

# Preserving and Protecting Freight Infrastructure and Routes

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A smoothly functioning freight transportation network is part of the nation's critical infrastructure and is essential to the U.S. economy. Transportation services deliver raw and intermediate materials to producers and final products to retailers and customers. Freight and its transportation are an integral part of supply chain management (see Figure 1, below).

According to the most recent U.S. Commodity Flow Survey, on average, 42 tons of freight worth \$39,000 were delivered to every person in the United States in 2007. In terms of distances traveled, that approximates 11,000 ton-miles of freight per person. This is equivalent to carrying one ton of freight for every man, woman, and child in the United States 11,000 miles.

The shares of domestic ton-miles of truck and rail freight increased significantly between 1980 and 2007, as shown in Figure 2 (above, right). Associated with the increases were significant pieces of legislation that largely deregulated these industries—the Staggers Rail Act of 1980 and the Motor Carrier Act of 1980. Intermodal shipments also are growing, particularly for truck and rail, in terms of ton-miles, and for truck and air for higher-value and time-sensitive shipments.

In addition, the freight transportation system is a major employer. In 2008, 4.5 million people were employed in transportation and warehousing industries in the United States, a little more than 3 percent of total U.S. employment.

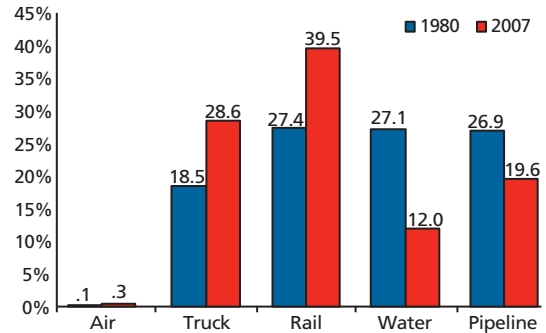


FIGURE 2 Shares of domestic ton-miles by mode, 1980 and 2007.

## Conflicts in Land Uses

Population growth, rising incomes, and other aspects of economic growth have led to increased competition for the land resources around freight corridors and facilities. Competing and incompatible land uses in close proximity often interfere with each other, leading to conflicts—this has become a significant problem for freight transportation operations. The expansion of incompatible land uses, especially in America's burgeoning megaregions, raises serious threats to the freight transportation system.

National Cooperative Freight Research Program (NCFRP) Report 16, *Preserving and Protecting Freight Infrastructure and Routes*, provides a perspective on the importance of the freight transportation system and presents tools and strategies to resolve or minimize conflicts that arise when nonfreight land uses

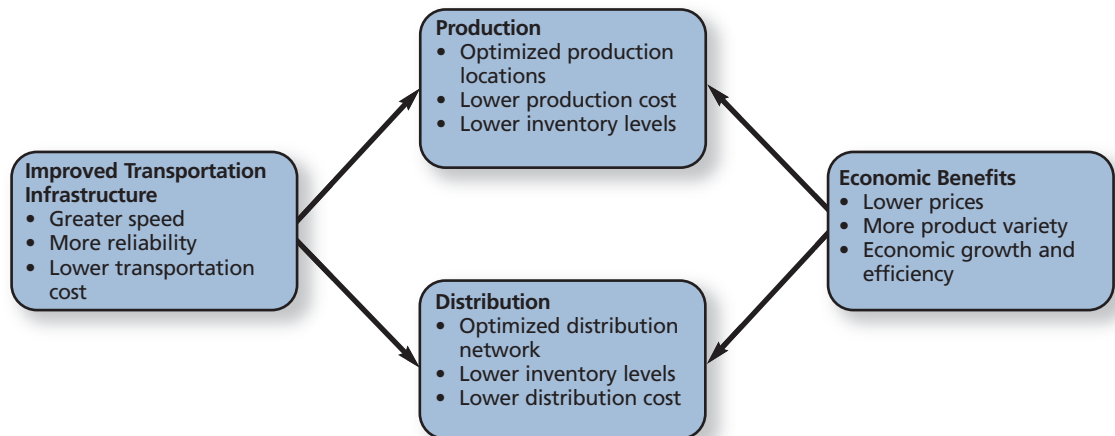


FIGURE 1 Role of freight transportation in production and distribution.

**TABLE 1 Conflicts Between Freight and Other Land Uses**

Noise-sensitive uses	Dwelling units (residential, motels, etc.); educational (childcare, schools, colleges, etc.); libraries; hospitals and other residential health care providers; playgrounds
Light-sensitive uses	Dwelling units; hospitals and other residential health care providers
Vibration-sensitive uses	Dwelling units; educational; vibration-sensitive industries (e.g., precision high-tech); buildings not constructed to withstand fatigue caused by rail vibrations
Pollution- and air quality-sensitive uses	Dwelling units; medical (hospitals and other residential health care providers); educational (childcare, schools, colleges, etc.); park and recreational facilities
Uses requiring potentially incompatible at-grade crossings	Dwelling units; educational; libraries; hospitals and other residential care providers; commercial; emergency services; park and recreational health facilities
Uses associated with the potential for dangerous trespass	Dwelling units; education uses (especially childcare facilities and schools); libraries; playgrounds; commercial
Time-sensitive uses	Nighttime-sensitive dwelling units; hospitals and residential care facilities
Traffic- and congestion-sensitive uses	Dwelling units; emergency services; residential health care facilities
Height-sensitive uses	Residential and commercial, with possible impact on flight paths at approach and landing

are in proximity to freight corridors and facilities. The project also produced the EnvisionFreight website (see box, below), which provides detailed information on the tools and strategies. Table 1 (above) shows the conflicts that arise when various land uses are adjacent to freight corridors and facilities.

**Causes of Conflict**

The NCFRP project identified the following factors as underlying causes of conflict between freight and nonfreight land uses:

- ◆ Planning for freight is generally inadequate;
- ◆ Zoning approaches to freight are typically inadequate;
- ◆ Funding for planning, corridor preservation, and conflict mitigation is often lacking or insufficient; and
- ◆ Communication among stakeholders is lacking.

From the perspective of freight interests, conflicts with other land uses often impede economically effi-

**EnvisionFreight**

*Online Information for a Range of Users*

The NCFRP project developed the EnvisionFreight website<sup>a</sup> for a range of stakeholders working to prevent, consider, and deal with the conflicts that arise because of the proximity of incompatible land uses to freight facilities.

For planners and elected officials, the website explains the role of freight in the local, national, and global economy; the issues and impacts that may arise from land use conflicts; and the kinds of tools, scenarios, communication, and educational outreach that can improve freight planning and preservation.

For developers, the website assists in identifying freight activities that may affect and intersect with residential and other types of land uses, in choosing appropriate sites, and

in incorporating construction and mitigation components to reduce conflicts.

For freight entities, EnvisionFreight provides education and assistance in land use planning and zoning processes.

For individual citizens or community groups, the website provides basic information about the various freight modes, the impacts of freight activity and proximity to incompatible land uses, and the tools available to plan for freight effectively.

For state legislators and staff, EnvisionFreight provides information and ideas for potential legislative changes to facilitate the integration of freight and land use planning.

<sup>a</sup>www.envisionfreight.com.





Freight-compatible development ensures that rail facilities and residential or other community land uses can coexist successfully.

cient freight transportation. In addition, barriers can arise from insufficient funding for the maintenance or expansion of freight facilities and corridors and from public policy decisions that impede or do not sufficiently accommodate the needs of freight transportation. Impediments include the following:

- ◆ Speed restrictions,
  - ◆ Restrictions on hours of operation,
  - ◆ Physical encroachment into freight corridors,
- and
- ◆ Impacts on transportation routing decisions.

Local jurisdictions have an incentive to maximize property and sales tax revenues. This can create pressure to change zoning designations to generate greater tax revenues. Demand for affordable land near city and downtown amenities has aggravated this issue, because many freight facilities—especially railroads and rail yards—historically are situated in these areas.

### Freight-Compatible Development

The project developed the concept of *freight-compatible development* as a guiding principle for land use planning and development. The main objectives are as follows:

- ◆ Ensure that freight transportation-related services are not affected by, or do not affect, other land uses that are placed close to the freight corridor or facility;
- ◆ Reduce and minimize community impacts that arise from the proximity of sensitive land uses, including residences, schools, hospitals, and emergency services; and
- ◆ Incorporate the preservation and protection of freight facilities and corridors as a forward-looking component of general planning and economic development policies.

Tools for achieving freight-compatible development fall into four main areas: long-range planning,

**TABLE 2 Tools to Achieve Freight-Compatible Development**

Long-Range Planning	Zoning and Design	Mitigation	Education and Outreach
State enabling acts	Zoning standards	Buffer areas	Informal negotiations
Regional visioning	Buffer areas	Noise and vibration treatment	Public involvement
Comprehensive plans	Overlay districts	Track treatment	Multijurisdictional agreements
Freight facility inventories	Lot orientation	Yard realignment	Public outreach and education
Official maps	Property design	Grade-crossing management	Stakeholder roundtables and freight-community committees
Purchase and advance acquisition	Construction standards	Port gate management	
Land swaps	Soundproofing standards	Environmental measures	
Protective condemnation		Zoning measures	
Permit development		Public outreach and education	
Access rights		Relocation	

An intermodal train of double-stacked containers and trailers passes a commuter rail station near Lisle, Illinois, along the BNSF Chicago Subdivision railroad. New freight megaregions that cross state and national boundaries require new tools to address land use conflicts.



PHOTO: VVA, FLICKR

zoning and design, mitigation, and education and outreach (Table 2, page 47). The project's analysis of these tools led to suggestions for preserving and protecting freight infrastructure and routes. Mitigation is often a final resort in resolving conflicts, and most mitigation activities are expensive to implement and have uncertain outcomes. In contrast, planning is a proactive tool that suggests actions for freight-compatible development.

### New Planning Dialogue

Land use planning is the primary forum for avoiding conflicts between freight and other land uses and for helping in the preservation of freight corridors and facilities. In general, however, land use planning processes inadequately accommodate freight needs.

Because the primary responsibility for land use planning lies with local jurisdictions, any planning for freight needs is piecemeal; most freight transportation corridors transcend jurisdictional boundaries. State and regional planning agencies typically do not have the land use planning authority to fill the gap in freight planning. For example, metropolitan planning organizations are not authorized to conduct transportation planning outside of their areas, and regional visioning exercises generally do not deal adequately with freight. This problem is often exacerbated by a lack of effective communication among freight and land use and transportation planning stakeholders.

No single entity at the federal level has responsibility for freight planning, financing, or project implementation. Multiple federal agencies oversee different aspects of the U.S. freight network, but none has authority over land use planning. Federal funding for freight preservation and protection activities has been sporadic; moreover, significant portions of the U.S. freight network are privately owned.

With the emergence of freight megaregions overlapping state and national boundaries, a new planning dialogue is necessary. Tools and strategies to minimize and resolve conflicts between freight and other land uses are needed in long-range planning, zoning and design, mitigation, and education and outreach.

Planning decisions in the next decade will be critical to future transportation system efficiencies and regional competitiveness. Local and regional freight planning will require highly skilled freight transportation planners, new planning strategies and tools, community support, longer-term regional visioning, and legislative authority.

A significant research effort is needed. Until the findings are put to practical use, the conflicts between freight and nonfreight interests will not subside.

### Suggested Actions

1. Amend state enabling acts to require states, local jurisdictions, and planning agencies to account



for freight in transportation planning and land use planning.

2. Provide guidance to land use planners about planning and zoning practices that relate to freight. For example, zoning overlays and industrial protection zones can be put in place not only for the industrial areas serviced by freight, but also for linking corridors.

3. Accurately map freight facilities and corridors as part of the comprehensive planning process.

4. Include freight entities as key stakeholders—and make freight issues a focus—in cooperative regional planning and visioning efforts.

5. Through state and national associations, provide appropriate education and tools for city and county planners for freight planning and development.

6. Encourage freight entities to participate as stakeholders in local, regional, and state planning and visioning processes.

7. Encourage private-sector groups, including local chambers of commerce, to keep freight issues on the agenda and to gain buy-in from the business community when a preservation project is proposed.

8. Include the principles of freight activity in graduate and undergraduate curricula in planning, architecture, policy, engineering, business, and law, through partnerships between private-sector and

governmental freight groups and educational institutions.

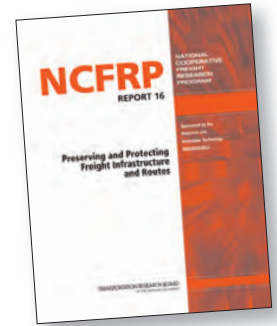
9. Encourage port authorities to quantify the congestion and noise impacts outside the immediate port area, in addition to tracking port-related job impacts throughout the region. Port master plans can illustrate affiliated congestion and chokepoints beyond the port properties. Other freight operations that cannot easily relocate can undertake similar activities.

10. Implement innovative funding practices—including public-private partnerships and rights of first refusal—for freight planning and preservation projects.

11. Include in real estate contracts—and in other documents provided to purchasers and lessees—discussions of the possible freight-related impacts that may occur as a consequence of living in proximity to freight activities.

### Acknowledgments

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NCFRP Report 16, *Preserving and Protecting Freight Infrastructure and Routes*, with supplemental material on CD-ROM, is available electronically at [www.trb.org/Main/Blurbs/166831.aspx](http://www.trb.org/Main/Blurbs/166831.aspx) or from the TRB Bookstore, <http://books.trbbookstore.org/fc016.aspx>.



Photo: Don Wilson, Port of Seattle

Cyclist commutes through truck traffic at Port of Seattle Terminal 18. NCFRP Report 16 offers suggestions for port authorities, such as measuring congestion and noise impacts of port activities, as well as port-related job impacts.