In every sector of the U.S. freight transportation industry in the past decade, service providers and customers sounded the alarm that facilities were inadequate for the demands of traffic growth. Trucking companies saw highway congestion eroding performance and profits, rail customers experienced service disturbances in the aftermath of industry mergers, and port operators sought federal assistance to cope with unprecedented growth in international trade. Responding to capacity demands, however, is complicated by conflicts between the requirements of passengers and freight sharing the same facilities and by the needs to balance demands for environmental quality, to preserve communities, and to accommodate economic growth.

The National Research Council of the National Academies convened the Committee for the Study of Freight Capacity for the Next Century (see box, page 34), under the auspices of the Transportation Research Board (TRB), to consider how government policy can allow more efficient provision of freight transportation system capacity. The committee’s study was sponsored by the Federal Highway Administration, the U.S. Army Corps of Engineers, the state departments of transportation (DOTs) through the National Cooperative Highway Research Program, and TRB.

The committee’s conclusions, published in Special Report 271: Freight Capacity for the 21st Century, address the implications of historical developments for freight system capacity and performance in the coming decades. The committee’s recommendations identify opportunities to improve government decisions on operating and expanding transportation facilities.

Prospects for Freight Capacity

The committee examined trends in traffic, performance, capital expenditures, and capital stock for the freight modes and noted an unprecedented pattern of tight capacity in parts of the system. Extrapolating the trends magnifies the concern: by 2020, the nation’s total output probably will increase by 70 percent, highway travel and all domestic freight traffic will increase by 40 percent, and international container traffic will double.

The strong economic growth of the 1990s placed exceptional demands on the transportation system but may not represent the trend of the next several decades. Nonetheless, even modest growth will cause a deterioration of performance if freight capacity is allowed to stagnate.

Prominent developments have included increased highway congestion and a slowdown in adding highway capacity; downsizing of the rail infrastructure, with disturbances of service; congestion at terminals and border crossings; lengthening lead times and rising costs of infrastructure projects; and freight–passenger conflicts in cities. These trends present challenges to public and private providers of freight transportation services and facilities.

Capacity is being added. For highways, improvements to current facilities are more frequent than construction of new routes. Overall, highway capital stock is being added faster than it is wearing out.

Railroads and ports have reported ambitious infrastructure spending plans. Market developments, including future global patterns of trade and commodities production, will determine the scale and locations of rail and port markets expansion.

Congestion in the freight transportation system
remains localized, but congestion at a bottleneck can have systemwide repercussions. The growth of international trade may exacerbate bottlenecks by concentrating freight traffic at a small number of nodes, including certain ports and border crossings.

Productivity growth in freight transportation historically has been impelled by technological and institutional breakthroughs. Improvements in vehicle and infrastructure technology will continue to be important, as will information technology applications to coordinate operations. Timely and appropriate reforms in management, operations, and finance could yield dramatic gains in transportation efficiency.

Increasing population density, urbanization, and wealth ensure increases in conflicts between freight and passenger traffic; in conflicts between freight transportation and residential, recreational, and other competing land uses; and in requirements to control pollution. These will increase the cost of expanding capacity and add to the risk of investment.

### Choosing a Course
The United States has ample resources for expanding the transportation system; however, if capacity addition lags, traffic grows, and congestion worsens, the long-run consequence will not be massive breakdown. Instead, users will adjust to accommodate or avoid congestion. Shippers will change logistics practices. Workplaces and residences will move away from congestion within regions and to other less-congested regions. Production will move abroad if congestion costs cause the United States to lose comparative advantage in some industries.

Therefore, one plausible course of development is to continue to accommodate growing freight traffic by increasing capital spending, by accepting more congestion, and by moving activity away from the most congested locations. This may be tolerable but will be far from optimal, because capacity will be used poorly on parts of the system if users do not pay prices that reflect costs and if operators lack incentives to be responsive to user costs and preferences. Moreover, the targeting of capital expenditures faces obstacles, particularly in the public sector.

Public capital spending will dissipate much of its impact because some high-payoff projects are passed by and some low-payoff ones are carried out. Changes in government policy that would allow the nation to make better use of current capacity and better investment decisions would have important economic benefits.

### Lessons from Case Studies
The committee examined transportation projects as case studies to illuminate the institutional setting of project-level decision making. The cases suggest that certain basic questions about the management of public transportation programs are not being examined adequately.

Governments often fail to recognize and take advantage of the link between project finance and performance. Consequently, public agencies usually do not evaluate how alternative funding mechanisms or user fee arrangements would affect the performance of transportation programs and do not follow funding practices that maximize the chance of producing successful projects.

The case studies indicate that, in project evaluation, governments usually do not compare returns from the selected freight-related projects with returns from alternative transportation uses of the funds. The cases, however, illustrate that solutions to freight and passenger capacity problems often may be complementary, because capacity problems often originate in operating practices that are not optimal.

### General Principles
The study committee offered a general recommendation about principles to guide decisions on government programs affecting freight capacity. Specific recommendations addressed investment, management of facilities, decision-making methods, and regulation.

#### Comprehensive Freight Program
The performance of the system and the adequacy of freight capacity in the next decades will reflect the outcomes of government decisions on spending, regulations, and operations. Decisions on these matters, however, often address narrow concerns, guided by short-run considerations. A coherent government effort is needed at the national level, taking into account the cumulative, long-run consequences of government decisions and applying consistent principles in decision making.

#### Guiding Principles
Experience in the United States and other countries demonstrates that respecting the following four principles will enable the freight infrastructure to provide the capacity and performance with the greatest contribution to the nation’s economic well-being:

- The primary goal of government transportation policy should be economic efficiency—capital improvements and operating practices should yield the greatest net economic benefit, considering all costs.
- Government involvement should be limited to circumstances in which market-dictated outcomes are far from economically efficient—for example, preventing monopoly power and dealing with non-
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market costs. Government also should be responsible for facilities it has historically managed and should exercise leadership in complex institutional settings. The federal government should be responsible if a conflict arises between national and local interests and for ensuring transportation facilities for the nation’s defense.

◆ Government’s responsibility to provide facilities or leadership in a project does not necessarily justify government subsidy of the costs. If a public-sector freight-related project directly benefits the users of the facilities by reducing transportation and logistics costs, the users should pay the costs.

◆ Finance provisions in public-sector transportation programs determine performance, affecting both the quality of investment decisions and the efficiency of operations. Relying on revenue from users, and from local matching funds in federal grant programs, will increase the likelihood that the most worthwhile improvements will be carried out and that facilities will be operated and maintained efficiently.

Many government investment and operating decisions are not consistent with these principles, and applying them may be controversial. Nonetheless, applying these principles affords the only realistic prospect for the nation to continue to enjoy the benefits of freight transportation productivity growth in the long run.

By themselves, technology, better planning, and increased spending levels will be unable to achieve comparable results. Keeping up with growth within the constraints that will be imposed on the transportation system in the future will be possible only if operators extract more service from facilities and higher returns on investment by selecting better projects. Finance reform in government programs and greater reliance on markets can help attain both of these goals.

The current inefficient use of transportation capacity should be regarded as a large, hidden reserve to be tapped through improved management. Revenues from appropriate user fees in many circumstances would be the best indication of where capital expenditure to expand capacity would be most valuable.

Specific Recommendations
The committee offered recommendations on specific programs to illustrate how the principles can be applied to government decisions on federal infrastructure programs, decision-making processes and planning, and regulatory issues.

Federal-Aid Highway Program
Because trucking accounts for the majority of U.S. freight transportation expenditures and the federal government has a leading role in national highway programs, no federal activity has greater significance for freight capacity than the federal-aid highway program. Highway services are essential to the functioning of the rail, air freight, port, and waterway systems. The next federal surface transportation program should further three goals:

◆ Maintain and reinforce the principle of user financing, reforming the structure of fees to relate more closely to the costs each highway user imposes.

◆ Support improved operation and maintenance of highway facilities.

◆ Provide funding to ensure that states have the resources to maintain the overall performance of the highway system.

The report details the provisions that Congress should enact to promote these goals.

Any programs that Congress enacts to redirect state and local government project selection toward freight-related projects should satisfy the following criteria:

◆ Sustain the user-pays principle that underlies the federal-aid program.
◆ Sustain support by funding projects that fee payers recognize as having value.
◆ Rely primarily on adjusting user fees instead of offsetting subsidies to competing modes, to ensure that the market outcomes of competition between trucking and other modes are in the public interest.
◆ Require ongoing and retrospective evaluation of the performance of the programs receiving federal multimodal credit assistance.

**New Systems**

Congress should direct U.S. DOT, in cooperation with the states and the private sector, to study the costs and market potential of exclusive truck facilities.

The committee recommends that the Administration and Congress reexamine the planning process for new projects as well as the present rules on funding formulas and sources for harbor and channel improvements, to ensure that available funding is concentrated on the projects with greatest net benefits. The committee urges Congress to recognize that tying channel capacity expansion and maintenance to project-specific user fees would have economic benefits.

Congress and the Administration should direct the U.S. Army Corps of Engineers to improve the efficiency of congested locks on inland waterways through demand management. Congress should begin to rely on revenues from user fees to fund inland waterways operation and maintenance, as well as capital expenditures.

**Public–Private Funding**

States and local governments should conduct routine, quantitative evaluations of the economic rationale for government involvement in their freight transportation infrastructure projects, prospectively for each new proposal and retrospectively for each completed project. Program rules should require such evaluations of projects that receive federal assistance. Congress should base its decisions on whether to adjust the federal-aid program rules after reviewing the outcomes of prospective and retrospective evaluations of past projects.

Governments have experimented recently with nontraditional projects involving public–private joint undertakings and complex financing packages with support from multiple sources. These projects often center on intermodal facilities and often entail public support for facilities commonly provided by the private sector.

An analysis of these kinds of proposals, however, should compare the estimated benefits, costs, and government budgetary impacts with alternative means of serving freight and with alternative institutional arrangements. If the proposal is for government support of a project that cannot obtain private-sector financing, the evaluation should demonstrate that the public benefits would raise the public rate of return above the private rate.

**Decision Making and Planning**

Congress also should continue to support the development of U.S. DOT capabilities for economic analysis of the federal-aid highway program and should provide for joint state–federal efforts to transfer and adapt the federally developed policy guidance tools to state and local needs.

Congress should create a clearinghouse for evaluation methods within U.S. DOT, so that program agencies and local and state governments can share and compare methods and evaluations. The clearinghouse would contribute to streamlining project development by clearly defining accepted methods and by providing staff expertise.

Public infrastructure investment choices are made more difficult by the lack of an explicit evaluation framework, political incentives that discourage evaluation, and failure to devote resources to research and data collection. The report proposes guidelines for government evaluations of freight-related infrastructure projects.

**Regulatory Issues**

Changes in practices and policies that shorten delivery time would reduce the difficulty of matching capacity to demand. Reforms should speed project delivery without compromising environmental safeguards. The committee recommended actions to reduce excessive delay.

The committee endorsed past U.S. government efforts to liberalize the international air freight market. Increased competition and increased carrier flexibility should improve efficiency in the international air cargo system.

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