buy their services. To encourage public acceptance of the acquisition of Conrail by CSX and NS, and to guard against monopolistic behavior, the two railroads were required to establish three large geographic zones in the former Conrail system so that shippers and receivers within the zones would have equal access to either CSX or NS. The zones established are, roughly, northern New Jersey, metropolitan Philadelphia (around Camden), and Detroit. The most important of the three is the northern New Jersey zone.

The freight railroads and the freight and passenger operations all share use of the rail lines. The two main commuter and passenger rail operators in northern New Jersey are Amtrak and New Jersey Transit (NJT). While the region has many dedicated freight rail lines, the passenger and freight operations still share some of the lines, especially in parts of the NJT network. Judging by the volume of rail movement in the region and the unhindered operation of NJT and Amtrak, passenger and freight rail coexist harmoniously.

Amtrak owns track from New Rochelle in the east to Washington, D.C., in the south, including the Hudson River tunnels and the rail lines through New York's Penn Station in the East-of-Hudson subregion. Along the Amtrak main line in New Jersey, several shippers are served by trains originating in and around Newark.[4]

NJT's rail lines are only partially publicly owned; CSX, NS, and Conrail own a substantial amount of right-of-way in New Jersey. With a fleet of 92 locomotives, 411 coaches, and 290 self-propelled cars, NJT carries almost 50 million passengers trips per year, on a schedule of approximately 660 daily trains. The 350-mile NJT network encompasses approximately 980 miles of track and is extensively shared with freight operations.[5] The main freight arteries, terminals, yards, and feeder lines have remained in the hands of private for-profit freight railroads such as CSX, NS, CP, and small short lines.

MAJOR RAIL FREIGHT YARDS AND INTERMODAL TERMINALS

The West-of-Hudson subregion has an ample network of rail yards and terminals, most of which could easily be expanded to accommodate more traffic.[6] If the East-of-

Hudson subregion used more rail freight, most of the infrastructure to the west would be ready to handle the increase.

- CSX North Bergen is an intermodal transfer facility owned and operated by CSX. Well situated for truck access, the terminal sits along U.S. 1-9 just off Exit 16E on the New Jersey Turnpike. In 2000 160,000 container lifts were performed. [7] The increase in traffic can be attributed to freight diversion from Little Ferry to North Bergen.

- CSX South Kearney, located off Exit 15E of the New Jersey Turnpike, is the largest intermodal facility in the region. It can handle as many as 360,000 lifts a year. The terminal mainly serves international traffic originating from Pacific Coast ports, while domestic freight is limited to north/south moves to and from Jacksonville and New Orleans. Immediately adjacent to South Kearney is the former APL Limited site, which is currently under CSX ownership and handles approximately 114,000 lifts per year.

- CSX Little Ferry was once Sea Land's regional rail intermodal facility. In 1994 the terminal began a major expansion, which culminated in CSX's buying Sea Land. Current volumes are estimated at 100,000 lifts per year, with the majority of domestic traffic going to Chicago, Ohio, and St. Louis, on the CSX River Line.

- CSX Trumbull Street Yard in Elizabeth, New Jersey, is a reload center controlled and exclusively used by CSX. Rail access to this easily developed terminal location is best via the Port Reading Line for north/south traffic.[8]

- ExpressRail[9] is the Port of New York and New Jersey's on-dock intermodal rail terminal at the Port Elizabeth Marine Terminal. It links the port with key inland markets and all major rail systems in the United States. In 2001, the 33-acre facility handled more than 200,000 container moves. It provides direct, double-stack rail service through NS to the Midwest and New England. ExpressRail's five tracks can accommodate 300 ocean containers at one time and can be loaded and unloaded simultaneously. The current ExpressRail terminal is being replaced with a 70-acre complex that is three times larger. The new ExpressRail will have a dedicated lead track and a rail overpass separating train traffic from roadway traffic.

- The NS E-Rail Terminal is located in Elizabeth, New Jersey, and handles approximately 120,000 lifts per year. It is operated by the "K" Line's RailBridge subsidiary, RBTC. Domestic container and "K" Line Pacific Rim cargo (about 25 percent of the total) are the terminal's major clients. The terminal is off Exit 13A of the New Jersey Turnpike and is on the NS Lehigh Line and the Penn Route. It is the region's most southerly intermodal terminal.

- NS Croxton is located in Jersey City, off Routes 1 and 9 and Exit 15W of the New Jersey Turnpike. It handles approximately 160,000 lifts per year. Customers include steamship line carriers, trailer traffic, and domestic trucking companies. The terminal is at the center of the Northern New Jersey Terminal district and has unobstructed rail access to all major routes.

- Resources Terminal is a small intermodal terminal compared with the others in northern New Jersey and is located just east of Croxton on the NYS&W line. It handles 25,000 to 30,000 lifts per year.
- CP's Oak Island Terminal is located adjacent to the Oak Island Yard, the principal classification rail yard in northern New Jersey.[10] The terminal currently handles about 800 lifts weekly and deals exclusively with Canada-bound freight. The terminal connects to the NS Lehigh Line and from there to the national rail network.
- There are two rail yards in Greenville, New Jersey, which collectively comprise what used to be (and is referred to elsewhere in this report as) the Greenville Yard. One is a support yard for the large Tropicana warehouse and other nearby freight rail users. This is a Conrail yard. A second and smaller yard in Greenville is operated by the New York Cross-Harbor Railroad (NYCH) and serves as a supplementary yard for the traffic coming from and going to Brooklyn by way of marine transfer. It includes a float bridge.

2.3 Freight rail to the East: underused, isolated, and outdated

The East-of-Hudson subregion has an extensive, highly utilized rail passenger network. Yet rail moved only 1.68 percent of the total freight tonnage in 2000, or about 5.30 million tons, a rate ten times lower than the national average. This section examines the East-of-Hudson rail system in detail—its connection to the national network, its major corridors and rail lines, its passenger and freight operators, its rail yards and intermodal terminals, and its vertical clearances and weight restrictions—with an eye to discovering why the subregion ships so little freight by rail.

CONNECTIONS TO THE NATIONAL NETWORK

Currently two routes are commonly used to move rail cars between the national rail network and the East-of-Hudson subregion.

1. The main on-track overland rail connection to the Midwest, West, and South is via the CSX Selkirk Yard. Selkirk is 140 miles north of New York City. It is not a major impediment to freight moving to the Midwest and West but is a formidable service and costly detour for moving freight to the Middle Atlantic and Southeast by rail (see Figure 2-1, page 24). Although this is a circuitous 48-hour, 280-mile route, it is often employed for long-haul shipments and is extensively used by CSX and CP. Rail cars going to eastern Canada and New England can go either by way of Selkirk or the former New Haven Line. A large, 1,250-acre and 128-track, highly utilized rail yard, Selkirk has the capacity to handle a total of 8,500 rail cars at one time.[11]
2. The second option for moving freight to the East-of-Hudson subregions is via rail marine, a traditional method in New York Harbor. Currently, only one operation exists, which is operated by the New York Cross-Harbor Railroad (NYCH) between Bay Ridge in Brooklyn and Greenville, New Jersey. In south Brooklyn, rail marine transfer consists of moving rail cars from track on land to track built onto a barge and then moving the barge over water. NYCH makes

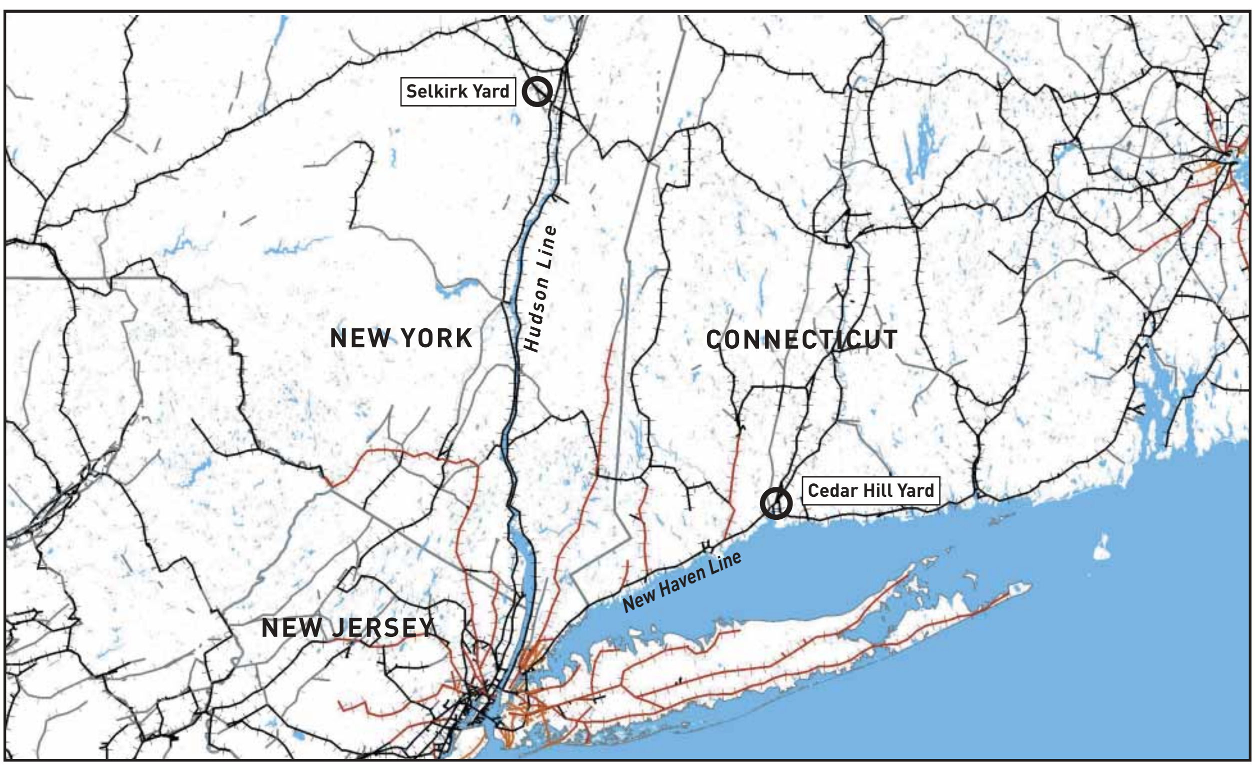
the transfer at Greenville using a traditional float bridge and, in Brooklyn, a pontoon. The NYCH's fleet has two 340-foot float barges and two 290-foot float barges, two float bridges, and three locomotives. This service is limited to carload traffic. In 2003, the volume of Cross-Harbor's general freight was close to an all-time high of 1,600 cars.

The Hudson Line connects the East-of-Hudson metropolitan area to the Hudson River crossing at Selkirk and the rest of the national rail network. It runs along the east shore of the Hudson River. At the south end it is used extensively by Metro-North for commuter service. Amtrak also operates intercity passenger service on this line. At the south end of the line, in the Bronx near Highbridge, a newly constructed all-freight track, the 1.8-mile-long Oak Point Link, connects the Hudson Line with the former New Haven Line. Oak Point Yard (the primary classification and support yard East-of-Hudson), Hunts Point Terminal, Harlem River Yard, and the freight line across the Hell Gate Bridge to geographic Long Island connect to this line.

CSX and CP offer freight service over the full length of the Hudson Line, from the Bronx to Fresh Pond. The Providence and Worcester Railroad (P&W) uses the CSX freight line in the Bronx and Queens to connect with the New York and Atlantic Railway (NYA).

The Metropolitan Transportation Authority's (MTA's) Long Island Rail Road lines serve freight users on geographic Long Island (including Brooklyn and Queens). Freight service is provided exclusively by the NYA, the railroad selected by the MTA to conduct freight operations on those lines.

FIGURE 2-1
The Selkirk detour
Rail connections to points north and east.



The Bay Ridge Branch is a dedicated freight line in Brooklyn and Queens that is owned by the LIRR. The NYA is the main operator on this line, through an interchange with the NYCH at the Sixty-fifth Street yard. The Bay Ridge Line extends from Sixty-fifth Street in Brooklyn to Fresh Pond in Queens with connections to Long Island and via the Fremont Secondary Line and the Hell Gate Bridge to points north. Fresh Pond, a junction of rail lines in Queens, is the nexus for rail services on geographic Long Island. Lines connecting the Long Island rail network to the national network extend from Fresh Pond north across the Hell Gate Bridge. Most North American rail freight moves in cars classified plate C (15 feet, 6 inches) or plate B (15 feet, 1 inch), but an increasing number of cars are being built 17 feet above the rail, or plate F. For the East-of-Hudson subregion, plate F cars present an increasingly daunting challenge: On the one hand, the commodities transported East-of-Hudson on plate F cars are important commodities, such as paper. On the other hand, unlike plate B or C cars, plate F cars cannot move freely through the East-of-Hudson rail system.

In North America, a growing number of new freight railcars of all plate dimensions are being constructed with trucks (or wheels) that allow 286,000 pounds gross weight on rail (GWOR). The lines East-of-Hudson are gradually being upgraded to handle 286,000 pounds GWOR, but the upgrading must be accelerated in order for the East-of-Hudson subregion even to maintain (let alone improve on) its current level of competitiveness.

SHARED USE OF PASSENGER RAIL

The New York metropolitan region has the most extensive and heavily traveled commuter rail systems in North America.[12] In general, the passenger and freight rail lines West-of-Hudson are separately owned and managed, although some are shared. East-of-Hudson, however, other than the Bay Ridge Line, most rail freight moves on track that is publicly owned and used to move passengers. The agencies that own and operate the region's rail lines provide extensive commuter and passenger services. Generally, these agencies are subsidized by a mixture of federal, state, and local government funds.

Since the 1980s, virtually all the rail lines East-of-Hudson have been owned and maintained by public agencies: the Long Island Railroad, Metro-North, and Amtrak. The transfer of the subregion's rail lines to public hands greatly changed the freight rail landscape. On Long Island, the freight service was provided by the LIRR until the system was privatized and the NYA started operating in 1997. In the Bronx, Westchester, and points north, freight services were always provided by private railroads.

East of the Hudson, public agencies invested heavily in improvements to and expansions of the passenger network but did little to keep the subregion's rail freight infrastructure up-to-date. This is understandable, for public transportation agencies recognize that the enhancement and improvement of passenger operations should be their primary focus and that the smooth operation of freight services is not. Historically, public agencies have not viewed freight service as within their mandate, and therefore the system has suffered from disinvestment and underutilization. A telling point is that even though much of the decline in freight traffic on the LIRR may not be directly attributable to management, the privately owned NYA has been able to reverse the long downward trend in Long Island rail freight traffic.

The LIRR is the country's most heavily traveled commuter railroad, providing service from geographic Long Island to Penn Station in New York City. It owns and maintains virtually all the rail lines in Long Island. With 68 locomotives, 187 coaches, and 933 EMUs,[13] the LIRR carries 290,000 passengers on a typical weekday, with a schedule of approximately 940 daily trains.[14] The LIRR network spans approximately 320 route miles, with 738 miles of track and 14 lines and branches.

The MTA Metro-North Railroad owns and maintains almost every rail line in the Bronx, Westchester, Putnam, and Dutchess counties. The Metro-North maintains and provides service on all Connecticut rail lines, extending to New Canaan, Danbury, Waterbury, and New Haven. The rail lines in Connecticut are owned by the state. Metro-North was created in 1982 to replace Conrail, which provided commuter rail operating and maintenance services to the MTA. Metro-North operates and maintains 738 track miles on three main routes terminating at Grand Central Terminal in Manhattan. On a typical weekday, the Metro-North operates 397 revenue passenger trains carrying 200,000 passengers.[15]

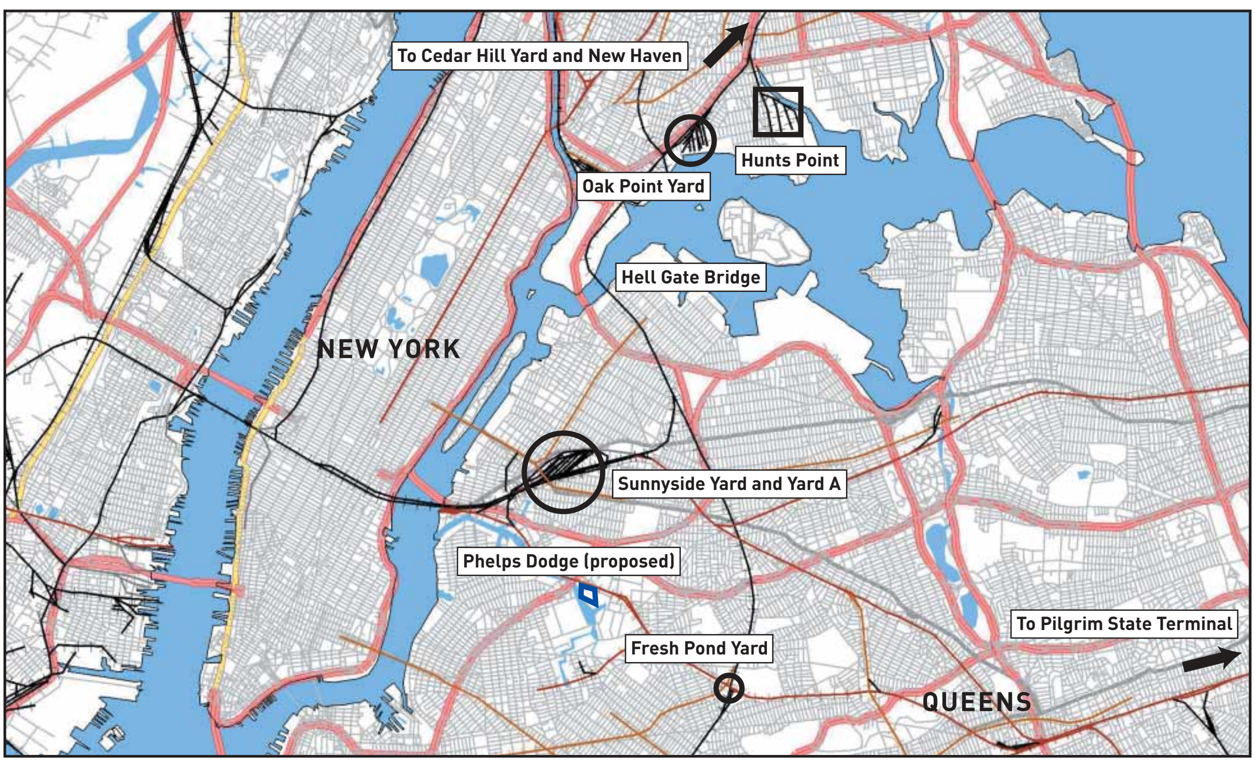
MAJOR RAIL FREIGHT YARDS AND INTERMODAL TERMINALS

Today, the East-of-Hudson subregion does not have the efficient and high-capacity rail yards that the West-of-Hudson system has. Nevertheless, the region has a number of yards, many of which can be upgraded (see Figure 2-2).

- Oak Point Yard is a 35-acre, highly utilized rail freight terminal in the South Bronx, owned and operated by CSX. CSX and CP are the only carriers at Oak Point.
- Fresh Pond Yard is a 10-acre rail freight yard in the Fresh Pond district of Queens, owned by the LIRR and operated by the NYA. The main rail carriers at

FIGURE 2-2

The freight rail network east of the Hudson River



Fresh Pond are the NYA, CSX, CP, and P&W. All on-rail freight originating or terminating in Brooklyn, Queens, or Long Island is delivered or received by the NYA at Fresh Pond from the intercity carriers CSX, CP, and P&W. The NYA is the sole freight carrier in Brooklyn, Queens, and Long Island.

- Harlem River Yard is a 28-acre facility in the South Bronx, owned by the New York State Department of Transportation (DOT) and operated by Harlem River Yard Ventures, Inc. CSX and CP serve this yard, which consists of an intermodal transfer facility and a large municipal waste transfer facility.
- Hunts Point Market is the largest food distribution center in North America, providing 80 percent of New York City's produce and 40 percent of the city's meat.[16] The produce terminal is served by rail. The complex also includes a major East-of-Hudson rail reload center that specializes in the distribution of flour. EDC rehabilitated its rail infrastructure with $5 million in federal and state funds.
- The Sixty-fifth Street Yard is a 25-acre yard owned by EDC and currently leased to CP. CP trains are forwarded to the yard from Fresh Pond by the NYA via the Bay Ridge Line. The facility contains 13 tracks, an intermodal transfer area, a reload area, and two float bridges to accommodate cross-harbor float operations (see Figure 5-1).
- In southwest Connecticut, CSX operates a reload center in the former Cedar Hill rail yard near New Haven. The Cedar Hill yard, now underutilized, was once used to distribute large amounts of freight throughout Connecticut. The P&W recently opened a reload center in southwest Connecticut (see Figure 2-1).

2.4 Improvement issues

In order to run modern freight trains along New York's tracks, the region must improve its obsolete rail network. Most of the railroad infrastructure in the area, especially in the East-of-Hudson subregion, was built in the nineteenth and early twentieth century, but since then the tracks, in many cases, have not been well maintained or upgraded for freight rail use. In the past, freight cars were shorter and lighter, so consequently bridges and other structures that limit the height and weight of rail cars were constructed over tracks that the freight system shares with commuter rail. In practice, this means that the East-of-Hudson has segments of track that limit those types of freight traffic that are in the greatest demand.

Freight rail improvements must take into account modern-day elevation and weight requirements for intermodal freight trains. Improving the tracks is a sensible option from a cost perspective,[17] as better tracks will improve overall efficiency, decrease costs, and render freight rail more convenient and competitive east of the Hudson than it is today.

RESTRICTIONS ON INTERMODAL FREIGHT RAIL

Intermodal freight is a vital part of the national freight network.[18] Today, much of the container traffic is off-loaded from trains in eastern Pennsylvania and northern New Jersey, mounted on tractor-trailer trucks, and driven across the Hudson River. A more efficient system might accommodate intermodal train traffic east of the Hudson. This subsection describes the basic features of trailer on flatcar

(TOFC), container on flatcar (COFC), and double-stack intermodal freight trains that use the West-of-Hudson system.

Intermodal trains move truck trailers and containers and carry many kinds of finished consumer goods, refrigerated foods, scrap, and raw materials. Because trailers and containers are able to move between modes, intermodal traffic is typically two way, in contrast to unit or mixed carload trains. Imported international containers may move inland from a seaport, be unloaded, and then reloaded with cargo, taking advantage of discounts offered by the railroads and container owners for the "backhaul."[19] This has helped make containers the fastest-growing segment of the maritime sector and thus crucial to the railroads.[20]

The two main components of an intermodal rail car are the container or trailer and the supporting flatcar.

Containers/trailers. Intermodal containers usually are between 8 feet, 6 inches, to 9 feet, 9 inches, high and measure 20 to 53 feet long.[21] International container capacity is measured in 20-foot equivalent units (TEUs), with one 20-foot container equaling one TEU, and one 40-foot container equaling two TEUs or one 40-foot equivalent unit (FEU). Most domestic containers range between 48 and 53 feet in length. The 40-foot containers are the standard in waterborne transportation. In 2000, international and domestic containers accounted for 51 and 23 percent, respectively, of total intermodal traffic. Traditional truck trailers vary from 28 to 53 feet in length and are typically 13 feet, 6 inches, in height; truck trailers account for about a quarter of intermodal moves (26 percent).

Flatcars. The many different kinds of flat cars have varying lengths, widths, and heights. The heights can range from 1 foot, 11 inches, to 4 feet, 8 inches, with most flat cars standing two to three feet above the rail, although according to the NS Intermodal Rules Circular, unrestricted rail transport is based on a worst-case flatcar deck height of 50 inches.

Most truck-to-rail traffic uses one of the three following methods:

Container on flatcar (COFC). Containers are directly placed on a flatcar. The 90-foot flatcars can accommodate up to four TEUs.

Trailer on flatcar (TOFC). Traditional truck trailers, or containers on a truck chassis, are lowered onto flatcars, wheels and all. Standard flatcars can accommodate no more than two containers or trailers, although some specially outfitted cars can handle as many as five.

Double-stack. Two containers are stacked, one on top of the other, and placed on special low-deck "well cars." Well cars can carry from two to 10 containers, depending on their length.[22] Double-stacking containers is an attractive option for shippers and clients because a train can move more than double the freight with greater fuel efficiency and a relatively small crew.

Although they are not structurally similar to TOFC and COFC cars, *auto carriers* handle time-sensitive, high-value goods. Automobiles are moved on special bi- or trilevel carriers, which have roughly the same overhead clearance as double-stack cars. Other innovative intermodal options are discussed in chapter 4.

Trailers on flatcars.

DAVID GRAHAM

As Table 2-1 shows, intermodal rail cars require certain minimal overhead clearances.

In the real world, the height of TOFC and COFC rail cars varies with the equipment. A special "bogie" well car that sits 16 inches off the ground makes the total height of a TOFC car 15 feet, 0 inches.[23] Obviously this kind of car can run on any part of the regional network. But generally, rail car manufacturers and railroad professionals believe clearances should be determined by each rail line. More than just bridges influence the desired clearance for a particular line. Other factors are the positioning of the overhead catenary (the electrical wire used to carry electricity to trains), the configuration of the tunnels, and the width of the tracks. Therefore, while a particular TOFC clearance may work on one line, it may not on another.

VERTICAL RAIL CLEARANCES AND WEIGHT LIMITS IN THE HUDSON REGION

One pressing problem for the improvement of the general freight rail lines east of the Hudson is clearances. On some lines, bridges and pedestrian crossings are simply too low for modern trains. Generally, clearance requirements are based on the height of individual cars, the size of containers stacked on a car, and the vertical space between the tracks and the car bottoms. The Association of American

TABLE 2-1
Minimum height clearances for intermodal cars

COFC single-stack	15 feet, 6 inches
TOFC	17 feet, 6 inches
Double-stack COFC (international containers)	19 feet, 4 inches
Most multilevel auto carriers	19 feet, 8 inches
Enclosed trilevel auto carriers	20 feet, 2 inches
High cube double-stack (domestic containers)	20 feet, 6 inches

Source: NYMTC Regional Freight Plan—Task 2, "Description of Freight Transportation System in the Region" (2001).

A double-stack train.

TED DAHLBURG/DELAWARE VALLEY GOODS MOVEMENT TASK FORCE

Railroads (AAR) sets the standards for rail clearances. “Plate” designations refer to the total vertical height of a rail car and are the standard system for estimating the heights of the rail cars and determining the necessary clearances.

Virtually all the freight rail lines providing service in New Jersey have clearances high enough for double-stack cars and cars that are 286,000 pounds gross-weight-on-rail (GWOR) compliant.[24] Thus, they can handle the heaviest freight rail cars without height restrictions.

The East-of-Hudson subregion, however, lags behind the national standards for clearances and weight limits. Currently, only the relatively low plate B and plate C boxcars can move freely in the subregion. Height restrictions rule out the use of popular, cheap, and efficient intermodal trains, which are heavy and tall. Movements of plate F cars, those with the greatest height, are restricted to areas outside the East-of-Hudson urban core. At the subregion’s south end, plate F cars can move only between the float bridges and Brooklyn’s Sixty-fifth Street yard.[25] At its north end, plate F cars can run only as far south as the Oak Point Yard.

TABLE 2-2
AAR height designations for common freight cars

Plate B boxcar	15 feet, 1 inch
Plate C boxcar	15 feet, 6 inches
Plate E boxcar	15 feet, 9’inches
Plate F boxcar	17 feet, 0 inches
Plate H boxcar	20 feet, 2 inches
Plate I (includes double-stack well cars) boxcar	20 feet, 6 inches
National clearance standard (future electrification)	23 feet, 0 inches

NOTE: The 2¾ inches above the top of the rail is the absolute minimum under any and all conditions of lading, operation, and maintenance. The LIRR demands a 4 inches buffer above the car, whereas Metro-North needs 6 inches.

Source: *The Official Railway Equipment Register,* vol. 117, no. 4, April 2002.

In addition, the subregion's rail network cannot handle the new weight limits. East-of-Hudson tracks meet the old standard of 263,000-pound GWOR, but national railroads rely on new cars that can carry 286,000 pounds. Individual line specifications for the subregion are as follows:

- *Hudson Line.* The Hudson Line currently allows limited TOFC service from Selkirk through Tarrytown and along the Oak Point Link to the Harlem River and Oak Point yards. As of February 2003, one track was able to accommodate TOFC cars along this entire distance.[26] Aside from that one track, the Hudson Line does not have TOFC clearance between Tarrytown and the Oak Point Link,[27] although it is scheduled to obtain clearance by 2004 on a second track through the Port Authority-New York DOT rail freight initiative (see section 2.5). The Hudson Line, in accordance with all Metro-North rail lines, is cleared for 286,000-pound GWOR cars.
- *LIRR Main Line track (including the Bay Ridge Branch).* At present, there is no TOFC clearance in Brooklyn, Queens, and Long Island, except for a very limited piece of track. Furthermore, 286,000-pound GWOR cars are not allowed on LIRR track, except for the recently cleared Lower Montauk Branch and the portion of track between Maspeth and Fresh Pond.
- *Fremont-Hell Gate.* There is no TOFC or 286,000-pound GWOR clearance in this corridor. The Hell Gate Bridge is a particularly important part of the network, which has not yet been cleared for 286,000-pound cars; CSX and Amtrak are working to resolve that issue.
- *New Haven Line.* This line is cleared only for plate C cars, although its tracks are rated for 286,000 pounds.

2.5 Rail projects currently underway and in the planning stage

In order to make the region's rail system more efficient, a number of repairs, improvements, and investments are needed. Maintenance of the existing rights-of-way, track expansion, rail yard development, and removal of height and weight limitations are key steps toward a more efficient freight system.

The New Jersey DOT, the New York DOT, Metro-North, the LIRR, and the Port Authority all are currently undertaking projects to enhance the regional rail freight system. Although all these projects are essential, none is large enough in scope to change the region's freight system dramatically. These public subsidies do, however, signal a shift toward public-sector investment in freight rail.

JOINT NEW YORK DOT-PORT AUTHORITY INFRASTRUCTURE IMPROVEMENT

> *This joint effort between the State Department of Transportation, the Port Authority, and the railroad industry will upgrade critical rail routes and facilities in the metropolitan region, in order to accommodate the doubling of freight traffic we anticipate over the next two decades.*
>
> —New York Governor George Pataki, September 22, 2002

The New York DOT and the Port Authority are jointly sponsoring a $40.195 million project to improve the regional rail freight network. New York State and the

Port Authority view the program as a first step toward alleviating the region's congestion problem.

The recommended projects are increasing track and yard capacity in Brooklyn and Queens; removing height and weight restrictions in Queens and the Bronx; and improving the flow of freight along the Hudson River Line in Westchester County, which today is the primary rail route for bringing freight into New York City and Long Island.[28]

The state is contributing $15.195 million, and the Port Authority, $25 million. The projects can be divided into four geographic components:

- $13.06 million ($6.5 million from the Port Authority) for clearance improvements on the Hudson Line. Metro-North has already committed funding in its 2000-2004 capital plan for the replacement of many station pedestrian overpasses to facilitate rail operations.[29] The funds allocated through the joint state-Port Authority initiative will finance the incremental cost of improving the vertical clearance to 23 feet, 0 inches, at the Metro-North Hastings Station pedestrian overpasses, as well as undercutting the track at two limiting structures at Dobbs Ferry. The initiative will also fund an additional power station for Track 1 in order to facilitate routing of freight and passenger operations. All these improvements will permit a second TOFC route on the Hudson Line south of Tarrytown to the Oak Point Link.[30]
- $7.4 million ($5.0 million from the Port Authority) for the Harlem River Yard, Oak Point Yard, and Hunts Point Market. This program includes a new intermodal track and TOFC support tracks that are meant to help the CSX TOFC and CP Expressway intermodal trains as well as the waste management sidings at Harlem River Yard. The plan also includes upgrading tracks and switches to accommodate plate F and 286,000-pound GWOR standards on at least two tracks at Oak Point Yard and the route leading to Hunts Point Market.[31]
- $11.8 million ($7.8 million from the Port Authority) for Queens. This will fund the extension of the second track northward to provide interchanges and passing siding to increase capacity and reduce delays between the Oak Point and Fresh Pond yards. Money has been allocated for the upgrade of existing rail yard facilities used by the NYA at Blissville and Maspeth. The funding necessary to re-rate the Hell Gate Bridge to 286,000-pound GWOR standards has been budgeted and will be taken out of the remaining balance.
- $7.935 million ($5.7 million from the Port Authority) for the Brooklyn Bay Ridge Branch and part of the Bushwick Branch. These funds will be used to make track and safety improvements on the Bay Ridge and Bushwick branches. In addition, the Fresh Pond Yard will be improved, including the relocation of the NYA engine house, more security fencing, and the restoration of an interchange track to facilitate rail car transfers. Finally, the project will perform engineering analyses to upgrade the Bay Ridge Line into a 17-foot 9-inch-, 286,000-pound-compliant piece of track.[32]

NEW JERSEY'S $80 MILLION FREIGHT RAIL IMPROVEMENT PROGRAM

In 2003, New Jersey Governor James McGreevey announced an $80 million package to improve freight rail access to the Meadowlands and Port Newark/Elizabeth.

The package includes a joint initiative with NS, CSX, and Conrail to increase the rail capacity of the Port Newark/Elizabeth marine terminal. The state's $25 million will be matched with an equal investment from the railroads. An additional $30 million of state money will go toward eliminating a grade crossing (where a roadway crosses a railroad) at Croxton Yard, by building a road bridge over the yard.

The state has also agreed on a $50 million plan in conjunction with the Port Authority to

- Add a second mainline track on the Chemical Coast Line serving the port complex to relieve congestion and improve efficiency.
- Provide a second track near Conrail's Oak Island Yard to improve train movements and eliminate delays.
- Provide a second main line track on the Lehigh Valley Line between Bound Brook and Clark to allow trains to move in both directions simultaneously, eliminating the need to idle on sidings.
- Acquire additional property in Oak Island to accommodate additional capacity and eliminate the "mountain" of stored containers that has grown over the years.[33]

OTHER ONGOING PROJECTS

Staten Island Railroad reactivation. In 1994 EDC purchased from CSX 10 miles of freight rail right-of-way known as the Travis Branch and the Arlington Yard, a 50-acre terminal in northern Staten Island. By the end of 2004, EDC plans to restore rail service between the northern-bound Chemical Coast Line in New Jersey and Staten Island. EDC also will improve Arlington Yard and build an extension of the Travis Branch to connect to the new Fresh Kills waste transfer station. Bridge replacements along the Travis Branch are being considered as well. The rail line will connect to the Visy paper plant and will be able to handle some municipal solid waste.

Hudson Line Platform and Station Improvement Project. In January 1999, Metro-North started this project to repair 17 stations on the Hudson Line, from Morris Heights in the Bronx through Ossining in Westchester County. Because Metro-North is obligated to allow plate F cars to run on the Hudson Line, the reconstruction efforts will take that into account. The New York DOT will provide funding to raise the height of three structures that are lower than 17 feet, 9 inches, the clearance that Metro-North requires for TOFC. Phase I of the project, the rehabilitation of structures from Morris Heights through Greystone, began in the fall of 2001 and will be completed in the fall of 2004.

Hell Gate Bridge Rehabilitation Project. The purpose of this project is to enable the Hell Gate Bridge to accommodate 286,000-pound rail cars. Amtrak owns the bridge, and CSX has trackage rights over it. Engineering personnel of the two railroads are reviewing the requirements and costs of enabling full 286,000-pound service over the bridge. The improvements will be financed by the New York DOT-Port Authority rail freight package.

LIRR Third-Track Project. The purpose of this project is to build a third track on the LIRR Main Line between Hicksville and Jamaica, a well-known traffic bottleneck for passenger operations. Although the primary purpose of this investment is to help increase the number of rush-hour trains to Manhattan and improve intra-island and reverse-commute operations, it will also facilitate freight rail operations. The project's proposed Environmental Impact Statement (EIS) was included in the 2000–2004 MTA capital program.

New York DOT Downstate Rail Clearance Program. This project will provide a comprehensive inventory of all structures and their vertical clearances throughout downstate New York. DOT staff members have been collaborating with the LIRR and Metro-North on this very important task.

CURRENT STUDIES

Hudson Railroad Corridor Transportation Plan. The purpose of this study is to provide a comprehensive analysis of train operations and infrastructure needs for the East-of-Hudson Line rail corridor.[34] This project will benefit the Metro-North, Amtrak), New York DOT, CSX, and CP. The study will analyze the following rail routes East-of-Hudson: Schenectady to New York City, Selkirk to Stuyvesant (i.e., CSX Selkirk Branch), and Highbridge Yard to Harlem River Yard (i.e., the Oak Point Link).

This project is supposed to produce a railroad corridor transportation plan with recommended infrastructure capital improvement programs for the near term (2007) and the long term (2022). It will include operational service plans to extend passenger and freight train movements, to raise schedule reliability, to increase speeds, to reduce lengths of trips, and to improve operating efficiencies.

Work on the project began in August 2002 and was to be completed by the third quarter of 2003.. It is slightly behind schedule, as the data collection is taking a little longer than expected. Metro-North is the contracting agency.

LIRR Clearance Study. The LIRR is conducting a clearance study of the Bay Ridge Branch and other rail lines in geographic Long Island. According to LIRR officials, the Bay Ridge and Montauk West portions of the network have almost been completely surveyed.

LIRR Bridge (Weight) Study. NYMTC and the MTA will determine whether certain sensitive structures on the LIRR track are capable of handling 286,000-pound GWOR trains. At least 18 undergrade crossings need to be examined. LIRR officials have indicated that a consultant has been selected and that the project is under way.

Pilgrim State Intermodal Facility Environmental Impact Statement (EIS). New York DOT is contemplating the development of a rail transload and TOFC/COFC terminal on state land near Deer Park Station on the LIRR Main Line. An EIS has been commissioned for this purpose. A consultant has been hired, and the EIS is due at the end of 2004.

Port Authority East of Hudson Infrastructure Improvement Program. This project is examining medium-term improvements to and investments in the rail system, and it will address the need to find customers to ship by rail. In effect, this study's main goal is to sort and analyze existing EDC data in order to use the current freight rail system most efficiently.

Cross-Harbor Freight Movement EIS. The New York City EDC is examining and analyzing a variety of alternatives to optimize rail freight transport in the region, including the construction of a cross-harbor rail freight tunnel.

2.6 Conclusion

The freight rail system west of the Hudson River is reasonably well integrated into the national freight rail system. It has an extensive system of rail yards, adequate clearances, and dedicated freight rail routes. The system east of the river, however, is not as well connected to the national rail network. Particularly in downstate New York, it suffers from clearance and track weight limits, deficiencies in yard space and intermodal facilities, problems inherent in the widely shared use of track, and no direct efficient connection across the Hudson River in the metropolitan region. All these problems make freight rail unattractive to many shippers doing business in the subregion. In many places in the subregion, railroads do not have the clearance required to take full advantage of economies of scale.

Several projects to improve the regional rail system have been launched. The New York DOT and Port Authority are improving the infrastructure on several lines in order to accommodate heavier loads, and the state of New Jersey is expanding its rail system to reduce delays. Other, smaller projects are attempting to increase the weight-bearing capacity and efficiency of the regional rail system. Several studies are being conducted to determine possibilities for new rail yards, greater clearance, and general increases in rail efficiency. While these efforts are promising, they will not achieve revitalization of the regional freight rail system.

Chapter 2 notes

1 AASHTO, *Transportation—Invest in America: Freight-Rail Bottom Line Report*, (2002). Available at http://nutcweb.tpc.nwu.edu/Sources/FRT/RAIL/AASHTO_railbottomline0103.pdf. Last accessed February 12, 2004.

2 NYMTC Regional Freight Plan-Task 2, "Description of Freight Transportation System in the Region" (2001), p. 3-4.

3 The entire corridor ranks as one of the busiest passenger rail lines in the nation, with more than 2,000 Amtrak and local agency commuter trains running each day. See National Rail Passenger Corporation, "Amtrak to Adjust Northeast Schedules October 27 to Improve Train Reliability," news release, October 10, 2003. Available at www.amtrak.com/press/atk20031010167.html. Last accessed February 12, 2004.

4 NYMTC Regional Freight Plan—Task 2, "Description," p. 3-3.

5 Ibid.

6 Most of the information in section 2.1 is from the NYMTC Regional Freight Plan—Task 2, "Description."

7 Intermodal lifts are transfers of containers and trailers among ship, rail, and truck.

8 NYMTC Regional Freight Plan—Task 2, "Description," p. 6-10.

9 All the information about ExpressRail is quoted from the Port Authority New York and New Jersey Web site: www.panynj.gov/commerce/ExpressRail.htm. Last accessed February 12, 2004.

10 A classified yard—more commonly known as a hump yard—switches cars from one train to another by pushing the cars up to a summit, then allowing gravity to pull them down into place, aided by human-controlled power switches.

11 Steve Myers, "CR Visitor Guide to Selkirk Yard," www.rr-fallenflags.org/cr/cr-skirk.html. Last accessed February 12, 2004.

[12] Most of the information in this subsection is from the NYMTC Regional Freight Plan—Task 2, "Description."

[13] EMU is the acronym for electric multiple units. These units are spaced along the train, not necessarily on every car, and allow the driver of the locomotive to electrically control the train's traction system. Before the advent of EMUs, the traction system was concentrated in the locomotive. EMUs make braking smoother and reduce turnaround times.

[14] NYMTC Regional Freight Plan—Task 2, "Description," p. 3-2.

[15] Ibid.

[16] EDC Plans for Rail Distribution in NYC, *Testimony before the Joint Hearing of the NYC Council Committee on Transportation and the Select Committee on Waterfronts* (January 13, 2003).

[17] In New York State, adding a mile of highway is several times more expensive than adding a mile of track.

[18] The discussion of intermodal equipment is primarily based on AASHTO's Freight-Rail Bottom-Line Report.

[19] AASHTO Freight Rail Bottom Line Report, p. 21.

[20] U.S. General Accounting Office (GAO), *Surface and Maritime Transportation - Developing Strategies for Enhancing Mobility: A National Challenge* (Washington, DC: GAO, 2002), 25.

[21] Ibid.

[22] This requires using an articulated car to enable and ease turning.

[23] Conversation with railroad engineer Walter Pogue.

[24] The latter weight is the standard maximum weight for freight rail cars in the national freight rail system.

[25] East of Hudson Rail Freight Operations Task Force, East of Hudson infrastructure memo.

[26] New York State's DOT staff recently modified an obstructing structure at the site of the old Yonkers sugar refinery plant to allow this.

[27] There is TOFC clearance on all four tracks between Poughkeepsie and Tarrytown and, from there on, only one track to the state-owned Oak Point link.

[28] New York Governor's Office, Press release: "$40 million for NYC Rail Infrastructure Improvements'" (September 22, 2002).

[29] See the Hudson Line Platform and Station Improvement Project in the next section.

[30] The New York State DOT is separately funding the incremental cost of raising clearances on two additional Hudson Line Metro-North stations at Glenwood and Dobbs Ferry ($6.56 million). It also is financing the undercutting of an additional highway structure in Tarrytown, as well as the replacement of the Vark Street utility structure in Yonkers and the Bridge Street highway structure in Irvington, and is buying two high car detectors ($3.7 million). With this project and the State-Port Authority $40 million, the New York State DOT is trying to provide (at least) TOFC level clearance along the Hudson Line on two routes.

[31] The New York State DOT is separately funding a highway project that will increase the vertical clearance at the intersection of Bruckner Boulevard and industrial siding to Hunts Point Market.

[32] The New York State DOT is separately funding a portion of these improvements on the Bay Ridge Line as well as the upgrades at Fresh Pond.

[33] NJDOT, Press release: "Gov. McGreevey Announces $80 Million for Freight Rail Improvements." Available at www.state.nj.us/transportation/press/2003releases/042903.htm. Last accessed February 12, 2004.

[34] All the information about the Hudson Line Railroad Corridor Transportation Plan is quoted from the project's December 14, 2001, work statement.

PART B

Improving regional mobility

CHAPTER 3

Goals and criteria for assessing freight transport investments

Given the dire states of both the trucking and rail networks in the Hudson region, it is crucial to ask which sorts of improvements, and in what proportions (rail versus trucking), would best meet the current and future freight needs of the region. Should investments in freight transport be principally in roadway capacity or in a combination of rail and water transport improvements, and should investments in highways to remove bottlenecks be limited? In order to compare investments in highway and freight rail capacity, we need a framework with criteria for measuring the costs, benefits, and impacts.

Any transportation investment should be good for the economy, the environment, and people's quality of life. This report compares investments in highways and freight rail to improve freight mobility options by using the following six criteria:

1. Which investment best reduces congestion on the region's roadways?
2. Does the investment have minimal land-use impacts? How does it change the quality of life of the surrounding communities and ecosystems?
3. Which investment leads to the biggest gains in air quality and the reduction of fossil-fuel consumption?
4. Which project does the most to strengthen the economy and provide jobs?
5. How expensive is the proposal? What are the operating and capital expenses?
6. Will the project improve security in downstate New York and the greater metropolitan area?

We suggest these criteria as a basis for comparing the merits of truck and rail improvements as the two main alternatives for increasing freight mobility and improving freight service in the Hudson region.

3.1 The potential for a capacity investment to reduce congestion

Nationwide, roadway congestion is heavily impeding mobility. A recent U.S. General Accounting Office report states that "congestion is generally growing for passenger and freight travel and will continue to increase at localized bottlenecks (places where the capacity of the transportation system is most limited), at peak travel times, and on all surface and maritime transportation modes to some extent."[1] Capacity is most limited in regions with heavily urbanized areas, like the Hudson region.

Recent studies by the New York Metropolitan Transportation Council (NYMTC) and the New York City Economic Development Corporation (EDC) predict that, if no action is taken, the movement of freight will dramatically increase, along with an equally dramatic increase in the number of truck vehicle miles traveled (VMT) and the number of trucks on the road. Nevertheless, a large investment in highway capacity cannot easily be restricted to truck use. Typically, in the New York metropolitan region and in every other metropolitan region, adding more highway lanes and building new roads actually lead to more car trips and more VMT. Paradoxically, more asphalt can result in less free space on our roads.

Without a well-formulated pricing system to deter potential new highway users, it is difficult to see how a greater highway capacity would help truck mobility. Transportation planners often fail to take into account the impact of added capacity on housing and business decisions. Instead, they tend to assume that car and truck VMT is independent of capacity, an assumption refuted by the experience of added highway capacity typically filling rapidly and congestion quickly returning.

An expanded and improved freight rail network may not have the same secondary effects on induced travel and decentralized land-use decisions. Although a shift from trucking to freight rail may free up highway capacity, it may not encourage travel as much as highly visible highway improvements could.

3.2 The comparative impacts of highway and freight rail investments in adjacent land and communities

The expanding roadways in the New York metropolitan region are squeezing land resources and adjacent communities. By some measures, the region is the most densely populated in the country, with concentrated office, retail, and business centers, and it usually is impossible to expand highways without encroaching on land that has other uses. Increasingly, community opposition thwarts highway projects, and for understandable reasons. Many local residents strongly opposed the expansion of the LIE in Queens and in some portions of Nassau County, and they have complicated efforts by the New York Department of Transportation (DOT) to expand the Staten Island Expressway. While transportation planners may think on paper about expanding roadway capacity, community or environmental organizations—rightly concerned about community and environmental impacts—can impede these plans.

Expanding freight rail or waterborne freight capacity may not have similar impacts on adjacent land use and communities. The region does not need to evict residents and tear down miles of businesses to lay tracks; most existing freight rail lines, like the Bay Ridge Branch in Brooklyn, can easily accommodate more freight rail transport. Many rail lines in the region have land in their rights-of-way for more trackage that will not encroach on adjacent land. Expanding freight rail yard capacity may have undesirable impacts on adjacent communities or businesses.

Raising clearances and increasing the strength of track to accommodate heavier freight rail cars have no impact whatsoever on adjacent land use and communities. Nevertheless, local noise and air pollution from the greater number of trains can extend beyond the rail right-of-way, just as vehicular traffic noise typically saturates the surrounding area. Communities are aware of this, and they often express concerns about rail system changes that affect their neighborhoods, just as communities located next to major roadways do. Noise barriers and, eventually, the noise reduction technologies discussed in chapter 4, could reduce these concerns.

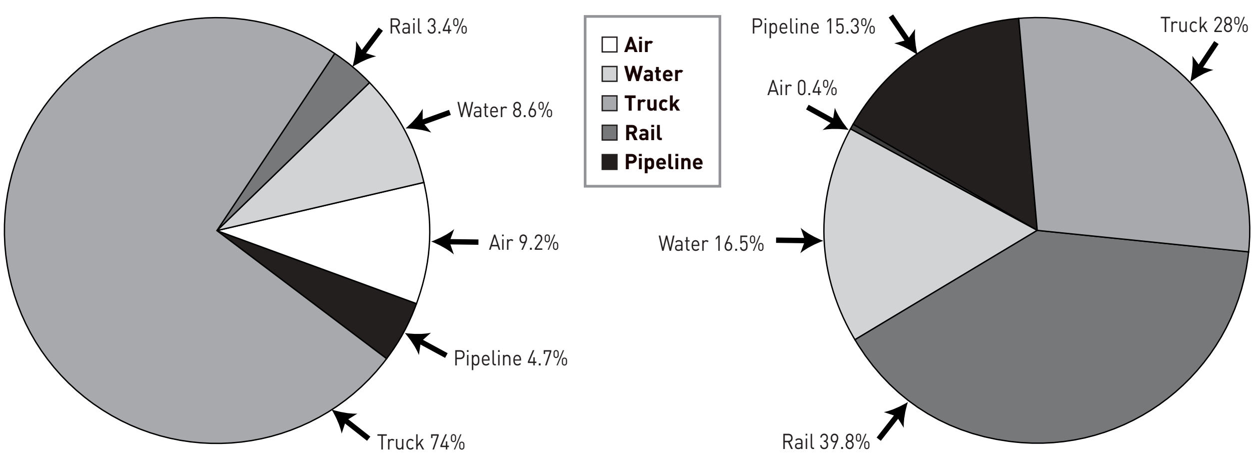
3.3 Comparative impacts of highway and freight rail investments in air quality and fossil-fuel energy consumption

What are the likely effects of comparative investments in highway versus freight rail for air pollutant emissions and fossil-based energy use? Freight rail is significantly more energy efficient and cleaner per ton-mile than trucks are and will be so for the foreseeable future.[2] If we assume that freight rail engines are used efficiently, several studies suggest that freight rail has decided advantages over truck use in regard to the emission of fine particulates and nitrogen oxides, as well as energy consumption per ton-mile of goods moved. Environmental Protection Agency (EPA) data suggest that per ton-mile, trucks emit three times more nitrogen oxides and particulate matter of than a locomotive does.[3] Compared to their share of ton-miles of freight hauled nationally, it appears trucks are responsible for a disproportionately large share of carbon dioxide (CO_2) emissions from the transportation sector (see Figure 3-1).

One recent study of fuel economies found that railroads are a little more than three times as fuel efficient as diesel trucks are, with an efficiency of 455 ton-miles per gallon, compared with diesel trucks' 105 ton-miles per gallon.[4] Furthermore, according to the U.S. Department of Energy, trucks expend 3,200 BTUs of energy per ton-mile, compared with a locomotive's average of 352, making trains almost 10 times as energy efficient.[5]

Improved truck engine technology and cleaner truck fuels can alter this equation, as reflected in EPA's recently affirmed truck engine emission and fuels rule that will take effect in 2006–2007.[6] Although under this rule all trucks will be required to use low-sulfur diesel fuel, the new emission control standards currently apply only to new trucks. For the foreseeable future, freight trains should be considered cleaner and more efficient than tractor-trailer trucks on a per-ton-mile basis. One of the main issues for both truck and rail improvements is that regional air quality benefits are generally achieved at the expense of some local increases in air pollution near intermodal facilities, depending on the particular engine technologies, fuels, and emissions standards. If residential communities are right next to such facilities, they are much more likely to notice the impact on

FIGURE 3-1
National transportation sector CO_2 emissions and ton-miles of freight hauled, 2001



Major sources of CO_2 emissions from fossil fuel combustion in transportation end-use sector in 2001

Ton-miles of freight hauled in 2001

Source: U.S. Environmental Protection Agency, U.S. Bureau of Transportation Statistics their local air quality than regional residents are to notice the benefits to their regional air.

3.4 Comparative development impacts of investments in highway and rail

Economic development is a primary consideration when evaluating a major transportation project. Given the very high cost of highway and rail transport investments, it is understandable to want to know what the region will get in return for its investment. Engineering and consulting firms use a variety of models to assess a specific project's overall effect on a region's economy.

It is very difficult to isolate the benefits of a particular freight transportation project, particularly when one includes external economic benefits as well as those not directly realized by the market, like reduced transportation costs because of the increased connectivity of the freight network.[7] On a quantitative level, economic development estimates may be based on regional freight transport costs and fuel efficiency, freight reliability, international trade volume, freight facility productivity, and many other factors.[8] All of these affect a region's employment rates, personal income levels, and corresponding standard of living. Overdependence on trucking, high shipping costs, high levels of congestion on critical freight corridors, and high warehousing costs all can hinder economic development in the East-of-Hudson subregion.[9] Any major transportation project would have to account, in some way, for its effects on shipping, warehousing, and congestion costs, which most large studies do not.

A comprehensive rail transportation project may alter shipping costs, fuel efficiency, freight reliability, international trade volume, and freight facility productivity. The reliable and cheap movement of goods translates into greater levels of employment, personal income, spending power, and economic growth. Nevertheless, the dearth of owned and available yard space in the East-of-Hudson subregion has made it impossible for freight rail to reach many important distribution centers to which shippers would move their products by rail if they had such access. In many areas of the regional rail network, track on both land and bridges (as well as dispatching and clearance, which will be discussed later) must be improved for rail to be able to carry certain types of freight effectively and efficiently.

In an effort to reach beyond merely stating the truism that every potential infrastructure investment is unique and that its development impact will depend in large part on other improvements, we offer the following comparative measures. Recent estimates by the American Trucking Associations (ATA) and the Association of American Railroads (AAR) indicate that it costs 2.7 cents per ton-mile to ship by rail, compared with 5 cents per ton-mile by truck. Based on data from the Bureau of Labor Statistics of the U.S. Department of Labor, the U.S. Department of Transportation estimates that labor productivity as measured by either output per hour worked or per employee grew by about 30 percent for trucking and 95 percent for railroads between 1987 and 2000.[10]

These data suggest that freight rail is becoming overall a more efficient means of transportation, reducing costs for shippers and end users. However, because freight rail offers generally higher productivity per employee, investments in rail infrastructure may reduce employment in the transportation sector even while they reduce costs, in other sectors. These reduced costs could lead to increases in income and employment in those sectors.

3.5 Comparative total capital and maintenance costs of highway and freight rail investments

It is nearly impossible to compare the capital and operating costs of rail with those of highways. Freight rail lines are dedicated to transporting goods, whereas highways are designed for both passenger vehicles and trucks. It is also difficult to divide highway capital and maintenance costs between trucks, on the one hand, and cars, on the other. Who will bear these costs and in what proportions are still more difficult to determine: the traditional methods of financing freight rail and highway capital and operating costs are very different, as chapter 7 explains in detail. In addressing any regional mobility problem, benefit-cost ratios of alternatives must be determined using appropriate economic forecasting based on commodity flows and consumer and shipper demand for various modes. This kind of evaluation is beyond the scope of this report.

3.6 Security and transportation-option diversification

It may be advantageous to have a modally more diverse system of freight transport in the Hudson region—and certainly the East-of-Hudson subregion—than what we have today, and freight rail could provide a meaningful alternative to the subregion's near-total dependence on truck transport. That is, if the use of one of the major current Hudson River crossing were precluded, this diversity might allow goods to continue to flow relatively uninterrupted and the economy to continue to function. In general, the use of both road and rail would add travel options and would mitigate the effects of such events.

3.7 Conclusion

Although transportation planning agencies and elected officials are willing to consider spending hundreds of millions or billions of dollars to expand the region's highway and transit systems, they have not seriously considered investing comparable sums to improve and expand freight rail capacity. Instead, the thinking for recent and current freight rail projects is in terms of tens of millions of dollars, not much larger sums. Indeed, a comparison of the benefits of investing large sums in freight rail or highway capacity with a view to improving freight mobility based on the preceding six criteria suggests that large investments in freight rail in the order of hundreds of millions or billions of dollars deserve serious consideration.

The six criteria presented in this chapter will be our rough guide in evaluating potential regional mobility improvements. Our focus will be on those dealing with freight rail, since the criteria suggest that these may, on the whole, yield greater benefits to regional freight mobility than roadway capacity improvements will. However, if we are going to think about large investments in the region's freight rail system, we should know what the state-of-the-art freight rail technologies look like and can do for the system's convenience, speed, and reliability. This is the subject of chapter 4. We then need to look at the options for major improvements in the freight rail system, particularly East-of-Hudson, with efficient trans-Hudson connections to the national freight system and adequate intermodal yard capacity. This is the subject of chapter 5.

Chapter 3 notes

[1] U.S.s General Accounting Office, *Surface and Maritime Transportation—Developing Strategies for Enhancing Mobility: A National Challenge* (Washington, DC: U.S. Government Printing Office, 2002)., p. 27.

[2] See, e.g., Massachusetts Institute of Technology and Charles River Associates, Inc., *Mobility 2001:World Mobility at the End of the Twentieth Century and Its Sustainability.* Available at www.wbcsd.org/plugins/DocSearch/details.asp?type=DocDet&DocId=185. Last accessed February 12, 2004.

[3] U.S. Department of Transportation, Bureau of Transportation Statistics, *National Transportation Statistics 2003,* BTS02-08 (Washington, DC: U.S. Government Printing Office, 2002) and Environmental Protection Agency, Office of Transportation and Air Quality, Facts & Figures. Available at www.epa.gov/otaq/smartway/facts.htm. Last accessed February 12, 2004.

[4] Cross Harbor Freight Movement Project, Presentation to Connecticut Strategy Board, September 6, 2002.

[5] Stacy C. Davis, *Transportation Energy Data Book,* 22nd ed. Prepared for the U.S. Department of Energy, Office of Planning, Budget Formulation and Analysis, Energy Efficiency and Renewable Energy (Oak Ridge, TN: Oak Ridge National Laboratory, 2002).

[6] See generally Environmental Protection Agency, *Cleaner Trucks, Buses, and Diesel Fuel Proposal.* Available at www.epa.gov/otaq/regs/hd2007/dsl-nprm.htm#documents. Last accessed February 12, 2004.

[7] Randall W. Eberts, "Principles for Government Involvement in Freight Infrastructure." In Transportation Research Board, *Policy Options for Intermodal Freight Transportation.* Special Report 252 (Washington, DC: National Academy Press, 1998), p. 136.

[8] For a more detailed account, see NYMTC Regional Freight Plan—Task 4, "Definition and Assessment of Needs" (2001), p. 6–9.

[9] Warehousing and distribution facilities are concentrated in northern New Jersey, where they enjoy unobstructed landside access and opportunity for expansion. Some experts have suggested combining these facilities with transfer and logistics facilities to form something akin to Europe's "global freight villages." See Roberta E. Weisbrod, Ernest Swiger, Gerhardt Muller, F. Mack Rugg, and Mary Kay Murphy, "Global Freight Villages: A Solution to the Urban Freight Dilemma," paper presented at the annual meeting of the Transportation Research Board, Washington, DC, January 2002.

[10] *National Transportation Statistics 2003.*

CHAPTER 4

Freight railroad technological development and institutional trends

Over the past two decades the American railroad industry has developed and adopted new technologies that have made it more efficient and better able to adjust to the changing industrial demographics. As a result, all trains move faster; labor productivity is higher per ton-mile by almost 300 percent; and the rate charged per ton-mile to move freight is about 30 percent less than it was in 1981.[1] Today, new technologies are evolving that, when ready and integrated, will allow the railroads to offer competitive short-haul services.

In order to realize the full benefits of the technological advances available now and in the near future, railroads must modify their operations. In the United States, nearly all rail freight transportation is provided by privately owned shareholder companies, each of which falls into one of three broad categories: Class I, regional (Class II), and short-line (Class III) railroads. In 2000, the six Class I railroads generated 86 percent of the freight carloads and 94 percent of freight rail revenue. While numbering in the hundreds, short-line railroads are, for the most part, spin-off segments of track not wanted by the Class I carriers. Their fiscal sustainability often depends on public funding. Regional railroads, which number no more than a dozen and a half, generally serve self-contained markets. The Providence and Worcester Railroad (P&W), which covers southern New England, and the Wisconsin Central, which serves the north central plains region, are two examples of this. The nature of their markets allows most regional carriers to be less dependent on interchanges provided by Class I carriers than short lines are.

In the years immediately preceding the railroads' deregulation, begun in 1980, the number of Class I carriers dropped quickly because of mergers and other forms of consolidation.[2] As these large carriers consolidated, management was able to direct traffic to selected core corridors, partially in response to the 1980 Staggers Act's relaxation of restrictions on the abandonment of unprofitable lines.[3] Concurrently, railroads employed various operational optimization models to respond better to the demand for freight rail services than they had previously.[4] These models invariably instructed the railroads to focus more on long, time-insensitive hauls on the core corridors, usually in heavy commodity markets in which the unreliability of rail deterred shippers less and the economies of scale offered by adding cars to create long trains could be fully realized. Following the models, the railroads greatly improved the efficiency of their operations. The core corridors became the focus of a vast infrastructural and technological makeover to enhance efficiency, the success of which is evidenced by the industry's posting in 2000 the lowest cost per ton-mile ever attained.

These institutional changes have led to increases in the rate of return on capital investment in railroads.[5] Although the rate of return remains below the cost of capital, it continues to rise, often through capital expenditure cuts made in response to shareholders' dissatisfaction with the railroads' tendency to shift efficiency gains to customers rather than to the shareholders themselves.[6]

Nevertheless, these achievements have had a price, for even though the industry is setting productivity and ton-mile records, rail's share of the freight market has declined, and whole geographic areas of service have been abandoned.[7] Indeed, relative to the growth in the economy, we could even say that the industry is underperforming. Economic growth has allowed the railroad industry to focus on a small corner of the freight transportation market, namely, heavy goods and some light intermodal goods carried over very long distances. Some long-term results of these policies for the Hudson region are the absence of a reasonably truck-competitive intermodal rail service (1) between the New York metropolitan area and other metropolitan areas, such as Cleveland, Detroit, and Pittsburgh; and (2) along the entire Northeast Corridor from Richmond, Virginia, to Portland, Maine.

As the railroads consolidate, they will continue to exploit their comparative advantage in the long-haul movement of light intermodal freight through high-density, high-production corridors. To prevent competition, deselected lines (i.e., those downgraded from main-line usage following the consolidation of assets) have been, and will continue to be, abandoned, and intermodal transfer facilities will often be established in locations on the outskirts of metropolitan areas.[8] From these facilities, trucks will carry the loads the rest of the way. This practice maximizes the benefits from longer hauls but leaves the railroads with few other ways of sustaining themselves as they abandon the competing infrastructure and tailor their line capacity and technology to the heavier and longer trains traveling great distances. These trends, while to some degree applicable to all U.S. railroads, have been felt particularly East-of-Hudson, where their reversal requires changes in operations.

In sum, in order to maintain and increase market share, the railroads must begin to serve markets that involve shorter hauls on stricter schedules and, in many cases, with shorter trains. To do this in a way that satisfies both operational optimization models and shareholders, they must adopt new technologies. This chapter discusses the institutional changes required to advance this effort in the context of the technological changes that will enable and, in some cases, accelerate it.

Section 4.1 considers faster service for all types of freight rail, and section 4.2 describes a few innovative intermodal technologies. The East-of-Hudson subregion needs a more efficient and dependable way to move freight trains across the Hudson, and to that end section 4.3 considers the potential of and requirements for a modern railway barge system and modern loading float bridges. The technology report concludes with sections 4.4 and 4.5, a discussion of improved tracks, cleaner fuel-consuming locomotives, and better customer service.

4.1 Faster service

The average freight train may never be as fast as a truck, but the system can come close. Electric braking, tight dispatching, more modern and fuel-efficient locomotives, and well-maintained tracks and equipment can make regular freight rail service better than it is now.

Intermodal service already is significantly faster than most freight trains and some highway truck service, and could be improved even more by using the existing railroad infrastructure effectively, as well as alternative and parallel routes (section 4.2 looks at improved intermodal service).

Just how slow is freight rail? Class I railroads move freight at an average speed of about 25 miles per hour (see Table 4-1).[9] This is not as slow as it sounds, since it includes some idling time, but it is still much slower than the speed of trucks. Nevertheless, intermodal freight, which generally is time sensitive, moves about 30 to 40

TABLE 4-1
Average train speeds

Freight carrier	All trains	Intermodal trains
CSX Transportation	22.4 mph	29.9 mph
Norfolk Southern	23.3 mph	29.8 mph
Union Pacific Railway	25.3 mph	32.0 mph
Burlington Northern Santa Fe	25.4 mph	35.1 mph
Kansas City Southern Lines	27.0 mph	28.4 mph
Canadian Pacific Railway	27.5 mph	32.9 mph
Canadian National	28.1 mph	34.1 mph

Source: Railroad Performance Measures (www.railroadpm.org). All figures are third-quarter 2003 averages.

percent faster than this, demonstrating that slow service is not built into the system but is to some degree a by-product of the operational trends just described.

In fact, intermodal trains are slowed by having to share track with longer, slower-moving freight trains. Intermodal trains could run as fast as 70 mph, but in order for them to do so, sidings and tracks would have to be added in some places, and the operation of other freight trains would have to be changed. Some freight trains in the Northeast already operate at or about 70 mph, and most of those do not go faster for one or both of two reasons. The first pertains to the good being transported. If their customers do not demand a scheduled delivery, the railroads run the trains slower to reduce wear and tear and sometimes fuel consumption. The second reason is precautionary: trains are run slower than 70 mph so that faster speeds can be reserved for making up lost time.

Although many freight trains can go even faster than 70 mph, that threshold is not at all arbitrary. Most freight track is classified either at Class 3 or Class 4 and, when the track is used by high-speed passenger trains, Class 5.[10] At Class 5, the Federal Railroad Administration's (FRA's) regulations do not permit freight trains to go faster than 80 mph. Since time must be allotted for recovering from delays, this effectively caps freight trains' speed on Class 5 track at roughly 70 mph. When an operator wants to run a freight train faster than 80 mph, the FRA requires that the track be at Class 6 and that the train meet certain dynamic requirements.[11] For longer hauls, the railroads have little incentive to upgrade the track. The initiation of shorter, scheduled trips at higher speeds would help them acquire market share in many markets in which they are currently marginalized, but in some cases, the track would have to be improved for rail to be competitive with trucking.

Operating trains at high speeds also requires that the right-of-way and the rail cars be well maintained and that an advanced signaling system be in place. Of course, railroads are enormously capital intensive, and many lack the capital to make crucial improvements (see chapter 5 for a discussion of specific improvements and chapter 7 for a brief description of the financial state of the freight rail industry).

New locomotives are capable of moving freight significantly faster than they do now. While many such locomotives are designed for passenger service, freight rail could use them if they were accompanied by other technological improvements. Currently, a large part of the reliability problem with freight rail stems from its irregular velocity due to the trains' frequent stops, some systematic and some sporadic.

New braking technology makes it possible for freight trains to stop in much shorter distances—up to 70 percent shorter—than is currently the case in the Hudson

SMITH MARKETING SERVICES

New York Air Brake's EP-60 ECP brake

region. By now all passenger cars in the United States and Canada are equipped with electric braking systems, but since the 1860s, freight trains have relied on air brakes, a system of pressurized tubes that begins in the locomotive. For particularly long freight trains, it can take as long as two minutes for the air pulse to travel to the last car, making stopping distances extraordinarily long. Some freight trains have recently been fitted with electrodynamic braking, also called electronically controlled pneumatic braking, or ECP. ECP systems synchronize braking and have sophisticated self-diagnostic tools. These systems reduce slack action, breakaways, and derailments. Because freight trains with ECP have shorter stopping distances, it is possible to run them closer together, interspersed between passenger trains at any time of day when appropriate, permitting faster and more efficient shipping that meets the regularity required for sharing tracks with passenger trains, compared with freight trains with traditional air brakes.[12]

Another problem with dispatching freight trains is the system used to keep trains a safe distance apart. Today, most freight trains are dispatched using a block system: a train is assigned a block of track, regardless of length, and inside that space it has freedom of movement. The River Line in New Jersey exemplifies the underutilized capacity resulting from the fixed nature of the block system. A more efficient system, using a global positioning system (GPS), would make it safe to run trains comparatively close together, with automatic slowdowns and engine cutoffs if the trains draw too close. Passenger trains already use this system, usually called positive train control (PTS). Freight carriers could retrofit their fleets with PTS technology, which would lead to safer train operation, better fuel efficiency, and faster service.[13] Even with ECP and PTS, long, 9,000-foot freight trains would have difficulty sharing a track with passenger trains. Freight railroads could therefore use shorter trains to take advantage of this more efficient service to attract business from customers currently shipping by truck.

Trains equipped with high-speed capabilities mean little to customers unless they arrive on time and provide dependable service. The relaxed dispatching of freight trains makes this extremely difficult, however. Freight trains do not have the regular schedule of passenger rail, operators are not penalized for late service; and trains are not scheduled as closely as possible. Even so, relaxed dispatching has become commonplace. Shipments sometimes arrive days later than planned, undoubtedly discouraging prospective customers from using rail.

Dispatching is the responsibility of individual carriers. Disciplined dispatching in accordance with a fixed operating plan is certainly a reasonable expectation. Companies that move time-sensitive intermodal freight (just-in-time shipping) already run tight schedules, although some people would argue that elapsed times are still too long. Generally speaking, North American railroads have a good record for moving dedicated intermodal trains fast and reliably. Some major intermodal users, such as UPS, pay a premium for faster-than-normal intermodal train service. The users of these special trains are given a money-back guarantee of on-time departure and arrival. A good example of top-of-the-line train speed in the East is the CSX Buffalo-to-Selkirk Corridor, where intermodal trains run up to 70 mph for

NORFOLK SOUTHERN

Modern freight rail dispatching.

substantial periods of time. Even though the extra expense of moving freight at this speed is not always economically efficient, the current system of dispatching is damaging freight rail's long-term health.

Freight rail should be able to work closely with passenger rail carriers. Penn Central once ran a late-night mail and express train through Pennsylvania Station, from New Haven to Philadelphia. It was a train of considerable length, used COFC equipment, and even had a caboose. The service was discontinued when the Northeast Corridor (and the tunnels between Washington, D.C., New York, and Boston), on which it ran, was sold to Amtrak. In recent years Amtrak has opposed efforts to allow the operation of intermodal trains through New York's tunnels and Pennsylvania Station.[14] Yet the service exemplifies the benefits attainable with the close cooperation of freight and passenger rail. Tighter scheduling and faster service are technologically feasible when freight and passenger managements are willing and public or private sources are available to finance the necessary technological and infrastructure improvements.

ADVANCES IN EUROPEAN SERVICE

Over the past 30 years, the amount of freight moved by rail in Europe has declined sharply. Compared with freight rail in North America, the European system is balkanized and expensive but exceptionally well maintained. Rail moves only 8.4 percent of goods in Europe, about half the American average, and service is generally poor.[15] In Europe, freight trains move at an average of 12 mph. As one European Union (E.U.) report points out, this is about the speed of an icebreaker in the Baltic Sea cutting a path during the chilliest part of winter. Most of Europe looks, with some chagrin, to the superior freight rail system in North America.

Nevertheless, in recent years Europe—particularly France, Italy, Switzerland, Austria, and Germany—has tried to move more freight by rail. The European Commission is in the process of finalizing a five-point plan to improve rail freight service.[16] With this project, the E.U. envisions a 70 percent increase in freight rail tonnage by 2020, doubling rail's share of the freight market.[17] Partly as a result, the continent has become a crucible of freight rail modernization in infrastructure, technology, and operational strategies.

Why the sudden emphasis on freight rail? Like the American Northeast, much of Europe is densely populated, and roadways have become overwhelmed by truck traffic. For both environmental and economic reasons, the E.U. seeks a more diverse freight transportation system. Moreover, particularly in the Alps, governments and residents have looked to freight rail for safety and environmental reasons. Although noisy roadways and exhaust fumes have, in the views of many, marred the mountains, safety has become the primary impetus to shift truck traffic to trains.

In part, advances have been forced by a number of catastrophes that closed various routes to commerce for lengthy periods of time. Through the 1990s, Europe suffered a series of horrific disasters in Alpine highway tunnels resulting in dozens of fatalities, many of them involving tractor-trailer trucks carrying freight. Probably the worst was the 1999 Mont Blanc tunnel disaster, in which a truck carrying margarine and flour caught fire. The ensuing conflagration took three days to put out and killed 39 people. But this was hardly the only, or the last, incident. In the fall of 2001, a head-on tractor-trailer collision in Switzerland's Gotthard Tunnel sparked another fire that left 10 people dead. Likewise, in North America the safety record of trucks pales next to that of trains.[18] With these kinds of disasters in mind and wary of the human cost of moving trucks through the Alps, European governments redoubled their efforts to move freight by rail.

Ironically, before the Gotthard disaster, Switzerland's constitution had been amended by a popular referendum to require that all trans-Alpine traffic be moved by rail.[19] A second article stipulated that the transition to freight rail must be completed within 10 years, and it imposed a tariff to fund the project.[20]

Italy, France, Switzerland, Austria, and Germany are collaborating to build a network of tunnels, including the 71.7-kilometer Lyon-Turin Ferroviare, which will accommodate both passenger and freight operations. In order to integrate high-speed passenger service with freight rail, Alpine freight carriers have been forced to make two major changes. First, they have built modified TOFC cars that can run tractor-trailer trucks through low-clearance passenger rail tunnels and within the clearance profile envelope under the catenary system. Second, they have been forced to dispatch freight trains with extreme efficiency to accommodate the fixed schedules of passenger service.

Freight train dispatching in the Alps is, by necessity, timely and efficient. In part, the freight companies have been forced to comply with passenger carriers, which must have reliable, regular service, and with truck drivers, who need prompt intermodal connections. To cross the Alps, railroads have instituted special truck trains. A truck driver is able to drive his vehicle onto the bed of a flatcar, park it, walk away, and board the passenger car provided for drivers on the same train from, say, Lyon to Turin. In Turin the driver walks up to the intermodal car holding his truck and drives away. Trains leave the loading area at regular time intervals (e.g., at 20 minutes past, 40 minutes past, and on the hour), and drivers expect their truck trains to arrive promptly at the other end of the tunnel. On long-distance overnight service, second-class sleeping cars are provided for the drivers, enabling them to get a night's sleep as good as or better than they would get in the cab of a truck.

Since dispatching must accommodate passenger traffic, freight trains are often given specific mileposts they must meet by certain times or else face penalties. In return, freight trains are allowed to run at speeds close to that of passenger trains. In some parts of Alpine Europe, it is common to see an 18-car passenger train fly past and, on its heels, a 100-car, three-locomotive freight train moving at 60 mph. This would be an astounding sight in America, but it should not be.

While by no means a comprehensive list, the following routes accommodate high-speed freight service in Alpine Europe, on parts or all of the lines:

1. The Austrian railways cargo network (ÖBB) between Vienna and destinations west and south through the Alps.

2. Over the Brenner Pass between Austria and Italy, passing through Innsbruck and Bolzano and into northeast Italy.

A BLS freight train travels through the Austrian Alps near the Lötschberg Tunnel.


BLS LÖTSCHBERGBAHN

3. From Milan north into Switzerland through the Gotthard Tunnel to Zurich and then Germany and Austria, and through the Simplon Tunnel to Brig, Geneva, and beyond to France. Both tunnels are double-tracked.
4. In Switzerland, on the Bern Lötchberg Simplon (BLS) Railway's main line between Brig, Bern, and Basel, and then on into France and Germany.

There is no reason why the New York area, plagued by the same truck-related congestion problems, cannot operate freight as quickly and efficiently. The biggest investment, as the Europeans have demonstrated, is in dispatching discipline, equipment technology, and operational philosophy.

4.2 Advanced intermodal transport

Today, coal accounts for 44 percent of rail freight tonnage in the United States,[21] although intermodal traffic is rapidly becoming the primary growth market in rail freight and holds the most promise for expanding traffic in the future. Over the past 10 years, intermodal traffic has been the fastest-growing segment of the industry and now accounts for about a fifth of freight rail's revenue.[22]

The United States has two popular methods of intermodal transport, TOFC and COFC (see section 2.3 for a more detailed description of traditional intermodal services). But planners should be aware that there are innovative alternatives to traditional intermodal service that, together with an improved rail infrastructure would provide relief for the region's troubled transportation network.

SAVING TIME WITH SHORTER HAULS AND INTERMODAL SERVICE

The railroads' share of goods that must be transported more than 1,000 miles is respectable, but their share below 1,000 miles is not. As a result, the modal distribution of freight for short and intermediate distances is lopsided and overly dependent on trucks. For rail, becoming a competitive alternative to trucks for shorter distances will require not only some expansion of line capacity (discussed further in chapter 5) but also the application and use of available and developing technologies. These changes will require an increase in the number of trains offering service directly between important trading partners. As mentioned earlier, New York and Cleveland lack a competitive alternative to truck service for transporting freight.

The railroads will also need to institute more frequent services. Some trading partners are very large and have many different freight transportation needs. To serve these needs, it often is best to run shorter trains more frequently in order to accommodate various schedules and loads. This, as well as direct service to smaller markets, will demand flexibility from the railroads that can be accommodated best (and, in some cases, only) by faster speeds. Shorter trains do cost more to operate per ton-mile because of fixed labor costs, but these costs can be partially offset by the development of low-cost locomotives and other equipment. Europe and Canada are experimenting with a new kind of short-haul intermodal service—sometimes for distances as short as 200 miles—that should attract both rail carriers and truckers in the United States.[23]

To the north, the intermediate-haul Montreal-Toronto-Detroit run (about 560 miles) makes money for the Canadian Pacific (CP) and Canadian National (CN) railroads. CP recently inaugurated an "Expressway" service, similar to its Iron Highway service. Trucks are driven onto specialized railcar flatbeds and then moved by rail to their terminal destination. CP offers twice-daily service between Montreal, Toronto, Windsor, and, beginning this year, Detroit. According to a company press release, the Expressway service has been fully booked for "almost every trip" over the last year. The service has recently added Ford Motor Company to its list of clients and is expanding.[24] Competing along the Toronto-to-Montreal route is Canadian National's RoadRailer service, in which reinforced truck trailers are placed on rail wheels, without removing the truck from its chassis, and pulled by a locomotive.

In the Alps, geography has spurred a similar kind of innovation. For truckers, the Alps are a massive barrier, one that is unluckily located right in the center of the continent. It is almost as if the Himalayas were placed between New York and Washington; trucks on the I-95 corridor would move slowly if they had to navigate sharp switchbacks and narrow tunnels in Delaware and New Jersey. Actually, trucks in the region face a Mont Blanc of their own: the George Washington Bridge and the New York metropolitan area's traffic. What if they could avoid the congestion on the Hudson River while still delivering the door-to-door service associated with trucking?

The northeastern United States could emulate France's nationalized rail carrier, known as SNCF, and other European rail carriers. Truckers driving north could drive their rigs onto specially outfitted trains at a southern point, in New Jersey or as far south as Washington, D.C., or Virginia. The trucks would travel by rail under the Hudson, and truckers would get back in them once they passed the snarl of traffic in the metropolitan area—probably in New Haven, where there is ample yard space to accommodate them, or in geographic Long Island or the Bronx, if adequate intermodal yard space became available. With the proper structure and financing, the system could take trucks off the road, easing congestion, creating jobs, and leaving cleaner, healthier air.

It is unclear exactly where such service should be provided and how it should be financed in order to encourage trucking companies to take advantage of it. Although these questions are beyond the scope of this study and our expertise, what does seem evident is that the concept merits close study, soon.

THE ALPS' LOW-PROFILE, FAST-LOADING INTERMODAL CARS

The current intermodal rail system in the Northeast, and certainly east of the Hudson, is ill equipped to handle this kind of rapid-transition traffic. The first problem is the slow speed of most American freight rail. But the previous section demonstrated that swift and reliable freight train dispatching is possible, even at passenger train speeds, if carriers have incentives to commit to it. A second obstacle is technical: putting truck containers into deep-well train cars is not unusually slow, but it is not very fast, either, and the rail system's clearance remains a problem.

The Alpine rail providers faced the same two obstacles. Many of the tunnels and bridge clearances were too low for traditional TOFC service, and loading trailers onto the back of railcars was prohibitively slow, requiring a crane or gantry. They therefore designed a unique railcar system with a low clearance profile and a quick-loading system, known as Modalohr.

Modalohr railcars have a rotating bed—it looks a bit like a Swiss Army knife—so that multiple trucks can load simultaneously. When the bed swings out, the tractor-trailer drives onto the railcar. In some models, the cab is unhitched, and it drives onto a separate flatcar, which usually carries two truck cabs. Modalohr's intermodal car also has a flat floor, making it possible to load vehicles of almost any size without the need for special equipment or the reinforcement of the trailers.

The Modalohr car also enjoys a low profile—a benefit of having wheels with a very small diameter. Historically, trains have had large wheels because small wheels present a formidable engineering challenge. The friction associated with the movement of steel wheels over steel rails is good in that it makes trains much more energy efficient than cars, since rubber does not grip asphalt as tightly as steel does. But steel generates tremendous heat. As a result, train wheels usually are designed to have a generous surface area in order to radiate the heat efficiently, as well as to accommodate heavy loads, and so flatcars have an accordingly high profile. Using a novel system of ball bearings, Modalohr and others have been able to resolve the friction problem, and, by distributing the weight over four to eight axles, the cars can carry high-tonnage freight.

Since Modalohr cars are a new technology and so far have been ordered only in small batches, they are relatively expensive to buy. In 2002, SNCF bought 35 cars at a cost of approximately $12.9 million. Since each car carries two trucks, this works out to an average of $184,000 per unit of truck space. How does this compare with the rest of the railcar market? In Europe, over the past fiscal year, Greenbrier Co. received orders for 1,300 Modalohr cars at $130 million; this figure applies to all types of railcars, from intermodal to boxcar to coal hoppers. Roughly speaking, then, a mass-produced railcar costs $100,000.[25] It is reasonable to expect that as the technology matures and the order sizes increase, economies of scale and competition will drive down the cost to close to that of a traditional intermodal car. Rail carriers should consider the service as an option and investigate pricing.[26] In 2003 SNCF experimented with using Modalohr cars in its Lyon-Turin tunnel. In addition to the Modalohr cars, the trains carry a passenger car for the truckers, complete with televisions and other amenities. By 2006, SNCF plans to offer regular service, with between 20 and 30 departures per day.

THE AMERICAN RESPONSE

The North American answer to European-style intermodal cars has been services like the Expressway and, before that, the Iron Highway. Like Modalohr's cars, Expressway service is roll-on, roll-off, and it can accommodate most tractor-trailers, albeit with limitations. Since the Iron Highway is older and has problems, this section will focus on CP's recently introduced and revamped Expressway service from Montreal through Toronto and on to Detroit.

CP's Expressway operates on a regular schedule for the convenience of truckers. It only takes 15 minutes for a truck to check in. The driver enters the terminal, unhooks the trailer, and has his ticket scanned. He then leaves the yard in the truck cab, often after attaching another trailer brought to the terminal by the service. A specially designed tractor rolls the trailer onto the flatbed, where it is secured. Since the truck is loaded by way of a ramp, the rough handling associated with cranes is avoided. At the other end, the trailer is ready to be picked up within 60 minutes of the train's arrival.

According to CP, the service has been a success. The company recently ordered 50 more flatcars to add to its fleet of 260, and it has acquired high-profile clients, including the Ford Motor Company. The recent addition of the Detroit leg should lead to more business, although the Detroit-to-Montreal run is not as fast as the Toronto-to-Montreal service, generally offering second-morning availability, instead of first-morning availability, after the departure date.[27] Expressway does not require extensive terminal equipment: the principal addition to the yard is a security ticket system to make sure that the trailers are not stolen.

The Expressway service differs from the Modalohr-style intermodal in the following ways:

1. It requires a specialized tractor to load the trailer.
2. Truck cabs are *not* carried on board the train. For some companies this is an advantage, since the driver uses his cab to reach the rail yard. Other companies, without enough free cabs at the terminal destination, find this extremely inconvenient.
3. Loading and unloading times are substantially longer. The simultaneous loading of many trucks is not possible.
4. The clearance profile of Expressway is higher than that of Alpine intermodal cars.

Although Expressway is a worthwhile service, and one that ought to be widely available in the United States, the Modalohr system has a number of advantages. As U.S. companies consider expanding their intermodal service, it seems likely that roll-on/roll-off service will become popular.

ROADRAILER, REEFERRAILER, AND RAILRUNNER

In some circumstances, shippers do not even need railcars to move containers by locomotive.[28] Wabash National's RoadRailer and ReeferRailer,[29] as well as the forthcoming RailRunner built by RailRunner, N.A., make it possible to attach train "wheels—"bogies"—to the bottom of truck trailers. The trailers are hitched together and pulled by a conventional locomotive along the nation's freight rail network. Since RoadRailers ride low to the ground, they can travel virtually anywhere, and all cars conform to plate B boxcar height standards so that they can move freely East-of-Hudson. RoadRailers are now in use in the United States, but the railroad industry does not regard them as important, even though they have the potential to capture a significant portion of short-haul intermodal service.

TRIPLE CROWN

TRIPLE CROWN

Top: A Triple Crown RoadRailer being prepared for attachment to a bogie. Bottom: A Triple Crown RoadRailer attached to a bogie.

RoadRailer service offers the door-to-door flexibility of truck shipping with freight rail efficiency. At the yard, the trailer's air-ride suspension lifts the vehicle onto a bogie where it is locked in place, the truck wheels are retracted, and the tractor is unhitched. Each trailer needs only one bogie, although the train is organized into units of trailers with CouplerMate bogies separating a series of trailers. The trailers and bogies are strong enough to accommodate a train with up to 125 trailers and, depending on the configuration, have a maximum speed between 70 and 90 mph. The RoadRailer trailers have smoother handling than other intermodal services, as the trailers have an air-ride suspension for the highway trip and for the bogie attachment process.[30] Moreover, the trailers have less slack between cars (in some setups, 95 percent less than a double-stack train), leading to fewer en-route jolts and less damage to freight.

The forthcoming RailRunner is a similar product with a slightly different design. A study by the company that makes the bogies found that the capital outlays for a RailRunner-equipped terminal were significantly lower than for a double-stack equipped terminal. But the company found ambiguous results for the operating costs, which in some circumstances could be higher using RailRunner.[31]

Both the RoadRailer and RailRunner truck trailers are different from traditional vehicles. They have a special suspension and coupling mechanism, and the trailers must be reinforced in order to survive the extreme tension and compression forces of rail transport. Accordingly, the trailer equipment itself weighs several hundred pounds more than most trailers, but the total weight of the equipment and goods transported is not heavier. Why this is so requires a brief discussion of freight weight regulations.

A container is built to carry a certain amount of weight, known as its *gross weight*, which is the sum of the *net weight* (the load weight of the goods transported) and the *tare weight* (the equipment weight). Highway laws regulate the gross-weight-on-axle, which is always lower than the gross-weight-on-rail. Since RoadRailer trailers operate on both highways and tracks, they must abide by the lesser weight restrictions. Their added tare weight forces a reduced net weight per trailer, thereby increasing the per-unit costs. However, these costs are more than offset by the reduced space and infrastructure required for the trailers' operation. Most notably, their transfers do not require the construction and maintenance of terminals. These cost savings, along with their lighter weight compared with that of flatcar-based transport (which requires an additional tare weight of almost

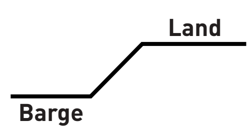
40,000 pounds in the form of a flatcar), make RoadRailers excellent candidates for certain short-haul operations. Which operations they are best suited for depends on the good transported. The internal dimensions match those of most over-the-road trailers and are more spacious than any domestic container unit, making them very useful for less dense goods. Like double-stack cars, RoadRailers' better tare-to-net ratio makes them an attractive choice for trips through hilly terrain.

Traditional trucks, the kind that nearly every shipper uses, cannot use RoadRailers because of the specialized equipment they require. Nevertheless, there appears to be a substantial market for RoadRailers.[32] Amtrak has a fleet of about 300 RoadRailers and a number of ReeferRailers, which it runs between Philadelphia and Chicago or Florida. The service operates in conjunction with Amtrak's passenger service by attaching the RoadRailers and ReefRailers to the passenger trains, and as a result, it has high performance expectations.

Before the acquisition of Conrail by the NS, Triple Crown was a joint Conrail/NS operation. Triple Crown had a terminal at E-Port across from Newark Airport near Ikea's Elizabeth outlet and ran its service from that terminal to Atlanta. About a year after the acquisition and the absorption of Triple Crown into NS, the Atlanta train's Triple Crown (RoadRailer) service was discontinued, and a few months later the Triple Crown Northeast terminal was moved 80 miles west and across the Delaware River to Bethlehem, Pennsylvania. Why Triple Crown moved out of E-Port is not clear. There are NS claims that the Port Authority forced it out, but the Port Authority insists that NS wanted to move out.

4.3 Advanced carfloats

New York Harbor has a cross-harbor float system,[33] but a float system using state-of-the-art technology would look quite different, with greater efficiency and speed than the current system. The New York Cross-Harbor Railroad transports railcars across the harbor using barges pushed by a tugboat. Although the carfloat barges may not always be in good repair, even in pristine condition they have an operating flaw. Like a lakeside dock, the apron that connects the float barge to land is hinged, so if the tide is low, the connecting apron has a steep grade. Exaggerated, the situation would look something like the following (or the reverse, depending on the tide):



As a railcar travels over the lip of this steep incline—although the angle would never be as steep as depicted—it can get hung up, its wheels dangling slightly above the tracks in midair. Complicating matters, the barges themselves have a "frog" in the track, a switch on the barge itself that makes it a challenge to load and unload railcars. Both these problems reflect the fact that the recent refurbishment of the system did not incorporate state-of-the-art technology.

An expanded and better carfloat operation could be fast, reliable, and probably just as cheap as the current system. Two rail barge systems handle train traffic to Alaska: Canadian National's (CN's) Aquatrain and Alaska Rail Marine.

Alaska Rail Marine loads railcars directly onto a float barge, thereby avoiding the apron problem just described. The company owns a fleet of six-track barges that carry up to 56 cars per trip. A barge leaves every week (even in the winter) from Seattle and arrives seven days later in Whittier, Alaska, and then travels to Seward. Alaska Railroad offers service from anywhere in the lower 48 states to Alaska.[34] For its part, CN's Aquatrain service runs 32 times a year from Prince Rupert, British Columbia, to Whittier. The service uses what CN calls "the world's largest railcar barge," which accommodates 50 cars on eight 400-foot tracks. The 5,670-ton barge is pulled by a 176-ton ocean tug on an 830-mile voyage that takes four days. Like Alaska Rail Marine's service, the trains are loaded directly onto the barge without a connecting apron. The service is used by a wide range of customers, from British Petroleum to the Fort Knox Gold Mine, mostly to move materials for the mining, fuel, and construction industries.[35]

In the Baltic Sea, too, several large-scale rail ferry operations run between Scandinavia and the Baltic states. These services carry entire freight trains and passenger trains. Rail cars are uncoupled and pushed onto the ferries. The ferries themselves are quite versatile. One ferry run by Scandlines between Rostock and Trelleberg offers a combined rail/motorcar/passenger service (with the passenger section of the ferry offering amenities from a cinema to first-class cabins). Other ferries can unload railcars on both ends, and some can carry large numbers of railcars. In most cases, the ships are self-propelled ferries and not barges that must be pushed by tugboats.

On the Black Sea, large-scale rail ferry operations transport freight from Yalta to Turkey and other destinations on the Sea's southern shore. The ferry, roughly the size of a passenger ocean cruiser, has two tiers of tracks that dual-load at both the dock level and the upper level via a trestle. If such mechanisms can be installed for long distances like the Black Sea, surely smaller versions of these same ferries can be constructed for the relatively short distances between banks of the New York Harbor.

Is a float bridge simply a cheap alternative to a tunnel? The difference is a question of volume. Generally, float bridges work best for relatively light traffic traveling over a long distance. The Whittier-Seattle route, for instance, moves a fairly small number of railcars over more than 800 miles. The distances involved in the Baltic and

ALASKA RAILROAD

An Alaska Rail Marine barge.

Black Sea transport also would require tunnels hundreds of miles long. Although float operations offer some environmental benefits, because harbor sediment is disturbed less, when moving a higher volume of traffic smoothly, particularly over a shorter distance, a tunnel or a bridge has decided advantages over a float operation.

Nevertheless, New York Harbor is a promising site for expanded float operations, particularly in the short term while no other Hudson crossing in the metropolitan area is available. Since the Harbor is somewhat protected, weather is usually not a problem. Although a float operation with a world-class barge system could load railcars simultaneously on both shores and move a fair amount of traffic, the volume of traffic moved by railcar barges alone would be limited.

4.4 Environmental and quality-of-life improvements

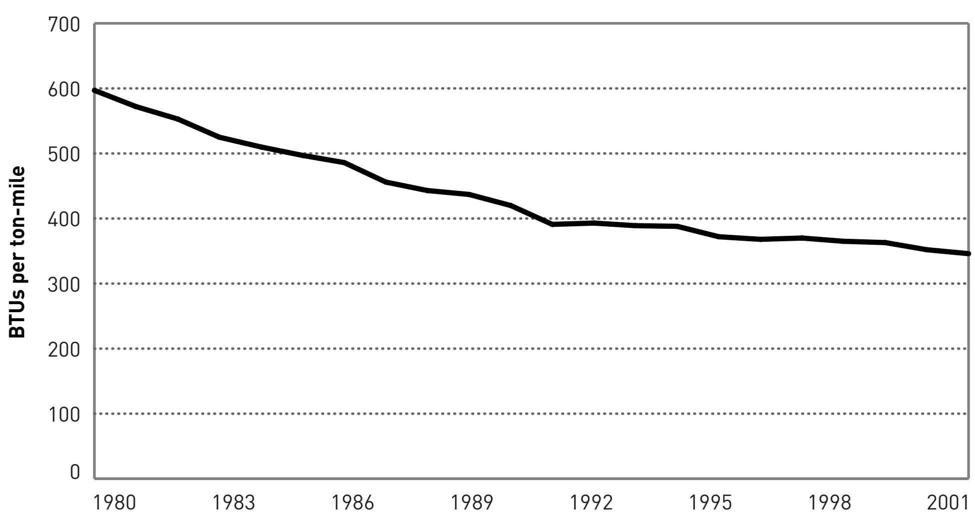
For the foreseeable future, trains will continue to be the cleanest way to move freight. Higher emission standards will ensure that locomotives' efficiency continues to exceed that of trucks. Regrettably, it appears that hybrid and fuel cell locomotives are not on the horizon. While there already are prototypes, it will take at least a generation for them to be widely used. In the meantime, the major quality-of-life problem for railroads is noise, which could be alleviated if the appropriate noise-muffling technology were used.

CLEANER LOCOMOTIVES

The main reason that locomotives produce fewer emissions than trucks do is physical: the lower rolling resistance of steel on steel means that trains consume less energy per ton-mile and therefore combust less fuel. This energy efficiency has been increasing, as demonstrated by the decreasing energy intensity per ton-mile of Class I railroads (see Figure 4-1).

In 1998, the Environmental Protection Agency established stringent emissions reduction rules for new locomotives that will be fully phased in by 2005. The

FIGURE 4-1
Energy intensity of Class I railroads



Source: Oak Ridge National Laboratory

standards will reduce hydrocarbon emissions by 40 percent, particulate matter emissions by 40 percent, and nitrogen oxide emissions by 60 percent. The railroad industry is ahead of schedule in meeting these new standards.

New engine technologies are emerging as well. Hybrid locomotives, which use a combination of diesel power and electricity, are a feasible option for the future. Since the only fuel that hybrid locomotives require is diesel, rail carriers could use the current network of fueling stations. In a hybrid, a diesel engine is used for charging a large bank of batteries, which power an electric traction engine.

RailPower Technologies recently built a prototype hybrid that it calls the Green Goat.[36] It is a switching locomotive, which means that it will be used in rail yards and not for intercity traffic. Like most switching locomotives, it has a 2,000-horsepower engine (an intercity locomotive is typically 3,000 to 4,400 horsepower), and its maximum speed is relatively slow, about 20 mph. But RailPower estimates that the hybrid will save carriers 30 percent on capital costs, including fuel, and the engine reduces the quantities of most pollutants emitted, including 90 percent of nitrogen oxides, compared with that of a diesel-only switching locomotive. Union Pacific tested the locomotive for a year in California and then moved it to Chicago in the winter for cold weather testing, and West Coast short lines have also used it for test periods.[37] If it proves to be a cost-effective option, the Green Goat might be attractive for both Class I and short-line carriers.

ABBA Volt is interested in rebuilding an old Metropolitan Transportation Authority (MTA) switching locomotive into a hybrid. The MTA has a fleet of diesel-powered switching locomotives which it uses in the subway system and elsewhere.[38] Hybrid locomotives would allow workers to maintain the right-of-way, with less exposure to harmful emissions in the confined space of a tunnel.

Electric freight trains have been out of the question because electrifying freight rail lines is prohibitively expensive; railcars have varying heights, a problem for designing the catenaries; and freight trains are longer and heavier than passenger trains, demanding an enormously powerful electric locomotive. In the long term, however, hydrogen fuel cell research could change this.

Locomotive fuel cells must be more powerful pound for pound than auto fuel cells. It is possible that the high-power fuel cell technology built for boats could one day be adapted for railroads. In 2003 the U.S. Navy tested a prototype 500-kW fuel cell built by Fuel Cell Energy, Inc., in Philadelphia; the goal is to build a 3,000-kW fuel cell engine that could be used on the water.

Indeed, prototype fuel cell locomotives are already on their way. Sandia National Laboratories has created a four-ton fuel cell locomotive for industrial applications, about as long and wide as a golf cart, which will soon be put into use in gold mines. Hydrogen fuel cell technology is attractive to the mining industry because of the high cost of building ventilation shafts for diesel fumes. The second project of note is being pursued by the MTA, which in January 2003 asked a Connecticut company to draw up plans to gut a diesel locomotive and build a fuel cell prototype. Without a major technological breakthrough, however, fuel cell locomotives are at least a generation away.[39]

QUIETER TRAIN SERVICE

Historically, the best available noise-reduction technique for railroads was to build barriers that muffled the sound. On the whole, though, barriers are expensive and have only limited benefits. The new technologies are trying to reduce train noise at its source: the wheels and rails. The locomotive engines, of course, also make noise. But like highway traffic, the noise that appears to carry the farthest is wheel noise. The dull roar one can hear a half-mile from an interstate is often the noise of tractor-trailer wheels on concrete or asphalt.

One technique used to deal with this problem is Track-Wheel Interaction Noise Software (TWINS), which tries to pinpoint the source of the track noise. Small imperfections and roughness in railcar wheels and tracks cause vibrations that, in turn, cause the rumbling noise of a passing train.

4.5 Better customer service

Two advances—the personal computer and GPS—have meant enormously improved freight rail customer service.[40] It now is possible for companies to handle almost all aspects of rail shipping through the Internet, from reservation to tracking and receiving. While freight rail is hardly the only industry to have taken advantage of the Internet or GPS, it is worth observing that rail has kept pace with the rest of the transportation world.

Both the North American Container System (NACS) and REZ-1 run services to make it easy to move containers with multiple rail carriers.[41] That both systems' clients include most Class I railroads makes for a geographically broad, and quite vast, pool of resources. NACS has some 20,000 containers, and its participants include BNSF, CSX, CN, CP, Kansas City Southern (KCS), and NS. REZ-1 serves fewer railroads (Union Pacific, CSX, NS, and KCS) but about twice as many container units. Most of REZ-1's users are in the Midwest or on the West Coast. Both systems have Web sites where clients can make reservations, check shipments, and find empty containers. Most of the Class I railroads also have Web sites listing price and transit time information, which is calibrated to the kind of freight being moved, from beer to scrap metal. Some of the railroads also offer online payment and tracking services.

Computerized logistics has been a boon for railroads, reducing the number of empty backhaul containers. A significant amount of rail freight traffic is moving empty railcars; logistics software allows rail companies to make better use of their equipment and allows customers to book backhaul space at a discount.

Finally, automated terminals and containers with GPS units will make shipping faster and tracking easier than is typically the case today. A new terminal in Memphis for CSX and CN, which is scheduled to open sometime in 2004, will include an advanced check-in system for trucks that takes less than two minutes. As trucks enter the terminal, electronic sensors automatically scan the vehicle to check for equipment condition and freight damage; the driver swipes a card through an electronic reader; a digital camera automatically takes a photo of him/her; and he/she is finished. This system dramatically reduces check-in time and makes just-in-time intermodal faster and just as accountable as single-carrier transport.

4.6 Conclusion

Coupled with the improvements in freight rail fixed plant described in the next chapter, the application of state-of-the-art freight technologies would greatly increase the efficiency and usefulness of freight rail East-of-Hudson and speed its integration with the national freight rail network. These technologies include faster trains, better dispatching, a wide range of advanced intermodal technologies and services, advanced carfloats, and cleaner, quieter engines and improved customer service. Such technologies can be used only with institutional changes that would allow freight railroads to serve markets that are now served exclusively by trucking.

Chapter 4 notes

[1] American Association of State Highway and Transportation Officials, *Transportation— Invest in America: Freight-Rail Bottom-Line Report* (Washington, DC: AASHTO, 2002).

[2] Association of American Railroads, Economics and Finance Department, *The Economic ABZ's of the Railroad Industry* (Washington, DC: Association of American Railroads, 1980).

[3] Louis Thompson, "The Evolution of Railroad Regulation in the United States," in *Regulatory Reform in Transport: Some Recent Experiences*, edited by José Carbajo, pp. 31–41 (Washington, DC: World Bank, 1993).

[4] See, e.g., Clifford Winston, "A Disaggregate Model of the Demand for Intercity Freight Transportation," *Econometrica* 49 (1981): 981–1006. Such models consider the transit time, coefficient of variation of transit time, and other factors influencing the probability that a given shipper will choose rail over trucking.

[5] Association of American Railroads, "Railroad Profitability," July 2003.

[6] James J. Valentine (CFA, Morgan Stanley), *State of the Rail Industry. Testimony to the Subcommittee on Surface Transportation and Merchant Marine of the U.S. Senate Committee on Commerce, Science, and Transportation*, May 9, 2001.

[7] Rosalyn A. Wilson, *Transportation in America 2000, with Historical Compendium 1939–1999* (Washington, DC: Eno Transportation Foundation, 2001).

[8] Urban settings operate extensive commuter and intercity passenger trains, and the ability of the railroads to expand their infrastructure to meet the growing demand for their services is severely limited.

[9] Class I railroads have revenues of $250 million or more in 1991 dollars. See Bureau of Transportation Statistics, *Pocket Guide to Transportation* (Washington, DC: U.S. Department of Transportation, 2003).

[10] The reader should note that here "Class" refers to track. Elsewhere in the report, roman numerals following the word "Class" refer to a system of classifying railroad companies.

[11] Federal Railroad Administration, *Track Safety Standards Compliance Manual* (Washington, DC: U.S. Department of Transportation, Office of Safety Assurance and Compliance, 2002), §213.9, 213.307.

[12] See Marybeth Luczak, "Are We There Yet?" *Railway Age,* January 2000.

[13] American Association of State Highway and Transportation Officials, *Transportation*.

[14] The only exception was the limited use offered in the early 1980s to InterRail Express Corp.

[15] European Union, *White Paper: European Transport Policy for 2010,* September 12, 2001.

[16] The legislation on rail transport and interoperability is nicknamed the "Second Package." It was approved in its initial draft by the European parliament on January 14, 2003; the commission reached a common position on June 24, 2003.

[17] European Union, Directorate-General for Energy and Transport, *Trans-European Freight Rail Services,* April 30, 2003.

[18] U.S. Bureau of Labor Statistics, *Incidence Rates of Nonfatal Occupational Injuries* (Washington, DC: U.S. Government Printing Office, 2001).

[19] Article 84 of the Swiss Federal Constitution.

[20] Article 196 of the Swiss Federal Constitution.

[21] American Association of Railroads, "Class I Railroad Statistics," May 2003.

[22] American Association of Railroads, "Rail Intermodal Transportation," July 2003.

[23] Edward Hamberger, *Remarks by the President and Chief Executive Officer of the Association of American Railroads before the National Association of Rail Shippers*. San Francisco, April 24, 2001.

[24] Canadian Pacific Railway, "CPR Augments Expressway Fleet, Adds Track," June 20, 2002. Available at www8.cpr.ca/cms/English/Media/News/General/2002/CPR+Augments+Expressway+Fleet. Last accessed February 12, 2004. Expressway is discussed in greater depth later in this section.

[25] Modalohr cars currently cost 84 percent more per unit of truck space than TOFCs do. That this will remain so is unlikely.

[26] Greenbrier Companies. News release, July 23, 2003. Available at www.gbrx.com/news/press/2003/GBXEuropeNewOrder.pdf. Last accessed February 12, 2004.

[27] "CPR Augments Expressway Fleet, Adds Track," *Canada News Wire*, June 20, 2002.

[28] Information from Wabash National, "RoadRailer Operations Manual—Mark V System."

[29] A RoadRailer truck is unrefrigerated, and a ReeferRailer is refrigerated. Since RoadRailer is the most popular brand, and the name most commonly used, this report refers to the technology as RoadRailer.

[30] Air-ride suspensions use air springs, a column of compressed gas that pushes springs to raise the vehicle. Air-ride suspensions lead to fewer jolts on the road.

[31] N. A. RailRunner, "An Intermodal Freight Transport Proposal: An Urban Trash Move Using RailRunner" (East Point, GA: RailRunner, 2003).

[32] The biggest provider in the United States is Triple Crown Services, a subsidiary of Norfolk Southern. Canadian National regularly offers a RoadRailer service between Toronto and Montreal. As of 1999, CN had bought 200 trailers and 130 bogies, which it operates in trains of up to 60 units. The delivery time for CN's RoadRailer service is slightly longer than Expressway service.

[33] An overview of the NYCH's float bridge operation can be found in section 2.2.

[34] Information from Alaska Railroad Website: www.akrr.com/. Last accessed February 12, 2004.

[35] Information from Canadian National Railway. Available at www.cn.ca/productsservices/aquatrain/en_KFAqautrain.shtml. Last accessed February 12, 2004.

[36] RailPower Technologies, "Green Goat: The Hybrid Yard Switcher," April 9, 2003.

[37] Union Pacific, "Union Pacific Testing Experimental Locomotive in Chicago," March 12, 2003.

[38] Conversation with Bryan R. Johnson, sales manager for ABBA Volt, August 14, 2003.

[39] D. Duncan, S. Summerfield, J. Lafrance, and J. Kosior, *Feasibility of Fuel Cell Locomotives: A Study of Energy Alternatives* (Quebec: Environment Canada Transportation Systems Branch, 2001).

[40] Information about computerized logistics and GPS tracking is from NYMTC's *Review of Technologies Used in Freight Transportation*. Information about the Memphis rail terminal is from NYMTC and newspaper reports.

[41] See www.rez1.com and http://nacsfirst.com. Last accessed February 12, 2004.

CHAPTER 5

Options for improving freight mobility

According to the criteria described in chapter 3, improving freight rail may be preferable to building more highways in order to add to freight transport capacity in the Hudson region. That notion is amplified by the prospect of integrating the freight rail policies and technological innovations discussed in chapter 4 into the regional rail network. Nonetheless, these policies and innovations will do little without improving the freight rail connections and increasing yard space. A major revitalization of the freight rail network that connects the East-of-Hudson subregion with the national rail network should include easy connections between and within the west and east sides of the Hudson River. Real changes in freight mobility require investments in infrastructure, which are the topic of this chapter. They can be divided into two broad categories: those that will create or rebuild important rail connections (discussed in section 5.1) and those that will modernize the Hudson region's freight rail network (discussed in section 5.2). This chapter describes how each of the choices in these two categories would change freight rail service in the New York City metropolitan area.

CRITERIA FOR INCLUSION IN THIS REPORT

Although countless proposed and possible initiatives might improve freight mobility, here we look at only a few of them:

1. The proposal must be a major step toward improving access to the region's economic core, New York City, as well as to other parts of downstate New York and southern New England.
2. The proposal must ease congestion on the Hudson River's choke points—the bridges and tunnels—which have been a great detriment to regional freight mobility.

The purpose of these criteria is simply to eliminate those ideas that may be worthwhile for other regions but do not have definitive benefits for mobility in New York City, other parts of downstate New York, or the metropolitan area as a whole.

The following two sections describe what a revitalized freight rail system might look like, with an emphasis on the East-of-Hudson subregion. The first section examines the most appealing options for moving freight trains across the Hudson River. The second section expands the discussion to other urgent matters, such as lifting height and weight restrictions and expanding rail yards.

5.1 A revitalized freight rail system: crossing the Hudson

THE EDC STRATEGY

The New York Economic Development Corporation (EDC) is in the process of concluding the Environmental Impact Statement (EIS) of its Cross-Harbor Freight Movement Project, a sweeping study that is looking at ways to improve freight movement in the New York City area. Because the study is a multimillion-dollar effort with detailed engineering plans and economic analysis, it provides information beyond what our report can describe. Rather, we regard the EDC study as a great reservoir of information that should be examined critically.

In investigating whether better freight rail service would lead to less roadway use and congestion and economic opportunity, EDC is looking at ways to move freight trains across the Hudson River. At an earlier stage in this investigation, after analyzing 15 alternative strategies in the project's May 2000 Major Investment Study (MIS), EDC chose four for further review and analysis in its EIS:

1. *No action.* The first alternative assumes that no investment will be made in the current freight rail network, except in the infrastructure and planning work that is already under way or appears very likely to be implemented by 2025 (see chapter 2). This scenario provides a baseline for comparing the other three alternatives.

2. *Transportation systems management (TSM).* The second alternative is referred to as (TSM) and is a strategy to make the most of the current rail freight network with minimal capital investment. The emphasis is on better coordination of passenger and freight operations, including single-track rehabilitation and minor rail yard improvements. This alternative also includes a clearance to 17 feet, 6 inches, along the Bay Ridge and Montauk branches to accommodate TOFC trains and signal systems upgrades. Finally, the TSM alternative would involve rehabilitating the two existing Greenville Yard float bridges.

3. *Expanded float operations.* The third alternative encompasses the measures proposed in the TSM alternative but goes further to expand the hours of float service, schedule floating, and offer a larger network of support trains. In addition, expanded float operations would construct a new bulk/merchandise yard in Maspeth, Queens, and two more float bridges at Greenville Yard and two more at the Sixty-fifth Street Yard.

4. *Freight rail tunnel.* The fourth and final alternative that EDC examined in the MIS was building a single- or double-track freight rail tunnel under New York Harbor along with a number of improvements both east and west of the Hudson River to take advantage of the new direct link.

THE EDC PROPOSAL FOR A RAIL FREIGHT TUNNEL

The principal attraction of a cross-harbor freight rail tunnel is that it would provide the shortest, most direct access for freight moving to or through the heart of the New York metropolitan area.[1] The MIS describes two possible alignments for a cross-harbor rail freight tunnel: from Staten Island to Brooklyn and from New Jersey to Brooklyn (see Figure 5-1). The draft EIS focuses on the latter.

For both alignments, EDC suggests raising the vertical clearances along the Bay Ridge and Montauk branches to full intermodal access at a new intermodal facility in Maspeth, Queens. Farther north, into the Bronx and the proposed Pilgrim State Terminal (officially the Pilgrim Intermodal Freight Transportation Center), the vertical clearances would have to be raised for at least TOFC service (17 feet, 7 inches).

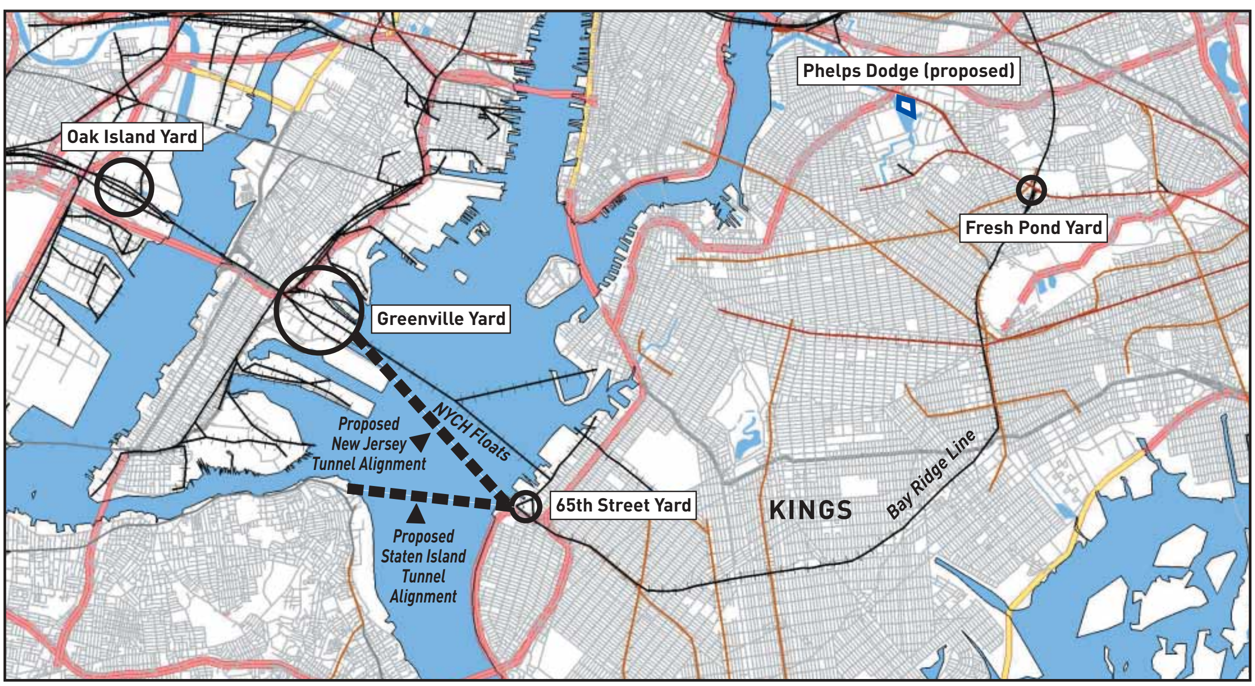
The Bay Ridge Branch has mostly a single track, but its right-of-way could support up to four tracks. It certainly will need additional track capacity to accommodate the increased traffic that a tunnel is projected to bring. Ideally, it should have at least two tracks that can handle double-stacked trains from the tunnel portal west to Glenwood Road in Brooklyn. Two additional tracks also will be needed at the east New York section of Brooklyn, where the Bay Ridge Branch has a single track. These additional tracks will lead to swifter service at the East-of-Hudson freight yards.

Furthermore, the rail line extending through the East New York Tunnel and farther east to Fresh Pond will have to be double tracked. Of these two lines, at least one has to be able to accommodate double-stack cars, which means that the Fresh Pond Yard and the Montauk Branch that connects to the site of the proposed Maspeth terminal will have to be improved.

On the west side of the river, according to the EDC proposal, an additional track must be constructed on the Chemical Coast Line to accommodate the greater volume of traffic. Three active main tracks would provide the necessary extra capacity. Connections between West-of-Hudson rail terminals also need improvement. Conrail, the New Jersey Department of Transportation, and the Port Authority are studying two projects: the addition of a new track that would allow trains to pass through the Oak Island Yard, and the addition of a "fly-over" track that would provide a more direct connection among the Oak Island, Kearny, and Croxton yards.

The alignment of the Staten Island Tunnel, as described in the MIS, would require a number of secondary improvements: the construction of a connection between the Chemical Coast Line and the Staten Island Railroad; double-tracking of the Staten Island Railroad, the Bay Ridge Branch, and the proposed Waverly Loop; the twinning of the Arthur Kill lift bridge; and the construction of an intermodal yard in Maspeth. In addition, the Arlington Yard terminal on the western end of the proposed tunnel would have to be improved, and facilities in Fresh Pond and the Sixty-fifth Street Yard would have to be expanded and/or

FIGURE 5-1
Proposed EDC tunnel alignments



reconfigured. Finally, the Staten Island Railroad would need to be upgraded: double-tracked from the tunnel portal to Arlington Yard and connected to the Chemical Coast Line.

The New Jersey Tunnel alignment, which EDC identified in the MIS and the draft EIS cites as the best option, would require the construction of a connection between Conrail's National Docks/Secondary Branch and the tunnel approach. Two tracks would have to be built through the Greenville Yard on the New Jersey side of the river. In addition, on the New York side of the river, the Bay Ridge Line and Waverly Loop would have to be double-tracked.

Except for a short segment that, for geological reasons, would be submerged, the tunnel would be bored. The final EIS will also evaluate the option of double-tracking the tunnel and whether the tunnel should be so constructed.

The tunnel and the accompanying track improvements would require a huge investment in the regional freight system. It would greatly enhance the infrastructure and provide a direct and dedicated link to the national network. Figure 5-1 depicts the two tunnel alignments.

REVITALIZING THE CROSS-HARBOR FLOAT SYSTEM

An important part of upgrading the regional freight rail system is improving the cross-harbor float operations currently run by the New York Cross-Harbor Railroad (NYCH). More broadly, we need to reconsider using water as a means for distributing rail freight in the harbor. As they were in the past, New York's significant bodies of water can be used as a platform for transporting rail cars throughout the metropolitan area. Accordingly, these bodies of water can be used more efficiently for rail freight movement, largely through two general initiatives:

1. Establishing rail marine reload centers at strategic locations where heavy commodities such as building materials and aggregates can be moved very near to the consumption points while at the same time minimizing highway use.
2. Using rail marine as a link between the national rail network and the East-of-Hudson subregion.

The existing system must therefore be upgraded physically, as described in section 4.3, and its perception must be modified. In order to attract users, the operation should look like a seamless conveyor belt. Ideally, there would be two to three trips (or "frequencies") in each direction daily, on a reliable schedule. The goal here is not just the reality of, but also the perception of availability of service. Certain specific components must be modernized or replaced, such as the pontoon—the floatation box used to support the rail bridge that first supports the rail cars when they are removed from the barges at the Bush Terminal in Brooklyn.

HUDSON RIVER BRIDGES

North of the proposed tunnel alignment, two possible Hudson River crossings between New York City and Selkirk, New York, could be considered. The first would entail rebuilding the Poughkeepsie-Highland Railroad Bridge, and the second would require constructing a standard rail line on the Tappan Zee Bridge, a project already under way that is discussed later.

Freight railroads, which had essentially abandoned the Poughkeepsie Bridge before a fire in 1974 rendered it structurally unsound, are reluctant to support reopening it. The reasons are that the bridge is an inconvenient distance from Brooklyn and New York City, and near the end of the bridge's life it had been used only lightly—by about four to six freight trains per day.[2] It is unlikely that the bridge would divert trucks off the road and freight trains into New York City, given how dilapidated the connecting system on both sides of the river has become, the bridge's distance from the city, and the fact that much of the surrounding right-of-way has been sold and used for other purposes or has become otherwise encumbered. For an efficient connection between the region's urban core in downstate New York and the national freight system, this route would not currently provide substantial advantages over the Selkirk crossing some 50 or so miles to the north.

The Tappan Zee Bridge is a northern crossing for the East-of-Hudson subregion, which truckers use primarily to avoid the congestion on the George Washington Bridge. That bridge is nearing the end of its scheduled life span. Although it still is safe and functional, the bridge has begun to deteriorate, and over the next decade the New York State Thruway Authority will either have to rehabilitate it or tear it down and build a new one. The eventual solution might be a new bridge with some kind of transit in the form of a bus lane open to multi-occupant vehicles such as vanpools or possibly a light or heavy commuter rail system.

As of October 2003, 14 options were being considered besides the "no build" and rehabilitation options that would require the construction of a new bridge.[3] The Tappan Zee Bridge could be replaced with a bridge containing barrier-separated rapid-bus and carpool lanes, with or without tolling, or a commuter rail line. The Metropolitan Transportation Authority (MTA) is the agency charged with investigating the commuter rail option for a new bridge, but it has not yet officially considered a rail option that could be used for both freight rail operations and passenger rail services. A new bridge could be built with full corridor commuter rail tracks or light rail connecting to the Hudson Line or conceivably the Harlem and New Haven lines. This project could include instead a supplemental commuter rail tunnel. Even a hybrid form could be constructed that in some way included one or more of the following: commuter rail, a commuter tunnel, high-occupancy lanes, and light rail. Instead of a bridge, the Thruway Authority could bore a tunnel for highway, commuter rail, and barrier-separated rapid-bus lanes. The task force responsible for deciding on the option to be pursued is scheduled to pare down the list to four or five by the spring of 2004, after an environmental impact assessment.

The possibility that a rail system would cross the Tappan Zee Bridge and, furthermore, could be designed to accommodate freight rail trains is not out of the question. Conceivably, such a rail line across the bridge could connect with the CSX River Line on the west shore. On the east side the route would presumably connect to the Hudson Line to provide access to New York City and Long Island.[4] Weight limitation and clearance issues, discussed in the next section, would have to be addressed.

This route has two very serious problems. First, while the New York Thruway Authority and the MTA are looking at options for a new bridge at this location, they are not considering a freight rail connection at this time. Second, without a west-east heavy rail line across Westchester east of the Tappan Zee Bridge, freight traffic on the east side would have to be routed down the Hudson Line. It would therefore provide a much less direct link from southern and western points into the East-of-Hudson subregion than EDC's proposed tunnel would.

5.2 Revitalizing freight rail with improved infrastructure

In order to accommodate more freight rail traffic downstate and East-of-Hudson, the tracks on the east side of the Hudson must have higher clearances and higher weight restrictions and, in some places, more track. Besides upgrading the existing yards, new yards that both support and connect train operations would have to be built.

The freight rail system East-of-Hudson is outdated and has been so badly maintained that it would take a huge amount of money to repair the existing system and to make it competitive, let alone economically efficient, even with a direct cross-Hudson link between this subregion and the national freight rail network. Until recently, this freight system has suffered from the same kind of system undermaintenance that characterized the MTA subway and bus system until the MTA and the state put together the MTA's first major five-year capital program in 1980. Over the last five years, with the help of the East-of-Hudson Rail Freight Operations Task Force, EDC, the New York Department of Transportation, and the Port Authority have come to acknowledge the backwardness of the 50-year-old freight rail system and have begun to make some improvements, conduct studies, and plan major investments as described in chapter 2. This is a good beginning, but only a beginning. This section describes the infrastructure changes that should be part of a major freight rail revitalization initiative.

TOFC AND DOUBLE-STACK CLEARANCE ON EAST-OF-HUDSON FREIGHT RAIL CORRIDORS

Most of the subregional freight rail system in the metropolitan area East-of-Hudson has insufficient vertical and horizontal clearances. The network cannot accommodate the high-profile freight cars, such as the TOFC and double-stack intermodal, that are popular with railroads for their efficiency. In addition, the third-rail power system along the Hudson Line and on the LIRR passenger lines creates a horizontal restriction for most container well cars. Recently, one track on the Hudson Line was cleared of vertical impediments for TOFC service, and a second track is being cleared to allow intermodal trains to take advantage of the opportunities of a double-tracked railroad. This is a step forward but offers only limited flexibility. Metro-North, the New York DOT, and the Port Authority are all collaborating to raise the clearances on the Hudson Line for TOFC service. The long-term goal is to provide these clearances along the entire Hudson Line on at least two tracks.

Raising the clearances would unclog a calcified system that prevents trains from flowing into the East-of-Hudson subregion. It would be possible to run TOFC and, eventually, double-stack trains from New Jersey to Brooklyn. This could be done using the cross-harbor float system and/or a cross-harbor tunnel, and from there trains could proceed to Queens or Long Island and points north and east, via the Bay Ridge Line. These trains could also run from Selkirk and points north down the Hudson Line and into the Bronx, Queens, Brooklyn, or Long Island. With these clearance improvements, New York City could be serviced by the most modern and efficient train systems.

At a minimum, the project would require major improvements of four segments of track. TOFC clearance on the Fremont and Bushwick lines to Fresh Pond would greatly facilitate freight movements in and to Long Island. Raising the clearances on the Bay Ridge Branch, from the Sixty-fifth Street terminal to Fresh Pond, would allow freight cars of all sizes to use it and make the cross-harbor float system more competitive. Investments in the Fremont, Bushwick, and Bay Ridge lines should include full physical intermodal access (i.e., double-stack clearance) downstate and greater line capacity on the Long Island Main Line. Providing clearance on the Long Island Main Line to Pilgrim State would allow Class I carriers to enter Long Island and deliver their shipments farther east, thereby avoiding traffic congestion in Brooklyn and Queens. Service would then undoubtedly be more cost efficient and competitive than it is today.

Full intermodal access on the previously mentioned corridors would be a dramatic improvement. It would give the railroads additional flexibility in operating, scheduling, and pricing freight services. Full intermodal access would also enable the railroads to offer more options and service frequencies.

According to Cambridge Systematics, the consultant for both the EDC and NYMTC studies, full intermodal access to Brooklyn, Queens, and Long Island is a key element in any comprehensive long-term solution for freight access problems east of the Hudson.[5] Intermodal trains traveling long distances are much less expensive to operate when using fully loaded, double-stack cars.

LIFTING WEIGHT RESTRICTIONS

Like vertical clearances, weight limits on East-of-Hudson rail routes must be raised. Across the nation, since the Class I freight carriers are moving an increasing volume of freight in cars that are 286,000 pounds gross weight on rail (or "286s"), the East-of-Hudson subregion must keep up with this trend to stay competitive and increase its market share. Currently only the Metro-North lines are designated suitable for 286s, although other lines probably have this capability. The LIRR is studying the bridge weights for its entire line (see chapter 2). Currently, hauling 286s on the LIRR is a heavily encumbered process: each car that a railroad moves must have separate paperwork filed in order to be cleared for use, even if it is identical to a car previously cleared. Many cars instead are loaded at less than their full capacity, leading to gross inefficiencies.

The 286 issue is critical to the Hell Gate Bridge, which has yet to be upgraded.[6] Hell Gate is of paramount importance since it connects Brooklyn, Queens, and Long Island to the rest of the network. If 286s cannot cross this bridge, the major rail access route East-of-Hudson is thereby hampered, and no railcar that is 286 pounds gross weight on rail can cross the Hudson River without using the float system.

ADDITIONAL YARD SPACE

The lack of yard space or access to yard space slows the growth of the system. Without available yard space, trains have nowhere to go. On the whole, the rail yards in the East-of-Hudson subregion have enough extra capacity to handle a large amount of freight. A NYMTC study published in the spring of 2003 found that most existing East-of-Hudson yards can theoretically accommodate about double what they do now.[7] Some yards, like the Fresh Pond Yard, which handles

1,500 carloads per acre every year, are already running at capacity. Most other yards, however, only handle between 20 and 360 carloads per acre per year. Compared with out-of-state rail yards, the East-of-Hudson rail yards could use their space more efficiently than they do today.

Even with the efficient use of existing yard space, raised clearances, improved weight limits, and increased line capacity, the system East-of-Hudson still needs more space to uncouple, unload, and store trains, particularly if freight rail transport is to grow. EDC has proposed adding two intermodal transfer facilities, one in central Long Island that is the subject of a New York DOT study, and another along Newton Creek in southwest Queens.

For central Long Island, the New York DOT has suggested building an intermodal transfer station on the site of what was formerly the Pilgrim State Hospital. The site is on the LIRR Main Line near Deer Park Station. Similarly, EDC has proposed an intermodal transfer facility on the former Phelps Dodge boundary site in southwest Queens.[8] The first proposal has progressed to the EIS stage. While these two intermodal transfer facilities are not absolute necessities given the current freight traffic, the development of Pilgrim State could provide much needed yard capacity to permit likely significant increases in the likely Long Island freight traffic given shippers' widespread interest in the project.

The second proposed facility, the former Phelps Dodge site, is in Maspeth, Queens. Galasso Trucking, Inc., currently has an option to buy the Phelps Dodge site, which makes its future uncertain. EDC has indicated an interest in acquiring this and adjacent properties if the city builds a tunnel or invests in a new cross-harbor float system. In either case, an intermodal transfer facility at the Phelps Dodge site would be indispensable. In order to accommodate container and trailer volumes, the city needs a substantial new yard.

The NS Rutherford Intermodal Terminal, a classification yard in Westmoreland near Harrisburg, Pennsylvania, is an example of the new kind of yard that North American railroads are building in order to consolidate and reinvent new intermodal trains. It is a hub for intermodal trains, located so that trailers on intermodal trains are coming from a certain group of origins, generally to the west. At the yard, the trailers are sent to several different destinations east of the yard. Consistent with the current trend, NS is assembling long intermodal trains and sending them into northern New Jersey terminals, like that at Croxton. Not all destinations demand enough volume for railroads to be willing to serve them, however. For Philadelphia and other such locations, instead of direct train service, trailers are grounded at the yard and hauled to their final destinations. This yard functions well, but with the technological, track-sharing, and scheduling improvements to trains discussed in chapter 4, it could serve a much greater area.

In southwestern Connecticut, near New Haven, the former Cedar Hill rail yard has unused capacity that could accommodate an intermodal transfer facility. Still another possibility, in Queens, would be to double-deck two conjoined yards, Yard A—currently leased by the New York Thruway Authority from the LIRR—and Amtrak's Sunnyside Yard in Queens, for a rail freight yard and warehouse cluster.

Despite the many other examples of areas for increased capacity, most require some imagination and determination. For example, Amtrak owns a broad right-of-way in the Bronx that could be used as yard space. The section to the north of the Hell Gate Bridge and past the Oak Point and Hunts Point yards could be designed to provide yard capacity with minimal disruption of the surrounding communities. The right-of-way close to the Pelham Drawbridge is wide, with enough space for eight tracks. Amtrak uses only two high-speed lines, and the rest of the space is covered by weeds and is surrounded by light industry. In the New Rochelle area, as well, where Amtrak joins Metro-North, a three- or four-mile stretch is wide enough for eight tracks but has only two. Since this area is near a residential area, a fully functioning yard could probably not be built, but freight rail carriers might use it for car storage.

The problem, however, is not finding capacity *somewhere* but finding capacity in the right places—areas where rail service would do the most business. Expanding the capacity of the yards that already exist, while feasible, may not attract more customers. Expanding rail yards in the right areas and building new ones in the right neighborhoods and in hubs of production or distribution are probably the greatest challenge for freight rail planners.

BUILDING A THIRD TRACK ON THE LIRR MAIN LINE

Additional line capacity is needed along the LIRR Main Line to accommodate increases in volume. The LIRR is planning to add a third track on that portion of the line for passenger operations (see chapter 2). The double-track main line between Hicksville and Jamaica already is congested with passenger trains. With an increase in line capacity, the number of freight trains could grow without interfering with passenger train service. Without such improvements, rail's market share East-of-Hudson cannot be secured.

REACTIVATING THE STATEN ISLAND RAILROAD

New York City acquired the Staten Island Railroad and Arlington Yard in 1994 with federal funds. EDC is currently proceeding with its design for Arlington Yard and an extension of the Travis Branch to connect to the Fresh Kills waste transfer station. The Port Authority is constructing a connection to the Chemical Coast Line, and the engineering work is scheduled to be completed by late 2004. The Staten Island Railroad will provide dockside service to the Howland Hook Marine Terminal, and it will serve the Visy Paper mill located on the Travis Branch in Staten Island. This improved freight rail service linking Staten Island to New Jersey and the national freight system will help reduce the freight-related congestion on the Port Authority's Arthur Kill Bridge crossings.

SHARING TRACKS WITH COMMUTER RAIL

New York already has a trans-Hudson rail tunnel and an extensive system of tracks East-of-Hudson, but they are used first and foremost as commuter rail lines. Where freight rail operators share trackage with commuter rail service operators or freight rail competitors, it is particularly difficult to run long trains. Nonetheless, freight rail operators typically have not looked for transport opportunities that might require short 10-, 20- or 30-car trains, and operational custom inhibits some track-sharing options. A regional rail line or short line transporting goods from New Jersey across the Hudson on the cross-harbor float system to the Bay Ridge Line and then the Long Island Railroad, or over the Hell Gate Bridge to Metro-North's New Haven Line, would have to deal with four or five different entities.

As chapter 4 suggests, shorter trains often are best for routes that require timely dispatching. Currently, freight rail's unreliability in this respect has rendered shared use during tightly scheduled daytime hours unworkable on many routes.

For example, on the rail line running from Albany to the Bronx on the east side of the Hudson River, CSX is restricted to operating its services during six or seven nighttime hours when no or very few passenger trains are operating. The changes described in chapter 4 could greatly increase the wealth of track infrastructure at the disposal of the railroads.

5.3 Conclusion

In conclusion, an East-of-Hudson freight rail network that is to become an integral part of the national freight rail network needs both an efficient connection (or several connections) between the west and east sides of the Hudson River in downstate New York and a modernized system of yards and tracks that can accommodate today's intermodal railcars. In view of the size of the market for goods in the metropolitan area East-of-Hudson, and the large portion of goods transported from south and west of the subregion, as well as the severe congestion evident on the subregion's major roadways, rail freight infrastructure improvements may constitute some of the most economically worthy investments the subregion could make.

Chapter 5 notes

1 Most of the information in this section appears in the Cross-Harbor Freight Movement MIS, published in May 2001. Therefore, it is possible that some of the stated ancillary projects, as well as some of the estimations of actual and projected freight volume, may have been modified during the EIS process. Refer to the MIS and draft EIS for a detailed and accurate account of all the EDC market flow, engineering, and operational analyses.

2 Jim Detjen, "City Railroad Bridge to Be Reopened after Damage from Fire Is Repaired," *Poughkeepsie Journal,* May 9, 1974.

3 The bridge could be rehabilitated to function as it did before, or it could be widened to permit light or heavy rail. A commuter rail tunnel could also be built. This option is being considered by the Thruway Authority.

4 Such a move might also preclude access by the NS and thereby limit competition.

5 NYMTC Regional Freight Plan-Task 5, "Preliminary Identification of Improvements and Solutions" (2001), p. 3-5. Note that double-stack service to Nassau and Suffolk would be much harder to obtain.

6 The original owner of the bridge, the New Haven Railroad, operated several classes of large, heavy, locomotives, including the EP-3, EP-4, and FL-9, which would have required the bridge to be rated for higher gross weight and loadings than its current rating allows.

7 NYMTC, *Rail Freight Yard Requirements: Land Assessment for the East-of-Hudson Region,* March 2003.

8 Parsons, Brinckerhoff, Quade & Douglas, Inc., Cambridge Systematics, Inc., and Tioga Group, *Pilgrim Intermodal Freight Transportation Center: Study of the Feasibility of Developing an Intermodal Freight Transportation Center at Pilgrim State Hospital Property on Long Island* (New York: New York State Department of Transportation, Long Island Region, 2001).

CHAPTER 6

A comprehensive mobility plan

Given the potential efficiencies of the state-of-the-art freight rail technologies discussed in chapter 4 and the opportunities for modernizing the freight rail system East-of-Hudson described in chapter 5, major freight rail improvements in the region are likely to be able to meet the regional mobility, economic, and environmental criteria stated in chapter 3 for increasing freight transport capacity better than substantial highway expansion could. In section 6.1 we describe these freight rail improvements in the context of a regional mobility plan.

Since highway congestion already is a serious problem and is projected to get steadily worse, as described in chapter 1, we must look at freight rail investments as part of an overall regional mobility strategy. Such a strategy must include commuter and high-speed trains as well as freight rail. The region already is considering major investments in transit. Since several other reports and studies deal extensively with transit improvements, this report, in section 6.2, only briefly summarizes the large transit investments being undertaken or considered. While transit and freight rail improvements may take many cars and trucks off the road, a perennial problem is the large number of trips that freed-up highway capacity may induce.[1] In order for the region to receive the full return on these rail and transit investments, the demand for road space must be regulated. One of the best such mechanisms is a congestion-pricing scheme, and section 6.3 presents an overview of the role of congestion pricing in a regional mobility strategy.

The New York metropolitan region has invested tens of billions of dollars in its subway, bus, and commuter rail systems over the last 25 years and is planning to invest tens of billions more over the next 25 years. But it does not have a comparable commitment to freight rail, and it has only begun to use roadway pricing as a tool to reduce congestion. A strategy that combines freight rail with transit and congestion pricing with only very modest investments in critical, intractable highway bottlenecks may in fact be able to improve regional mobility for both people and goods.

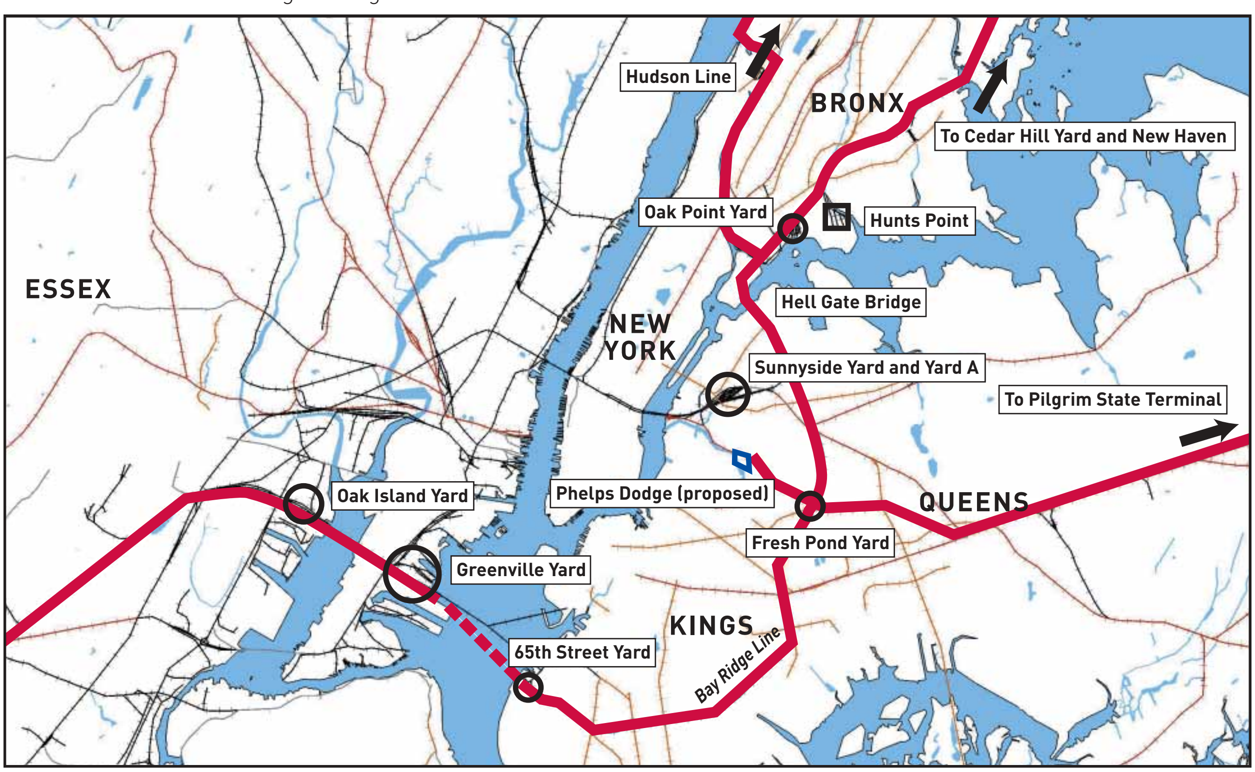
6.1 Freight rail improvements

For a cross-harbor tunnel, expanded intermodal yard space, and other freight rail improvements East-of-Hudson to satisfy the criteria set forth in chapter 3, the tunnel must be planned and perceived not as a transportation project that will benefit primarily the metropolitan area but as a much-needed regional improvement. The benefits of this expansion of freight rail services and of the creation of more and continuous routes will be noticeable across the eastern seaboard. Realizing them requires looking at all the elements of a revitalized freight rail system as described in chapter 5 and adopting the technologies and policy changes described in chapter 4. With the proper infrastructure, equipment, and management, freight trains will be able to come from points south via the Conrail Lehigh Valley Main Line, through Oak Island Yard, to a cross-harbor tunnel. From there the trains could continue through Brooklyn, Queens, and the Bronx, to New Haven-and there, one hopes, a rehabilitated Cedar Hill Yard-as well as other points in New England. At the same time, continued upgrading of Hudson Line rail infrastructure would improve freight rail operations to and from points north and west of the region (see Figure 6-1).

Pending the construction of a cross-harbor tunnel, New York City and the Port Authority should immediately help establish a dependable, competitive rail marine transfer system in New York Harbor. This would include the construction (or rebuilding) of the Greenville float bridges (a current Port Authority project in Greenville) and the institutional reintegration of the Sixty-fifth Street Yard and the Sixty-fifth Street float bridges. The failure of CP to develop the Sixty-fifth Street Yard underscores the lack of connectivity between the floats and the yards and the rail systems on both sides of the Hudson River. These functions must be integrated. In addition, the cross-Hudson float system should aim at providing frequent service, for example, twice daily between Oak Island Yard and Fresh Pond, so that freight users would be assured of reliable, competitive service. To do this, an operating subsidy and the upgrading of the Bay Ridge Line to at least class 2 standards may be required, with appropriate grade crossings to ensure the safety of the adjacent communities.

Full intermodal access on the Bay Ridge Line and other corridors discussed in section 5.1 would bring freight rail East-of-Hudson a big step closer to taking full advantage of the economies of scale afforded to intermodal freight rail. With a rail tunnel capable of accommodating double-stack trains, these trains could reach Phelps Dodge before transloading their cargo onto trucks. Other trains could continue north after leaving Fresh Pond, rather than going west to Maspeth. Going north from Fresh Pond, these trains could then cross the Hell Gate Bridge and either terminate at an expanded Oak Point Yard or continue into New England. This would not only provide a West-of-Hudson-to-New-England freight service highly competitive with trucking in both cost and time but could also relieve some

FIGURE 6-1
Increasing regional mobility
Possibilities for Hudson region freight movement.



new freight rail traffic at Phelps Dodge by diverting it to Oak Point. These kinds of improvements would enable the NS Rutherford Intermodal Terminal, for example, to assume a greater role in northeastern intermodal freight transport.

Two requirements must be met in order to do this properly. Plate H clearance (at 20 feet, 6 inches) will be needed to allow double-stack cars to operate. In addition, the double-stack fleet needs minor design changes in order for the cars to clear the third rail on the LIRR. On other lines, like the Hudson Line, TOFC clearance would also encourage more traffic East-of-Hudson. The advantages of this kind of system are well worth the investment and will be greatly amplified with the aid of a modernized car float system like that just described.

Like raising clearances, lifting weight restrictions is a fundamental component of the transformation that the East-of-Hudson freight rail network needs in order to form an efficient linkage with the national freight rail network. Metro-North's track already is capable of accepting 286,000-pound gross-weight-on-rail cars. With an adequate upgrade of the Hell Gate Bridge, as well as an overhaul of the LIRR clearance barriers, rail would be able to haul heavier freight and more of it East-of-Hudson. This would not only better exploit rail's traditional advantage in hauling heavy, less time-sensitive cargo over long distances but would also increase usage of the freight route from Brooklyn to New Haven resulting from the construction of a cross-harbor tunnel.

A modernized freight rail system with strategically located bridges and tunnels must have ample yard space in which to load, unload, and store the increased volume of freight it will attract. Among the possibilities for yard space discussed in chapter 5, some clearly meet the criteria of chapter 3. The proposed Phelps Dodge terminal in Maspeth should be built, all 27 available acres should be acquired for the new yard, and additional acreage from adjoining properties should be acquired as necessary to create a fully functional intermodal yard.[2] Amtrak's broad right-of-way in the Bronx should be redesigned as a rail yard that could relieve the pressure on the Oak Point and Hunts Point yards and accommodate the additional freight traffic. The Cedar Hill Yard should be rehabilitated to handle freight from Metro-North's track that originates both in the East-of-Hudson subregion and points south of the EDC tunnel. The Sunnyside Yard and Yard A in Queens should be decked for a rail intermodal transfer facility and reload yard. Decking would make available a large amount of space, some of which could be allocated for necessary warehousing space.

Rail freight, commuter, and high-speed passenger services cannot remain separate in dense urban areas like the East-of-Hudson subregion. Operators have the technical knowledge required for efficient track sharing—and here efficiency does not mean just simple divisions like running freight trains only at night and passenger trains only during the day. Rather, back-to-back scheduling of freight and passenger trains is possible with the technology and institutional changes described in chapter 4.

To be sure, all these improvements have the potential to yield good returns on the investment, but they must be implemented gradually, and they cannot be the sole component of a regional mobility plan.

6.2 Reducing congestion by investing in transit

In order to improve freight transport, major freight rail investments should be carefully coordinated with transit capital projects in the region. The region is pursuing transit projects to help people move throughout the region more efficiently. One project that has just opened is the Secaucus Transfer in the Hackensack Meadowlands that, along with the Kearney Connection, will improve access to Penn Station for several New Jersey Transit lines. The new trans-Hudson tunnel project known as Access to the Region's Core (ARC) of the New Jersey Transit, the Port Authority, and the MTA could likewise greatly help people moving between the New Jersey and New York sides of the Hudson River. These trans-Hudson transit projects, coupled with a new cross-harbor freight rail tunnel and modernization of the East-of-Hudson freight rail system, should reduce congestion for trucks using the principal New Jersey roadways and trans-Hudson corridors.

On the New York side of the Hudson River, the East Side Access for the LIRR project of the MTA, the Metro-North Harlem Line third track project in Westchester County, and the LIRR Main Line third track proposal in Queens and Nassau counties should help divert commuting cars from highway travel to rail. Together with the much more efficient freight rail system for the East-of-Hudson subregion described in section 6.1, these projects should relieve truck congestion in the East-of-Hudson subregion.

Transportation models used by the MTA, NYMTC, Port Authority and New Jersey Transit are capable of estimating the number of auto trips that a major transit project is capable of diverting from congested roadways. The MTA estimates that its construction of the Second Avenue Subway would attract some 25,000 new riders.[3] For the East Side Access for the LIRR Project, the MTA estimates that by 2010, some 341,000 daily automobile VMT would be eliminated; 11,000 daily automobile trips between home and work would be eliminated; and 24,000 daily hours of travel would be saved.[4] For the ARC project, the MTA Regional Transit Forecasting Model and the North Jersey Travel Demand Forecasting Model estimate that depending on the alternative adopted, 4,200 to 9,400 daily auto trips would be diverted.[5] This is one measure for evaluating the reduction in congestion and the improvement in air quality. But these models do not calculate whether these projects would reduce congestion or improve mobility on the affected roadways either by themselves or with other projects or measures. NYMTC's Best Practice Model is envisaged to have this kind of capability. But at the time of this report's publication, the model is either unusable or unreliable for many of its originally intended uses because in many cases its calibrated traffic flows deviated substantially from actual traffic counts. NYMTC is trying to correct these problems.

Some investments in transit and commuter track could be designed to improve freight rail transport as well. An example is the MTA's proposal for a third track on the LIRR Main Line between Jamaica and Hicksville. This additional track would facilitate the operation of LIRR trains during commuter hours, including reverse commuting. At the same time, with scheduled freight trains, a third track would add flexibility during many hours of the day for freight trains if the use of freight rail to Long Island, with possible access to an intermodal yard at Pilgrim State Hospital, were expanded significantly. Any proposal to add track capacity to the Hudson Line's right-of-way could similarly make dispatching freight and passenger rail trains more flexible.

Investing in transit or freight rail should be justified by the actual reductions in congestion and improved service, not just the diversion of cars and trucks. A fundamental problem with estimating or modeling the impact of these investments on roadway congestion, however, is that, in the long term, freed-up space on a roadway may encourage more car or truck traffic, when people find that they can live farther from work or shopping areas and shippers decide to send more trucks via such roadways. Thus, if investments in both transit and freight rail are to make freight more mobile and reduce highway congestion, the region needs a way to discourage induced car or truck travel on these less congested roadways. Properly implemented, the most powerful such mechanism is congestion pricing. It is used today only to a limited degree in the region, but it is a potentially effective market tool to make both cars and trucks more mobile, if applied broadly throughout the region to relieve congestion.

6.3 The impact of congestion pricing

In our society, we rely on prices to bring supply and demand in line. If the supply of a commodity does not meet the demand, the price goes up; if the supply of a commodity is greater than the demand, the price should go down. Highways become congested in large part because most roadway facilities do not use prices to tell drivers and shippers about the relationship between the supply of and the demand for roadway capacity at particular times of the day. When the demand for a segment of a roadway at a particular time exceeds its capacity (i.e., supply), it becomes congested.

Congestion pricing (also known as *time-of-day tolling* or *variable tolling*) uses roadway fees to moderate demand during periods of tight supply, such as commuter periods. Conversely, during evening or nighttime hours when congestion is low or nonexistent, the prices could be low or zero. If transit or freight rail investments diverted enough traffic during periods of high demand, congestion pricing could help maintain the mobility resulting from these investments and discourage additional travel by giving people and shippers an incentive to use transit and freight rail alternatives.[6]

Congestion creates both economic costs, in the form of time lost, and environmental costs, for movement of goods and people. Idle vehicles emit three times as many volatile organic compounds as do moving vehicles, and cars traveling under 10 mph emit more nitrogen oxides and carbon monoxide. Trucks stuck in traffic similarly emit higher rates of pollution and use more fuel per ton-mile than do trucks moving at moderate speeds. In general, drivers or shippers experience only their own congestion costs, not the congestion costs that one additional car or truck imposes on all the other users of heavily congested roadways (i.e., the social cost of driving). Congestion pricing is a tool that can inform a driver of a car or truck what congestion costs that vehicle is imposing on other drivers.

The first extensive economic analysis of congestion pricing, *Highway Benefits: An Analytical Framework*,[7] suggested theoretically in 1962 what has since been shown to be true empirically: congestion pricing diverts some drivers from using tolled roads during peak periods.[8] The resulting decrease in congestion allows for smoother flows of traffic and better absorption of the social cost of driving by individual drivers and shippers using trucks. Congestion pricing is most effective when roadway users have alternatives. For commuters this means the availability of rail or bus services, convenient, employer-supported car or vanpool services, or the ability to travel at off-peak times of the day. While there is, of course, no analogue to the carpool for trucking, shippers have two options if they wish to avoid paying tolls: moving goods during uncongested periods such as nighttime or finding alternatives to highways for freight transport, such as freight rail or barge.[9] To meet the needs of most such shippers, a partial shift to rail is a logical course of action as long as the service is convenient and reliable.

Many bridges and tunnels in the New York region, operated by the Port Authority, the MTA, and, in the case of the Tappan Zee Bridge, the New York Thruway Authority, are tolled. The primary purpose of those tolls is to provide revenues to cover the debt service on bonds and to maintain the facilities. A few highways, such as the New Jersey Turnpike, the Garden State Parkway, and the New York Thruway, also are tolled. When it raised the tolls on its bridges and tunnels in mid-2001, the Port Authority introduced a congestion-pricing feature that required users to pay somewhat more during peak commuter hours than at other times of the day.

Since bridges, tunnels, and roadways in the New York region are congested for an increasing number of hours each day, congestion-based tolls could produce additional revenues that could be used to pay for their maintenance. They also could be used to help fund investments in transit, freight rail, and other demand-related alternatives. Using such tolls to fund transit or freight rail investments is justified in that they allow people and goods to move through the region without contributing to highway congestion.[10]

Since time-of-day roadway pricing offers an incentive for roadway users to maintain the mobility that investments in transit and freight rail have produced, the technology for improving roadway user fees should be efficient and not interfere with mobility. In this region, commuters and truckers are accustomed to having to decelerate drastically at tollgates even if they have EZ-Pass cards, particularly at MTA tolled facilities with a speed limit of 5 mph. State-of-the-art electronic tolling technology, however, allows for smooth, uninterrupted travel with variable pricing designed to control traffic levels.

One example of this kind of tolling technology can be found on San Diego County's I-15 High Occupancy Toll (HOT) lane system, which operates on an 8.5-mile stretch of interstate highway. Carpoolers may drive in the single HOT lane without charge, and single occupancy vehicles (SOVs) pay via transponder using a system called FasTrak. Tolls are readjusted electronically every six minutes to maintain a free flow of traffic and are posted upstream.[11] Some of the toll revenues have been used to improve transit on the I-15 corridor by paying for four new express bus lines that serve areas otherwise lacking transit access.[12] A recent study commissioned by SANDAG, San Diego's regional planning agency, found that the pricing scheme has increased carpooling on I-15.

SANDAG's I-15 FasTrak congestion pricing project.

SANDAG

Many congestion-pricing mechanisms have been installed around the world. One of the best developed and time tested is Singapore's Area Licensing Scheme (ALS). Since June 2, 1975, Singapore has had a restricted zone surrounded by a cordon. Before the ALS was implemented, the restricted zone was severely congested, more so than the rest of the city and particularly during peak hours. In response, in 1998 Singapore's Land Transportation Authority installed its Electronic Road Pricing system, which requires all users of the road to have a transponder into which they insert a "smartcard"—a card they buy, from which a particular amount is deducted via short-range radio as their vehicle passes under the overhead gantries around the city. Cameras on the gantries photograph violators' license plates.[13] Investigations into the fairness of pricing have not found the tolls to be excessively high when time savings are calculated based on the wage rate.[14] Similar technology is now being used in Melbourne, Oslo, and Toronto. London has been fairly successful at reducing congestion by implementing a flat toll system along a cordon surrounding its central business district, but has had problems with complaints from drivers who believe they have been fined mistakenly.

Recent advances in GPS and general packet radio service (GPRS) technology have enabled a new type of tolling. Using GPS/GPRS technology, a satellite can track cars' movements and send the distance calculations to the driver's on-board unit (OBU). The OBU then displays the charges and sends them through the phone network to the toll administration agency.[15] Although the GPS/GPRS technology is expensive to set up, the variable public costs of increasing the number of users are much lower than those incurred by gantry-based systems. Individuals are generally expected to buy OBUs, even though they are more expensive than gantry transponders. Germany will soon begin implementing a GPS/GPRS system for trucks, having recognized how well they can alleviate the country's congestion problems. Both types of system have two benefits. First, they allow traffic to move at regular speeds, without vehicles having to decelerate rapidly at toll plazas, as they do on many Hudson region tolled roadways. Second, they eventually become self-sustaining, since the tolls are used to maintain the affected roadways, with extra revenues ideally dedicated to providing alternatives, such as transit or freight rail, that help relieve congestion, thus benefiting the very motorists and truckers who pay the tolls.

The use of congestion pricing must ultimately be considered in the larger context of regional transportation planning, with policymakers considering highway, transit, and freight rail investments as a whole. A well-designed congestion pricing system can help ensure a highly efficient and mobile transportation system that realizes the traffic-diversion and congestion-reducing benefits of investing in transit and freight rail. Current off-peak drivers, as well as those peak drivers who switch to driving during off-peak hours in response to congestion pricing, could face lower tolls on tolled facilities. Thus beyond the rewards of cleaner air, the benefits of a congestion pricing scheme could be, for many drivers, not only time saved but also money saved.

6.4 Conclusion

The New York metropolitan area should improve its freight rail system, including a trans-Hudson tunnel, modernized clearances, and a greatly expanded system of strategically situated rail yards, in conjunction with the continued implementation of major transit projects and a greater use of roadway congestion pricing. According to the criteria of chapter 3, this is a far better freight transportation strategy for the region than expanding highway capacity.

Chapter 6 notes

1 This is known as the principle of triple convergence, first articulated by Anthony Downs as the law of peak-hour traffic congestion in his landmark work, "The Law of Peak-Hour Express Way Congestion," *Traffic Quarterly* 16 (July 1962): 393–409. The law states that, unless economic growth is

nonexistent or virtually so, adding capacity to a given road will encourage mass-transit users, drivers who usually drive in off-peak hours, and drivers who usually take other routes, to use that new capacity. This leads to no reduction in congestion.

[2] Acreage figure from NYMTC, *Rail Freight Yard Requirements.*

[3] Gary G. Caplan, *2003 Progress Report to Investors* (New York: Metropolitan Transportation Authority, 2003).

[4] U.S. Department of Transportation Federal Transit Administration and Metropolitan Transportation Authority, *MTA Long Island Railroad East Side Access Final Environmental Impact Statement. Appendices* (New York: MTA, 2001), pp. 72–81.

[5] Metropolitan Transportation Authority, New Jersey Transit, and the Port Authority of New York and New Jersey, *Access to the Region's Core: MIS Summary Report 2003*.

[6] There are currently several efforts by regional agencies sharing the objective of reducing congestion. Among them, one of the most notable is NYMTC's Off-Peak Freight Delivery Study, expected in April 2005, which will study the possibility of moving some peak-hour truck trips to off-peak hours. Congestion pricing will make a shift to off-peak delivery more enticing only for those shippers whose trips are identified by the study.

[7] Herbert Mohring and Mitchell Harwitz, *Highway Benefits: An Analytical Framework* (Evanston, IL: Northwestern University Press, 1962).

[8] This was shown not long after economists began analyzing congestion pricing. See, e.g., Theodore Keeler and Kenneth Small, "Optimal Peak-Load Pricing, Investment, and Service Levels on Urban Expressways," *Journal of Political Economy* 85 (1977): 1-25.

[9] In rail, increasingly, since there are economies of scale in adding cars to a train, cars from different shippers going to the same place are being strung together, pulled by one locomotive. This is essentially a form of carpooling.

[10] See, e.g., William S. Vickrey, "Maximum Output or Maximum Welfare? More on the Off-Peak Pricing Problem, *Kyklos* 24 (1971): 305-30; and William S. Vickrey, *Port Authority of New York and New Jersey Hudson River Crossing Tolls: Statement on Behalf of the Environmental Defense Fund. Interstate Commerce Commission Adjudicatory Proceeding* (1977). See, more recently, Charles Komanoff and Brian Ketcham, *The Hours: Time Savings from Tolling the East River Bridges* (New York: Bridge Tolls Advocacy Project, 2003). For the last 10 years, the Transportation Research Board has repeatedly suggested that freight rail investments that mitigate highway congestion be made eligible for funding from the federal Highway Trust Fund, stating that use of these monies for non-highway—and particularly intermodal—freight projects "may be defended as offsetting the effects of imperfect pricing of highways. Highway users do not pay for the effects of air pollution and the congestion delay they cause for others." See Transportation Research Board, *Policy Options for Intermodal Freight Transportation*. Special Report 252 (Washington, DC: National Academy Press, 1998), 50. Congestion pricing would ensure that highway users pay for at least some of the effects of air pollution and congestion delay that they generate.

[11] David Brownstone, Arindam Ghosh, Thomas F. Golob, Camilla Kazimi, and Dirk Van Amelsfort. "Driver's Willingness-to-Pay to Reduce Travel Time: Evidence from the San Diego I-15 Congestion Pricing Project," *Transportation Research*, *Part A* 37 (2003): 373–87.

[12] SANDAG, http://argo.sandag.org/fastrak/fundrev.html. Last accessed February 12, 2004.

[13] For more information about Singapore's electronic road-pricing system, see A. P. G. Menon and Chin Keong, "The Making of Singapore's Electronic Road Pricing System," *Proceedings of the International Conference on Transportation into the Next Millennium*, Singapore, September 9–11, 1998 (Singapore: Centre for Transportation Studies, Nanyang Technological University, 1998).

[14] See Michael Li, "Estimating Congestion Toll by Using Traffic Count Data-Singapore's Area Licensing Scheme," *Transportation Research, Part E* 35 (1999): 1-10.

[15] Most of the information about GPS/GPRS discussed here can be found in Richard Handford, "Paying the Price for Road Usage: Congestion Charging: A Variety of Automated Toll Systems Are Up and Running," *Financial Times*, August 6, 4.

CHAPTER 7

Financing and planning for renewing the region's railroads

Investing in freight rail would help solve our congestion problem, clean our air, and strengthen our economy. But—we might ask—how should we finance this project, particularly when the federal government is not likely to spend large sums of money to fix freight rail tracks? And how should we plan a comprehensive program for freight rail revitalization? We also must find the funds and encourage the region's institutional capability to plan for freight rail in the metropolitan area.

This chapter shows how the government is investing in freight transportation and how freight rail companies are put at a competitive disadvantage by the government. It also describes the instruments already in place—the agencies, departments, and federal and state financing mechanisms—that would play a role in revitalizing New York's freight rail system.

A combination of state and local agencies should oversee the revitalization of a freight rail network on the east side of the Hudson River. In return for better infrastructure, freight rail carriers should open their rights-of-way to all other freight rail operators, within reasonable limits; and freight rail and passenger rail should cooperate more. The revitalization program should be financed by distributing the costs among the federal, state, and local governments, as well as the commuters, shippers, and railroads that will benefit from the program.

7.1 Seeking federal funds for rail infrastructure

Public funds typically do not pay for freight rail improvements. For major highway or transit capital investments, state and municipal governments usually look to Washington for money. No comparable federal source for freight rail investment, however, is available.

Funding for most no-toll roadways comes from the federal government through a surface transportation bill debated every five or six years. The most recent one is the Transportation Equity Act for the 21st Century (TEA-21), which expired in 2003 but has been extended through 2004. States are the other primary source of funding. The federal government finances a very large portion of the costs of expanding, rebuilding, and maintaining major roadways and a substantial portion of the transit investments in the region, with help from dedicated state taxes. Although the revenues for the federal and state transportation programs are derived largely from fuel taxes, the federal and state diesel fuel taxes that trucks pay do not cover the full costs of the capital and maintenance of the major roadways that the trucks use. The other source of funding for highways, bridges, and tunnels are bond issues repaid with future tolls. All the Port Authority's and MTA's bridges and tunnels require payment of tolls, which pay for their maintenance and contribute to transit operations.

No comparable, regular source of federal, state, or local funding for freight rail capital investments exists in the New York metropolitan region or in any other metropolitan region in the country—even though freight rail companies pay taxes on the diesel fuel they purchase, which go into the federal government's general fund.[1] The assumption has been that the freight rail companies in the United States pay for the system's improvements and maintenance out of this revenue. They also pay property taxes on their tracks and yards, although highways and airports are not similarly taxed. Only in 2002 did New York State pass a bill that substantially reduced property taxes on freight rail rights-of-way and facilities.

The Transportation Research Board offers criteria for determining whether a freight infrastructure project requires public financing at all or whether market forces will ensure its completion by the private sector. Fulfillment of any of these criteria warrants government involvement. The government should be involved if the project (1) reduces the external costs of transportation (i.e., those imposed by users on others, like congestion); (2) yields external economic development benefits (e.g., by promoting growth not directly resulting from the actual improvement); (3) is an intervention to redress the market imbalance caused by subsidies to some category of carrier; (4) fulfills a defense or public safety interest; or (5) "falls within the established government responsibility for major parts of the transportation infrastructure."[2] Almost every element of our plan clearly fulfills conditions 1, 2, and 3, and the freight rail tunnel fulfills condition 4 in addition (see section 7.2). Condition 5 is satisfied by our plan in principle but not in practice. We believe this experience ultimately justifies our plan on the basis of condition 3. How the need for this "intervention to redress the market imbalance" came to be requires a brief history of the last three decades of government involvement in railroading.

In 1970, with the establishment of Amtrak, the federal government assumed responsibility for intercity rail passenger movement. In 1973 it intervened to prevent the total collapse of the freight rail system in the north central and northeastern states. It established the U.S. Railway Association in 1974, which was charged with creating a viable rail freight system in the north central and northeast states. Most of the money went to restructuring, reorganizing, and rebuilding the longer east-west routes. The objective of this investment was to make the longer distance markets efficient and to preserve local commuter rail services. As a result, unused components of the former north-south freight corridor deteriorated, and the funding did little to make short- and intermediate-haul corridors in the central and northeastern states efficient or competitive. A large portion of public funds was spent on improving passenger services, especially commuter services around the large northeastern cities. But in the early 1980s and between the mid-1980s and the late 1990s, public funding dropped dramatically for investments in main line or Class I freight rail infrastructure. Instead, the federal money was spent mainly on highways and local rail services.[3]

In the last few years, however, this trend has begun to reverse itself in a modest way in the Hudson region and elsewhere, as discussed in chapter 2. The sums available are still very small compared with federal and state investments in either roadways or transit. Often, the Class I railroads themselves have been the greatest defenders of this situation, since they fear greater government regulation and being forced to share their track with new entrants into the railroad industry in exchange for funding. This antagonistic relationship between carriers and government is only beginning to soften.

Some federal programs for financing freight rail investments through loans or grants do exist, but have not been used extensively (or in some cases, at all) in the Northeast, including the New York metropolitan area. In 1998, (TEA-21) established the Railroad Rehabilitation and Improvement Financing (RRIF) program to provide loans to railroads, state, and local governments and government-affiliated authorities. These loans can be used to "(A) acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track, components of track, bridges, yards, buildings, and shops; (B) refinance outstanding debt incurred for the purposes described in subparagraph (A); or (C) develop or establish new intermodal or railroad facilities."[4] Applicants could submit proposals beginning in early 2001, when Federal Railroad Administration (FRA) regulations governing the application process were issued. Since then, of the $3.5 billion authorized for the RRIF program, about $700 million in loans has been approved.

An emerging consensus is that the biggest problem with RRIF is the application process. The application itself should be simplified, with redundancies removed, and streamlined. More guidance to applicants would encourage more seekers of funding. In general the current program is somewhat user unfriendly to applicants, partly because of the lack of a formal application form and process, the application fee, and the overly strict credit risk assessment. The FRA also should consider reducing the number of people from which a proposed project must receive approval.

At the FRA's request, the U.S. Department of Transportation's Volpe National Transportation Systems Center recently completed an evaluation of RRIF and suggested that better outreach to the railroads was needed and that the widely held perception that only politically well-connected railroads would be successful applicants for RRIF funding should be refuted.[5] The Volpe Center encouraged outreach, particularly to the short-line and regional railroads, for which $1 billion of the total funding is earmarked.

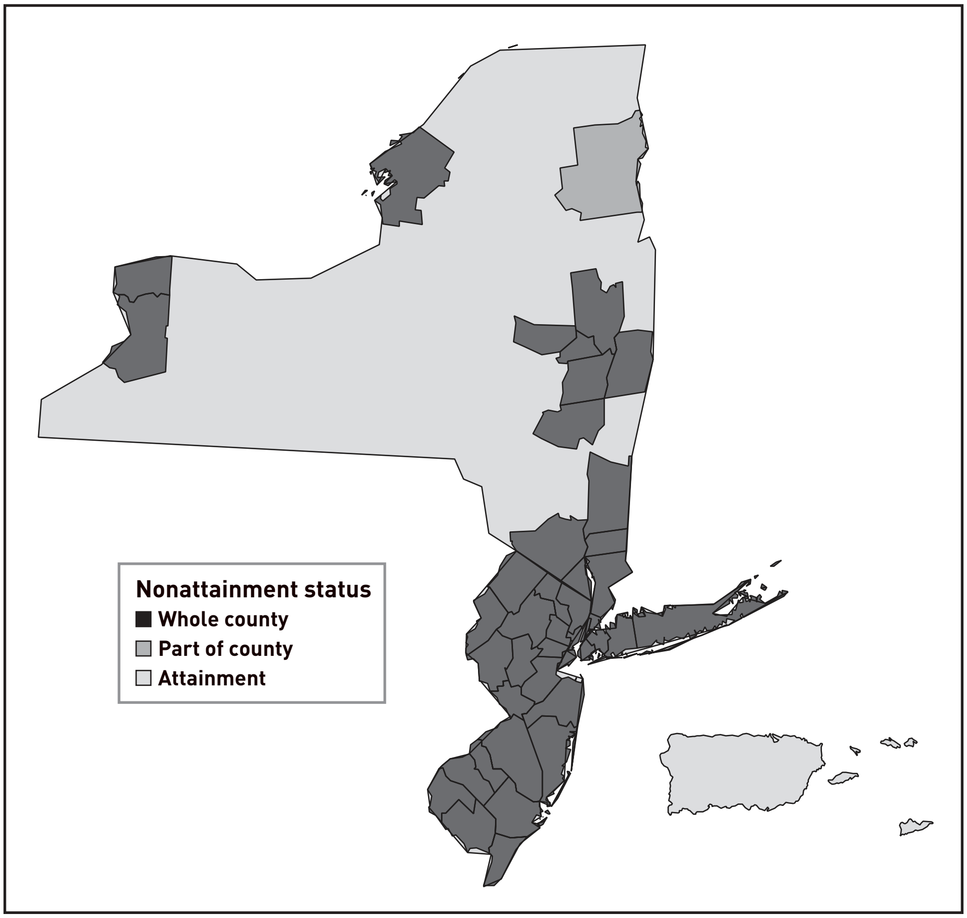
The Volpe Center claims that RRIF needs more administrative resources so it can serve rail interests more effectively and efficiently. Staff must be expanded and their roles better defined. Currently, prospective applicants do not know to whom they should address their questions. The Volpe Center also has encouraged the FRA to reduce the burden on applicants to produce vast amounts of historical financial data.

The inability of many railroads to take out such loans with the certainty that they can be repaid on time may ultimately prevent many potential beneficiaries from applying. Furthermore, many short-line railroads, regardless of outreach, will still not be interested in taking out loans to upgrade tracks, since they often operate on tracks they do not own, creating eligibility problems in the RRIF credit risk assessment. Nevertheless, adopting these recommendations would significantly increase the program's attractiveness, particularly for metropolitan planning organizations like NYMTC and government entities like the New York DOT, which has thus far been unsuccessful in meeting the requirements of the application process, though it has tried several times.

The Congestion Mitigation and Air Quality Improvement Program (CMAQ), jointly administrated by the Federal Highway Administration and the Federal Transit Administration under the auspices of TEA-21, was authorized with more than $8 billion for projects aimed at improving air quality in "nonattainment areas"—areas in which ambient levels of one or more pollutants named by EPA are above those established in its National Ambient Air Quality Standards. As of the publication of this report, no county in downstate New York was in attainment for all pollutants. Most are in nonattainment of the Standards for ambient levels of ozone (see Figure 7-1).

CMAQ funding has been used in the region for a number of transit projects. Especially if TEA-21 reauthorization were to increase CMAQ funding signifi-

FIGURE 7-1
Nonattainment areas map EPA Region 2 (New York, New Jersey, Puerto Rico, Virgin Islands)



Source: US EPA Office of Air and Radiation, AIRS database

cantly, the program could provide funding for some freight rail projects. The railroads have begun to use some CMAQ funding, but they cannot take full advantage of it until NYMTC has better inventories of emissions from freight transport, as well as projected emissions changes from freight rail investments. Without knowledge and modeling of present and future emissions, particularly of ozone precursors, the pollutant overwhelmingly responsible for the nonattainment of all Hudson region counties, CMAQ funds cannot currently be allocated to many freight rail projects. Any investments that the railroads can make to improve the quantity, availability, and accuracy of their emissions data will help the CMAQ disbursers better evaluate whether freight rail projects that could divert measurable amounts of truck traffic are more or less deserving of its monies than other proposals.[6]

7.2 Financing improvements in freight rail

Federal, state, and local governments have established ways of financing large transportation projects. Indeed, the kind of revitalization of the freight rail system described in Part B of this report could not occur without the public funding of at least a magnitude comparable to that of the late 1970s. New York DOT's Industrial Access Program funds rail projects of at most $1 million with 60 percent in the form of a grant, and 40 percent in the form of a no-interest loan to be repaid within five years. Several other programs offer funding, usually of lower amounts. This is far from ample, and accordingly, we need to explore how the government might fund the revitalization of freight rail in the Hudson region.

Freight rail investment should be viewed as a strategy for making freight transport more efficient and reducing truck-related highway congestion, just as transit investments reduce car-related congestion. Congress and the President should therefore consider including a freight rail title in the new federal transportation bill. The inclusion of such a title is justified by the fact that freight rail entities pay federal taxes on the diesel fuel that they use. It appears that the House of Representatives Committee on Transportation and Infrastructure is taking steps in this direction. Its reauthorization is expected to include a section authorizing funding for Projects of National and Regional Significance.[7] Projects that further the nation's security interests will be looked on particularly favorably. In this context a cross-harbor freight rail tunnel, as part of a revitalization program connecting the East-of-Hudson subregion to the national freight rail network, should qualify. Not only does the tunnel have clear regional benefits, but it also fills a security need by providing an alternative connection between the two subregions in the event that one of the existing trans-Hudson tunnels or bridges that trucks use is out of service.

In addition to any diesel fuel taxes that freight rail firms pay, a logical source of local funding would be a portion of the congestion tolls that trucks and cars pay on tolled facilities. The imposition of roadway congestion fees on those roadways throughout the metropolitan region that experience severe mobility problems, as well as time-of-day variations on currently tolled facilities, would be justified to reduce the enormous economic costs of delays caused by congestion. Shippers using trucks would, in particular, be far better off economically if the congestion fees resulted in significant improvements in highway mobility.

Since the aim of congestion pricing schemes is ultimately to relieve roadway congestion, toll revenues are usually used not only to cover operating costs and road maintenance, but also to fund investments that improve mobility on the tolled roadway. For example, a significant portion of SANDAG's I-15 receipts are directed toward improving bus transit in the corridor (see chapter 6). If the region were to implement a congestion pricing scheme, investing a portion of the toll receipts to improve freight rail would be a logical allocation of toll revenues, and one the authors support.

The final source of revenue would be tunnel use fees. Private freight rail carriers should expect to pay tunnel user fees, although these charges should be set at a level that assumes an efficient use of the tunnel and makes freight rail service attractive. Initially, as freight rail business expands, the fees should be low. With a congestion-pricing program established on the roadways, freight rail entities would be in a position to pay higher tunnel fees and still provide competitive services. A concurrent imposition of congestion pricing and tunnel user fees would also advance the proposition that users should bear part of the costs of the transportation infrastructure from which they benefit, regardless of mode. This is a concept that transportation experts and economists alike have long propounded as the best way to ensure that only the most worthwhile transportation infrastructure projects are undertaken.[8]

7.3 Better planning to increase mobility

As all states do, New York and New Jersey have elaborate roadway-planning and implementation capabilities. To plan roadway expansion and maintenance, transit operations, and capital investments, both the New York and New Jersey DOTs have very large budgets, backed by both federal and state funds.

Although the planning staffs of the two state DOTs deal with freight rail improvements, both staffs are very small. For both state DOTs, freight transport planning—whether relating to highways, freight rail, or waterborne (and other port-related) freight—has a far lower priority than passenger movement does.[9] But as these state transportation agencies have begun to realize, it is shortsighted to concentrate almost exclusively on passengers, since freight carriers compete for the same space in the transportation system.[10] In order to improve transportation for the general public, state and federal agencies must also address the movement of freight, by strengthening the professional capabilities of their respective staffs.

In the past few years, New York's and New Jersey's DOTs have taken an increasingly active role in regional freight planning.[11] In New York, the Pilgrim State EIS, the Downstate Rail clearance program, and other planning efforts attest to the state's renewed interest in rail freight matters. Along the same lines, New Jersey's DOT has established a freight transport task force.

The Port Authority once had a substantial planning staff that paid attention to freight movement issues. Although most of that staff was dismantled in the last decade, it still has a small, dedicated group that deals with freight rail issues. Nonetheless, in recent years the Port Authority has resuscitated its freight planning efforts in both the East- and West-of-Hudson subregions. It has just invested $25 million in the $40 million joint New York DOT-Port Authority East-of-Hudson freight rail initiative and is involved in other East-of-Hudson planning efforts (see chapters 2 and 5).[12] With other local and regional agencies, it also is developing and implementing the Comprehensive Port Improvement Plan. The plan's purpose is to identify potential improvements in the Port of New York and New Jersey, especially those that can shift freight from truck to railroads, barges, and coastal shipping.[13] The plan is currently being refined, and its draft EIS is expected to be released in the fall of 2004.

EDC is the government agency that has devoted the most resources to evaluating large investments in freight rail East-of-Hudson and cross-harbor possibilities. In addition, NYMTC has been carrying out its Regional Freight Plan, on which this report drew extensively. Nothing comparable has been done for more than 20 years.

Although a new entity for freight rail, similar to the MTA, might make sense, we should take advantage of existing transportation agencies by upgrading the importance of the freight transport agenda. Freight planning should be carried out regionally. The governors of New York, New Jersey, and Connecticut should allocate more state and federal funds for freight transportation planning and improvements, and they should also coordinate their planning.

If freight transportation is planned regionally, the governors of New York and New Jersey should also ask the Port Authority to look beyond just the port and upland freight transportation planning. While the Port Authority may be prepared to accept a larger responsibility for bi-state freight rail planning, it may hesitate for fear that the city of New York and the two states would expect it to provide significant public funding for the multibillion-dollar investments that EDC's freight rail tunnel study envisions. Section 7.2 addresses this concern with proposals for new sources of funding.

7.4 Making the network of tracks East-of-Hudson available to all freight carriers

Resuscitating the East-of-Hudson freight rail system is a challenge because most of the track is owned or controlled by passenger rail carriers (i.e., Metro-North, the LIRR, or Amtrak) and one freight rail firm, CSX. The problem of shared use, ownership, and control is described in section 5.2.

A short-line railroad, such as the New York and Atlantic Railroad, and a regional railroad, like the Providence and Worcester Railroad, tend to look aggressively for new business opportunities, but they have great difficulty gaining access to tracks owned by CSX East-of-Hudson or the other large freight rail entities. Norfolk Southern does not operate East-of-Hudson, and extended service through marketing agreements is minimal. Robust competition, however, is as important to efficient freight rail operations as it is to other sectors of the economy. These regional carriers therefore should be accommodated, since they think in terms of moving relatively short freight trains over shorter distances, exactly the kind of service that competes with trucks. It also would be useful to encourage more competition among the larger carriers on both sides of the Hudson River.

There are two ways of addressing these track ownership and control issues. Over the next five to ten years, some governmental entity could take over the ownership and control of all the tracks East-of-Hudson and lease the use of those tracks to passenger and freight rail services based on social and economic factors. In effect, this is the way the highway system works. As they do with roadways, government agencies would maintain the rights-of-way and establish rules of use while levying tolls and taxes to pay for them.

Another approach would have different pieces of the rail system owned, managed, maintained, and controlled by a combination of public and private entities. Other carriers could arrange to use the tracks.[14] An oversight body would have to be established to make sure that the terms of usage were reasonable and fair to both track owners and track users. It would have to price access high enough to encourage continued investment in freight rail infrastructure by those private railroads and public agencies that can afford to do so, and low enough to enable other operators, assuming their operations were adequately efficient, to use the track. The price should be determined by the cost of the track, its maintenance costs, and the revenues forgone by the owner in leasing the track to the lessee.[15] Special attention should be given to pricing access in a way that takes into account the high costs of capital investment in rail infrastructure.[16]

Since a cross-harbor freight rail tunnel would presumably be largely financed publicly, it should be open to all freight rail companies at equitable prices. The East-of-Hudson subregion should move toward public oversight of track usage and charges in order to encourage competition and good customer service. At the same time, freight rail carriers must be able to use trains of modest length with state-of-the-art locomotives that can move at high speeds and that can share tracks with passenger service during off-peak daytime and nighttime hours.

In the coming decades, it is the federal government's responsibility to allocate federal dollars to freight rail improvement, particularly in densely populated metropolitan areas. TEA-21 offers an opportunity to give freight rail the kind of funding it needs. Allocation of funds to freight rail can be encouraged by propagation of a greater understanding of the regional benefits it provides for regional freight mobility and reduced congestion for all vehicles. More generally, freight rail, transit, and highway investments must be part of better, coordinated planning efforts by state and federal agencies to maximize the return on major transportation investments. Railroads and trucking companies should make efforts as well to maximize their efficiency and competitiveness. Improved regional mobility will be a direct result of these efforts.

Chapter 7 notes

[1] Before turning it over to Conrail, the federal government invested billions of dollars in upgrading Penn Central's dilapidated freight rail system after its bankruptcy in the early 1970s. Since then, there has been no regular source of federal funding for the freight rail system, and no federal transportation act has included a title for freight rail, although some parties, including the White House, have advocated a title as part of the next transportation bill.

[2] Transportation Research Board, *Policy Options for Intermodal Freight Transportation*. Special Report 252 (Washington, DC: National Academy Press, 1998), 95.

[3] The acquisition of Conrail by CSX and NS in 1997 underscored the neglect of the northern portions of the north-south trade routes. The acquisition exposed the many pockets of depreciated and dilapidated infrastructure in the national rail network. Conrail neglected to develop its critical north-south corridor, today commonly called the Northeast Corridor.

[4] U.S. House of Representatives, *Conference Report for HR 2400, the Transportation Equity Act for the 21st Century, as printed in Congressional Record of May 22, 1998* (posted May 26, 1998) (Washington, DC: U.S. Government Printing Office, 1998), H3888. Available at www.fhwa.dot.gov/tea21/legis.htm. Last accessed February 12, 2004.

[5] See section 5.4.1 of Federal Railroad Administration, *Evaluation of the FRA's Railroad Rehabilitation and Improvement Financing Program*. Available at www.fra.dot.gov/Content3.asp?P=1353 (October 2003). Last accessed February 12, 2004.

[6] There are two other federal programs from which funding may be sought, but the limitations are great. The Transportation Infrastructure Finance Innovation Act (TIFIA) assists only those freight projects (often in the form of loans) that deal with publicly owned intermodal facilities adjacent to highways. The National Corridor Planning and Development program is a good source of funding, particularly to investigate possibilities for establishing a corridor like that described in chapter 6. However, it offers fewer funds than do the other programs discussed, and many projects with clear implications for already established corridors are competing for those funds.

[7] See Title I, Subtitle C, Sec. 1304 of H.R. 3550, the *Transportation Equity Act: A Legacy for Users* (2003).

[8] See, e.g., Transportation Research Board, Committee for the Study of Freight Capacity for the Next Century, *Freight Capacity for the 21st Century* (Washington, DC: National Academy of Sciences, 2003).

[9] See Federal Highway Administration, Office of Freight Management and Operations, *Freight Financing Options for National Freight Productivity* (Washington, DC: U.S. Government Printing Office, 2001); and Federal Highway Administration, *Addressing Freight in the Transportation Planning Process* (Washington, DC: U.S. Government Printing Office, 2001).

[10] In general, some have argued, their approach to freight in the planning context would benefit from some modification. As a recent General Accounting Office report laments, "The planning process often does not consider the regional nature of freight mobility and is subject to long lead times to plan and implement projects, factors that deter valuable private sector participation in the process." See U.S. General Accounting Office, *Freight Transportation: Strategies Needed to Address Planning and Financing Limitations. Report to the Committee on Environment and Public Works, U.S. Senate* (Washington, DC: U.S. Government Printing Office, 2003), p. 19.

[11] Chapter 2 discusses the $40 million jointly spent by the New York DOT and the Port Authority to improve downstate New York freight rail, as well as other studies that the New York DOT is sponsoring or cosponsoring.

[12] The Port Authority is investing $25 million to improve the rail system West-of-Hudson, where it is planning to double-track and expand segments of the Chemical Coast and Lehigh lines and is investing millions more in its Express Rail system servicing its port facilities in Newark and Elizabeth.

[13] Sir William Halcrow & Partners, Inc. *Task E Technical Memorandum (Draft #1): Market Demand and Port Capacity.* Prepared for the CPIP Consortium (Roslyn, NY: Halcrow, 2003), vols. 3 and 4.

[15] Here we are essentially suggesting application of what is known in industrial organization as the efficient component-pricing rule (ECPR) or parity-pricing formula; it has already been applied to some extent in several industries. See, e.g., William J. Baumol, Janusz A. Ordover, and Robert D. Willig, "Parity Pricing and Its Critics: A Necessary Condition for Efficiency in the Provision of Bottleneck Services to Competitors," *Yale Journal on Regulation* 14 (1997): 145–63.

[16] Jerry Hausman and Stewart Meyers, "Regulating the United States Railroads: The Effects of Sunk Costs and Asymmetric Risk." *Journal of Regulatory Economics* 22, no. 3 (2002): 287–310, 295.

SUMMARY OF REPORT FINDINGS

1. Many of the Hudson region's major roadways are heavily congested, and with the tonnage of freight hauled by truck projected to increase in the coming decades, it is doubtful that the current highway network can accommodate the increase in truck vehicle miles traveled. Given the requisite highway improvements and the severe and worsening congestion, it is clear that the region is overly dependent on trucking to move freight.
2. While the West-of-Hudson regional freight rail network is reasonably well integrated into the national network, the East-of-Hudson subregional freight rail network is poorly integrated into it. The two subregional networks do share some use of passenger tracks, although East-of-Hudson freight rail is heavily dependent on shared tracks. Some of the many important yards on both the east and west sides of the Hudson River are currently underutilized. Downstate, the only current rail connection across the Hudson is the cross-harbor float system, which is inefficient and underutilized. Intermodal traffic has been increasing using several types of cars, each of which is subject to various weight and height restrictions that can limit its use. Finally, some rail improvement programs and studies are now under way.
3. Investments in the improvement of freight rail and highways should be evaluated according to whether they look promising with respect to congestion reduction, land use, air quality, energy consumption, economic growth, and regional security.
4. In order for the benefits of these investments to be fully realized and for the railroads to increase their market share, the freight rail sector must adopt both new and already existing technologies. These range from braking, to car and locomotive design, to carfloats. The railroads also must consider institutional changes, which can be broadly grouped into changes in dispatching and reliability, speeds, and the types of markets and distances served.
5. There are several ways to improve the infrastructure of the Hudson region's freight rail network in order to better connect the East-of-Hudson subregion to the national rail network better. The most important are a cross-Hudson tunnel and, in the near term, an improved cross-harbor float system. Land-based infrastructure needs and clearance and weight limit problems also must be addressed, and more yard capacity is urgently needed. Passenger and freight rail operations should share track more often than they do now. This is an attainable goal if it is aided by institutional reforms and the adoption of appropriate technologies.
6. Specific investments in freight rail that the authors support should be coupled with investments in transit and congestion pricing as part of a comprehensive regional mobility plan.
7. These proposed improvements will not be cheap. Even though the federal funding of freight rail improvements has declined in the last two decades, it now ought to increase. Different mixes of public and private funds, a share of roadway congestion fees, and usage fees for freight rail improvements could provide some funding. All such money, however, risks being misspent if state agencies do not incorporate the freight rail sector and consider track-sharing possibilities in their regional planning.

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finding the ways that work

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