

Delaware Freight and Goods Movement Plan Technical Report

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**Delaware Department of Transportation
Division of Planning**

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PREFACE

The ultimate purpose of the Delaware Freight and Goods Movement Plan is to provide a specific plan of action for the Delaware Department of Transportation's (DelDOT) implementation of the *Statewide Long-Range Transportation Plan*, which sets forth key strategies to guide planning and investment over the next 25 years. The Delaware Freight and Goods Movement Plan is intended to define actions and investments that DelDOT should make to improve the movement of freight in Delaware. This Plan identifies freight and goods movement issues, describes solutions to encourage the efficient and economical movement of goods and materials, and establishes priorities for improvements through the year 2020.

This Plan was developed within a framework of the three goals set forth in DelDOT's *Statewide Long-Range Transportation Plan*. The goals guiding freight planning and investment are to:

- Provide a safe *freight* transportation system that sustains or improves 2000 levels of freight access and mobility;
- Support the state's economic well-being, while remaining sensitive to environmental needs and concerns; and
- Achieve efficiency in operations and investments in the *freight* transportation system.

Developing a plan of action requires an understanding the freight system and economy in Delaware. This report is the first of its kind for DelDOT. It reflects a growing recognition that moving freight is an important function of our transportation system, not just on highways, but also by rail, air, and water.

The relationship of the government to freight carriers has traditionally been reactive—mitigating and regulating freight movement, such as safety or nuisance issues—and even going so far as setting shipping rates. Growing congestion, both for passenger and freight traffic, has forced a broader view of the transportation system to emerge over the last 10 years. Both the government and private freight shippers and carriers are recognizing that proactive, cooperative actions are needed to keep our freight system (and, by effect, our economy) robust and reliable.

Chapter 1 - INTRODUCTION

Freight transport is big business in Delaware. Through its location on the East Coast interstate transportation corridor and the Delaware River estuary, Delaware occupies a strategic position in the national and international freight transport systems. The most recent national data on freight movement indicate that, in 1997, approximately 57 million tons of freight, valued at nearly \$38 billion, originated in, or was destined to, Delaware.¹ In addition, millions of tons of freight pass through the state, primarily by rail on CSX Transportation Inc. (CSXT) lines, by truck on I-95, and by barge and ship on the Chesapeake and Delaware Canal and the Delaware River and Bay.²

Delaware's future economic vitality depends on an efficient and effective freight and goods movement system. In cooperation with freight carriers and the Delaware business community, DelDOT has the responsibility for planning and implementing improvements to much of the state's freight transportation infrastructure and services. This report describes the cornerstone of DelDOT's freight program: the Statewide Freight and Goods Movement Plan. *The purpose of this Plan is to identify freight and goods movement issues, develop solutions to encourage efficient and economical movement of goods and materials, and set priorities for improvements through the year 2020.* It includes both low-cost immediate improvements that can enhance the near-term safety and efficiency of freight transportation and longer-term major capital investments to expand or rehabilitate the freight transportation infrastructure.

In 1997 and 2002, DelDOT published the *Statewide Long-Range Transportation Plan*, which set forth key strategies to guide transportation planning and investment over the next 25 years.³ The Statewide Freight and Goods Movement Plan will assist in the implementation of these strategies by defining actions and investments that DelDOT should make to improve freight movement in Delaware. Although it is essentially a plan to guide DelDOT investment decisions and policies, the Freight and Goods Movement Plan is proactive in recommending joint initiatives with the private sector and other public agencies. Cooperation with the private sector is critical to Plan implementation because so much of the freight infrastructure and service is owned or provided by private companies. DelDOT can use public investments to enhance and facilitate private freight services and leverage private investment in freight infrastructure improvements.

Report Structure

This technical report contains a chapter discussing each mode of freight movement, including intermodal, as well as a recommended plan of action to guide freight planning and investment in Delaware over the next 25 years.

¹ *1997 Commodity Flow Survey*. Census Bureau, U.S. Department of Commerce and Bureau of Transportation Statistics, U.S. Department of Transportation. December 1999.

² A recent study estimates that over half (55 percent) of the total ton-miles of freight carried by trucks within Delaware is through traffic with neither origin nor destination in the state. See: Chin, S., J. Hopson, and H. Hwang, "Estimating State-Level Truck Activities in America", *Journal of Transportation and Statistics*, January 1998.

³ *Statewide Long-Range Transportation Plan*, Parsons, Brinckerhoff, Quade & Douglas, Inc. et al. January 1997.

Chapter 1 provides an overview of the planning approach, including the involvement of stakeholders comprising an Advisory Committee, as well as a review of recent freight planning efforts.

Chapter 2 provides a review of DelDOT's freight transportation activities, organization, and responsibilities. In addition, this chapter presents a summary of interstate freight flows to and from Delaware, as well as Delaware intrastate volumes. Freight characteristics and trends of selected key industries are also included.

Chapter 3 describes the scope of motor carrier operations, interstate access, motor freight characteristics, and trucking issues.

Chapter 4 describes the railroad network, infrastructure limitations, principal commodity flows, the role of Norfolk Southern (NS) and CSXT in Delaware, and railroad freight issues.

Chapter 5 reviews the role and shipping characteristics of waterborne freight on the Delaware Bay and River systems, and related freight issues.

Chapter 6 provides a review of airfreight characteristics, facilities, and related airfreight issues.

Chapter 7 discusses the critical role of intermodal freight transportation in Delaware and issues related to optimizing its efficiency and utilization of both public and private transportation assets.

Chapter 8 provides a recommended plan of action to guide freight planning and investment over the next 25 years. It describes proposed freight improvements and investments that will be needed to achieve Delaware's long term goals and vision.

The *Appendix* contains a list of stakeholders representing various agencies and organizations who were interviewed during the preparation of this report. A *Bibliography* lists the numerous literature sources that were reviewed, and the *Glossary* provides a list of technical terms used in this report.

Planning Approach

The planning approach was structured to produce a pragmatic plan that (1) drew upon the experience and input of stakeholder groups, agencies, and organizations that have a direct and significant interest in freight and goods movement in Delaware, (2) took advantage of recent work by DelDOT and others on rail, port, and aviation planning, and (3) provided specific recommended actions that DelDOT could undertake independently or in cooperation with others to improve freight transportation safety and efficiency.

The planning approach included the following major tasks:

1. *Interaction with project committees and stakeholders.* A project Technical Committee composed of selected technical staff from DelDOT and other agencies with strong freight interests/responsibilities was created to give technical guidance to the consultant team. A broader project Advisory Committee, including representation from freight carriers, shippers, and county/regional agencies, was created to help identify freight issues and provide a sounding board for discussing issues, coordination, and preliminary conclusions and recommendations. More than 30 stakeholders from industry and government were interviewed to develop an understanding of freight services, needs, and characteristics.
2. *Inventory/review of relevant plans, studies, and DelDOT actions and programs.* This task focused on identifying freight issues, previous freight improvement proposals, and available freight data, as well as DelDOT's current actions and programs that affect freight movement. Particular attention was given to recent planning efforts that developed or updated modal plans for aviation, rail, and port facilities and services.
3. *Development of goals and strategies to guide Plan development.* Drawing upon the broad goals and strategies from the 2002 *Statewide Long-Range Transportation Plan*, more-specific strategies for statewide freight planning were defined.
4. *Development of a statewide freight and goods movement database.* Drawing upon the experience of other states and the unique needs of Delaware, a strategy was developed to build a freight database that could be integrated with the major, comprehensive transportation database already being assembled by DelDOT. The freight database will be expandable to meet changing future needs and resources and could be used for a variety of future planning purposes.
5. *Identification of critical issues, barriers, and trends affecting freight and goods movement.* This task involved obtaining information through stakeholder interviews and reviewing plans and studies to produce a comprehensive list of freight issues and to identify factors and trends affecting freight in Delaware.
6. *Development of a recommended freight and goods movement plan and program.* Recommended actions from the recently completed rail, aviation, and port plans were compared with the list of issues to assess whether the plans had considered all relevant modal issues. The recommendations were also evaluated for their continued validity in light of any changes in context that may have occurred since the plans were completed, and for their consistency with the freight goals and strategies developed in Task 3. Based on these reviews and analyses, the refined recommendations from the rail, aviation, and port plans were incorporated into the overall Freight and Goods Movement Plan. Because there was no previous statewide plan for truck freight, more original analysis and planning was needed in this study for that freight mode. Similarly, opportunities and needs for intermodal freight facilities were assessed, because of the limited previous work on intermodal freight in Delaware.

7. *Presentation of the recommended plan and program to DelDOT staff and official, and the public.* In addition to scrutiny by the Technical and Advisory Committees, the Freight and Goods Movement Plan will undergo stakeholder and public review.

Stakeholder Involvement

An Advisory Committee was established early in the project to provide a broad sounding board for discussing issues, problems, coordination, and preliminary conclusions/recommendations with freight stakeholders. Table 1.1 lists agency and organizational representation on the committee.

**Table 1.1
Project Advisory Committee Members**

CSX Transportation	Dover Air Force Base
Daimler-Chrysler Corporation	Dover/Kent Co. Metropolitan Planning Org.
Delmarva Poultry Industry	DuPont Corporation
Delaware Department of Transportation	General Motors-Saturn Corporation
Delaware Economic Development Office	Maryland & Delaware Railroad Co.
Delaware River and Bay Authority	Norfolk Southern Railway
Delaware Motor Transport Association	Rollins Leasing Corporation
Delaware State Chamber of Commerce	Sussex County Association of Towns
Diamond State Port Corporation	Wilmington Area Planning Council

Apart from Advisory Committee meetings during the project, individual members of the committee were interviewed by the consultant team to obtain specific information and insights on their respective freight operations or interests. These interviews/contacts have continued throughout the project and extended to numerous groups beyond those on the Advisory Committee. The Appendix contains a full list of stakeholder interviewees.

The Freight and Goods Movement Plan has been shaped by insights on freight issues and needs gained through stakeholder contacts. Stakeholders provided insights and data on existing freight characteristics that were invaluable to an understanding of how freight moves to, from, and within Delaware. They were asked what problems and constraints they faced in obtaining or providing high-quality freight services and what actions by DelDOT and others could help to solve those problems.

Review of Relevant Planning Efforts

Development of the Freight and Goods Movement Plan was greatly facilitated by several recent planning efforts at the statewide and regional levels, which provided valuable information on modal and regional freight issues, needs, and possible improvements. Proposed actions from these studies and plans were reviewed for consistency with the goals of the Freight and Goods Movement Plan, and most have been reflected in the Plan recommendations. Key plans and

studies completed within the last 3 to 5 years that were reviewed by Parsons are summarized below.

*Statewide Long-Range Transportation Plan*⁴

In 1995 the Governor's Cabinet Committee on State Planning Issues issued a landmark report entitled *Shaping Delaware's Future*, which defined a vision of what the state should be some 25 years in the future. The report evolved from an extensive public planning effort, involving hundreds of citizens across the state, and it defined the directions that growth and development should take in Delaware.

Recognizing the major role of transportation in achieving that vision, DelDOT in early 1997 published the *Statewide Long-Range Transportation Plan (LRTP)*. This document identified transportation strategies and actions needed to achieve the goals reflected in the Cabinet Committee report and in the plans developed by the two metropolitan planning organizations (MPOs) in the Wilmington and Dover areas and the Sussex County Transportation Policy Advisory Committee. The Long-Range Transportation Plan's recommendations are based on a desired future, as defined in the Cabinet Committee report.

The LRTP was multi-modal, covering both personal and freight transportation, and was strongly linked to state land use, economic, and environmental goals and plans. It provided substantial background data on the characteristics and usage of existing transportation facilities and services and examined trends and factors that would shape the future demand for mobility and access in the state. Seven key strategies were defined to guide transportation policies and investments over the next 25 years. From these strategies, an extensive set of related actions were proposed for implementation. Recommended actions were primarily policy and programmatic in nature.

Freight-related recommendations included (1) proposed partnerships with adjacent states to achieve "seamless borders" for commercial vehicle operations and to coordinate programs related to the Northeast Corridor and local rail freight service issues, (2) weigh-in-motion and electronic tolling to speed truck movements, (3) reestablishment of local rail freight service in selected areas, and (4) improvement of rail and truck access to the Port of Wilmington. However, the plan's most important contribution to freight planning was in defining key transportation strategies that provide context and linkage to land use and economic goals for the development of the Freight and Goods Movement Plan in this study.

In September 2002, as part of the Governor's 'Livable Delaware' initiatives, DelDOT produced a more detailed LRTP, built upon the 1997 document. 'Livable Delaware' is a "...positive, proactive strategy that seeks to curb sprawl and direct growth to areas where the state, counties, and local governments are most prepared for it in terms of infrastructure investment and thoughtful planning. It builds on the foundation laid by the Strategies for State Policies and Spending, which were adopted in 1999."⁵ All state agencies were required by executive order

⁴ Ibid.

⁵ *Livable Delaware* website is found at www.state.de.us/planning/livedel/.

to create or revise their business plans to support the goals of Livable Delaware. Because it reflected very progressive goals in terms of controlling growth, the 1997 LRTP required minimal updating to comply with the standards of the Livable Delaware program.

*Delaware Aviation System Plan Update*⁶

Prepared for DelDOT's Office of Aeronautics, this plan quantified the existing and forecasted aviation needs of the state and translated those needs into facilities, services, financial support, and policy initiatives for a 20-year planning period. It included detailed data on nine public-use airports and one joint military-civilian use airport, as well as the one public-use heliport in the state. Forecasts of aircraft operations and improvement needs were developed for each facility. Alternative sites for a general aviation airport in Kent County were evaluated, resulting in the recommendation that Delaware Airpark be acquired to meet this need. The plan also estimated usage, facility requirements, and costs for a new general aviation coastal airport to serve the beach communities in Sussex County.

The Aviation System Plan focused on business and general aviation needs in defining airport improvement and expansion requirements. Airfreight was recognized as having a very limited role at Delaware's airports, and the plan did not specifically forecast or discuss future airfreight potential or needs.

*Port of Wilmington Strategic Master Plan*⁷

This 20-year master plan for port improvements was commissioned by the Diamond State Port Corporation, which owns and operates the Port of Wilmington. Past trends and projected future markets were analyzed to estimate the port's possible growth and resulting need for capital improvements. Major recommendations included the development of new ship berths on the Delaware River to supplement existing berths on the Christina River. Site expansion, new warehousing, new cranes, expanded storage area for vehicles being shipped through the port, and circulation improvements were included in the recommended improvements, as well as two new gates for vehicular access. The Port's Master Plan was limited to on-site improvements and did not include possible off-site improvement needs for either truck or rail access.

*Freight Movement and Visitor Travel Programs in the Wilmington Area*⁸

The Wilmington Area Planning Council (WILMAPCO) sponsored this study of freight and visitor travel in northern Delaware and northeastern Maryland. The study reviewed the economic, transportation, and land use policies of public agencies in the Wilmington region to identify possible conflicts and inconsistencies with WILMAPCO's policies. Freight transportation improvement projects in the capital programs of these agencies were screened, using institutional, economic, and land use criteria, for their consistency with regional policies

⁶ *Delaware Aviation System Plan Update*. R.A. Wiedemann & Associates, Inc. December 1998.

⁷ *Port of Wilmington Strategic Master Plan*. Vickerman, Zachary, Miller. June 1999.

⁸ *Freight Movement and Visitor Travel Programs*. Hickling Lewis Brod Inc. January 1998.

for growth and development. Other freight improvements were identified through discussions with freight stakeholders and added to the list of projects for evaluation.

From this evaluation, seven roadway and two rail projects were identified as having the strongest consistency with regional growth policies and were proposed for more detailed feasibility analysis. The roadway projects are in the WILMAPCO Transportation Improvement Program (TIP), and thus, already in the “project pipeline” for implementation. The rail projects, improved rail access to the Port of Wilmington/Edgemoor area and improved CSXT access to the Port, were subsequently included in the State Freight Rail Plan and will be discussed later in this Technical Report.

Other Relevant Plans and Studies

Long-range transportation plans have been prepared within the last five years for each of Delaware’s three counties.^{9 10 11} These plans are the products of the comprehensive, continuing transportation planning processes that have been established in these areas, and they are constantly being updated to reflect changing local conditions and needs.

Freight transportation typically has not received major emphasis in these planning efforts, which have focused primarily on person travel and specifically on the accommodation of vehicular traffic. In the 1990s the planning requirements of federal transportation legislation (ISTEA and TEA-21) have increased the attention given to freight issues in urban transportation planning, and this is reflected in the county long-range plans. Each plan contains a general review of existing freight facilities in the study area, and freight improvement proposals are included in the plans’ recommendations.

As might be expected, more work has been done on freight planning in the Wilmington area and New Castle County than in the other two, less-urbanized counties. WILMAPCO supplemented the limited freight analysis in the LRTP with the freight and visitor travel study described earlier in this section. More recently, DelDOT, WILMAPCO, and the City of Wilmington sponsored a series of truck origin-destination surveys at more than 30 sites in and around Wilmington.¹² This study recommended a cross-town relief route across the south side of Wilmington to divert through truck traffic from the Maryland Avenue/Broom Street, Southbridge, and Church/Spruce Street corridors. It also called for the signing of truck routes to direct trucks to use the arterial system.

The *Wilmington-Harrisburg Freight Study* was sponsored by the Lancaster County MPO to assess the impact of freight moving from the Port of Wilmington to points beyond Harrisburg¹³. The study primarily focused on SR 41 from Delaware into Pennsylvania as well as U.S. 30 and

⁹ *2020 Metropolitan Transportation Plan..* Wilmington Area Planning Council. March 1996.

¹⁰ *Long-Range Transportation Plan..* Dover/Kent County Metropolitan Planning Organization. September 1996.

¹¹ *Sussex County Long-Range Transportation Plan.* Delaware Department of Transportation. October 1996.

¹² *Wilmington Urban Corridor Studies: Truck Origin-Destination Survey.* Orth-Rodgers Associates, Inc. December 1999.

¹³ *Wilmington-Harrisburg Freight Study.* WSA, Reebie and Martin. October 2002.

SR 283 in Pennsylvania. PennDOT is currently conducting area studies of these routes in preparation for potential major expansions. Those studies have not specifically focused upon freight movement, but truck traffic and its impact are a major concern for both the public and PennDOT.

The study generated estimates of current and future freight volumes and examined potential scenarios for shifting, removing, or facilitating freight movement in the study corridor. The scenarios were all taken from other studies, including Delaware's Freight Rail Plan, and were evaluated based upon their cost/benefit in terms of removing trucks from the 41/30 corridor. Although Delaware contributes only a small portion of the total traffic on the roadways, the route is very important to Delaware for interstate movement of freight. While not generating any original recommendations, the study reinforced the importance of several recommended projects that Delaware has already recognized, such as adding a freight track to Amtrak's Northeast Corridor.

The *Greater Route 301 Major Investment Study* in New Castle County included an extensive analysis of truck traffic in that corridor, including interviews of major trucking companies using the corridor. Traffic counts in 1995 and 1996 at the Maryland state line indicated that trucks accounted for approximately 40 percent of the weekday traffic on U.S. 301.¹⁴ Through interviews with trucking company representatives, the study team probed the reasons for truckers to choose either I-95 or U.S. 301 for travel through Delaware. According to those interviewed, tolls did not appear to be a major factor affecting route selection, although in fact tolls for a five-axle trailer were \$7 to \$9 higher in each direction on I-95 than on U.S. 301 between Richmond (VA) and Wilmington. A 1988 study revealed that two-thirds of the truck trips made on U.S. 301 in Delaware were through trips, having neither origin nor destination in the state.¹⁵

¹⁴ Greater Route 301 Major Investment Study: Truck Analysis Memo. Vanasse Hangin Brustlin, Inc. April 1997.

¹⁵ *Delaware Interstate System Study*. Wilbur Smith & Associates. 1989.

Chapter 2 – FACTORS AFFECTING FREIGHT MOVEMENT IN DELAWARE

This chapter provides a review of DelDOT's freight transportation activities, organization, and responsibilities. It also presents a summary of interstate freight flows to and from Delaware, as well as Delaware intrastate volumes. Freight characteristics and trends of selected key industries are also discussed.

DelDOT's Freight Transportation Activities

DelDOT is responsible for the development, management and maintenance of much of Delaware's transportation infrastructure. Its responsibilities in relation to freight operations are:

- to ensure that Delaware's transportation infrastructure supports the safe and efficient movement of freight throughout the state; and
- to ensure that freight movement does not have an adverse impact on the safety and economy of the community and the safety and efficiency of the state's transportation infrastructure.

DelDOT's responsibilities extend to each mode of freight transportation: truck, rail, aviation and water, most visibly affecting truck freight movement. The agency's actions regarding the development, maintenance, taxation, and regulation of roadways affect the ease, efficiency, safety, and cost of motor carrier operations. DelDOT is responsible for developing the Statewide Long-Range Transportation Plan and the Freight and Goods Movement Plan, and works with the three county governments to develop regional transportation plans. All of these plans are expected to reflect the state's policies and priorities for infrastructure development, enhancement, and growth.

Responsibilities that DelDOT assumes for the highway system include bridge and roadway design and regulation, including access and weight restrictions, geometric design, traffic signalization, signage, and pavement markings on state routes. These functions directly affect the travel time, safety, and cost of motor carrier operations. With direction from the governor and legislature, DelDOT imposes truck registration fees, a motor fuel tax, licensing fees, and tolls, which directly influence the cost of doing business in Delaware for motor carriers and their customers.

Rail freight is also under scrutiny by DelDOT, which has responsibility for ensuring the safety and utility of the rail infrastructure. In addition to owning two short-line rail properties, DelDOT's rail responsibilities include the inspection of state-owned rail lines, implementation and monitoring of grade-crossing-control devices, and development and implementation of the state rail plan. DelDOT ensures that federal safety guidelines on rail freight operations are followed, and it supports Delaware's economic goals through strategic enhancement of the rail freight system.

DelDOT's oversight of airfreight is limited, because most of the airfreight produced or attracted by the state is processed through airports in neighboring Maryland and Pennsylvania. Nevertheless, DelDOT has oversight of all public airports and ensures that safety regulations are met at all airports in the state. It develops and implements the statewide aviation plan and decides what investments the state should make to improve ground access to airports and expand airport facilities.

Waterborne freight movement is accommodated primarily by the Port of Wilmington, which is owned and operated by the Diamond State Port Corporation. While it has no direct role in port planning, maintenance, or operation, DelDOT directly affects ground access to the port through its highway and rail programs. The agency's actions to improve highway and rail access make major contributions to achieving the port's overall goals and objectives.

The roles and responsibilities of DelDOT and other government agencies that affect freight operations and facilities in Delaware are discussed further in the following sections.

DelDOT Organizational Structure

Starting in 2001, DelDOT undertook a major reorganization of its operational and support divisions in order to design and deliver projects more smoothly and rationally. DelDOT operations are distributed across several divisions that carry out the specific responsibilities of the agency. Freight movement is directly and indirectly affected by the activities of many divisions. Figure 2.1 presents a high-level organizational chart of DelDOT. The following paragraphs outline the responsibilities of key DelDOT divisions that play a direct role in freight operations. The Office of the Secretary is ultimately responsible for the management and direction of DelDOT.

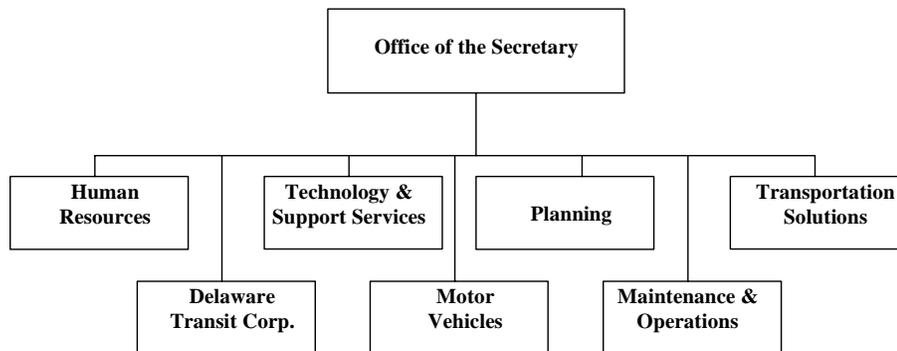


Figure 2.1 DelDOT Organizational Chart (2003)

The reorganization has brought several other support services directly under the office of the Secretary, including the Finance section. This section manages the Transportation Trust Fund for

Delaware and is responsible for ensuring the financial stability of DeIDOT. It also manages the state’s transportation bonds, loans, federal allocations, and operating budgets.

Division of Planning. The Division of Planning supports DeIDOT’s efforts to identify transportation needs and deficiencies and develops strategies, policies, and programs to achieve its overall transportation vision. The Division has three sections:

- Statewide & Regional Planning
- Statistics, Research & Special Programs
- Real Estate

The Statewide & Regional Planning section is responsible for the development of the state’s Long-Range Transportation Plan, including passenger and freight elements. These planning initiatives identify and prioritize the transportation needs of the state and are the primary tools used to identify capital improvement projects and transportation program initiatives. The section is also responsible for ensuring that federal and state legislative requirements, policies, and guidelines are reflected in DeIDOT’s operations and long-range plans.

The Statistics, Research & Special Programs section monitors the condition and utility of the existing transportation infrastructure and assesses growth and safety impacts of changing traffic patterns. A new addition to the Division of Planning is the Real Estate section, which begins the process of developing projects by identifying and procuring properties that are needed for easements or construction.

Table 2.1 summarizes specific freight-related responsibilities of the Division of Planning.

**Table 2.1
DeIDOT Division of Planning Freight-Related Responsibilities**

Planning Division Section	Freight-Related Responsibilities	Impact on Freight Operations
Statewide & Regional Planning	<ul style="list-style-type: none"> • Develop Long-Range Transportation Plan • Develop Freight and Goods Movement Plan • Development of DeIDOT policies • Implementation of TEA-21 legislation 	This section prepares these documents, which define transportation deficiencies and guide DeIDOT transportation policies and investments, including those related to freight movement.
Statistics, Research & Special Programs	<ul style="list-style-type: none"> • Transportation system inventory • System deficiency identification and assessment 	This section assesses deficiencies in the transportation network and supports system rehabilitation and enhancement plans that affect freight, especially trucking

Planning Division Section	Freight-Related Responsibilities	Impact on Freight Operations
Real Estate	<ul style="list-style-type: none"> Property assessment and acquisition 	<p>use of highways.</p> <p>This section procures land for DeIDOT projects, including roadways and off-road facilities, such as weigh stations and rest areas.</p>

Division of Transportation Solutions. The Division of Transportation Solutions is responsible for DeIDOT’s roadway and bridge project development, design, and construction. The Division’s development, design, and construction groups have been reorganized by geography rather than by function, with North (New Castle County) and South (Kent and Sussex Counties) regions. Each region has design and construction squads, which consist of various engineers and planners who follow a project from initial design to final construction. Certain functions, such as Traffic Engineering, Bridge Design, Environmental Studies, and Materials & Research, are still operated as single units, but lend specialized support to the regional teams. The freight-related responsibilities of each unit are outlined in Table 2.2.

Table 2.2
Division of Transportation Solutions Freight-Related Responsibilities

Transportation Solutions Section	Freight-Related Responsibilities	Impact on Freight Operations
Road Design (within North & South regional teams)	<ul style="list-style-type: none"> Design for paving, rehab, and repair of highways Develop highway design standards 	Design specifications for roadways determine weight restrictions, turning radii, and lane width, thereby affecting truck traffic.
Bridge Design	<ul style="list-style-type: none"> Design for paving, rehab and repair of bridges Develop bridge design standards 	Bridge design specifications determine clearance, weight tolerances, and lane widths, which affect truck traffic.
Engineering Administration	<ul style="list-style-type: none"> Capital budget & project coordination Rail crossing projects Review design for conformance with standards. 	Design standards should reflect projected importance of trucks in each project. Freight improvement priorities affect capital budget and project coordination.
Project Development (within North & South regional teams)	<ul style="list-style-type: none"> Corridor studies Location studies Access management Highway safety program Area studies Corridor capacity preservation 	These studies and services investigate the impact of development and growth on the transportation infrastructure. They aid in making decisions on land use, capital improvements, and access restrictions that affect

Transportation Solutions Section	Freight-Related Responsibilities	Impact on Freight Operations
Traffic Engineering	<ul style="list-style-type: none"> • Traffic studies • Traffic signal system • Traffic Management Center • Safety 	freight service and facilities. Effectiveness of traffic signal system, signing, and ITMS affects truck freight safety, operational efficiency, and costs.

Division of Maintenance & Operations. The Division of Maintenance & Operations manages Delaware’s highway infrastructure. This includes maintaining roads and bridges, erecting signs, controlling stormwater runoff, and collecting tolls. With the reorganization, some sections have migrated to the various maintenance districts, but still service the entire state. These include: Expressways (North District); Bridge Management and Sign Fabrication and Installation (Central District); and Pavement Management (South District). The freight-related responsibilities of these groups are outlined in Table 2.4.

**Table 2.4
Division of Management & Operations Freight-Related Responsibilities**

Highway Operations Divisions	Freight-Related Responsibilities	Impact on Freight Operations
North District	<ul style="list-style-type: none"> • Roadway and roadside maintenance • Bridge and railroad GX maintenance • Entrance/hauling permits • Expressway and toll road maintenance, including roadways and bridges. 	Quality of roadway and bridge maintenance affects truck operations. Railroad grade crossing maintenance affects rail freight service. Expressways (I-95 and SR-1 toll road) are major freight routes.
Canal District	<ul style="list-style-type: none"> • Roadway and roadside maintenance • Bridge and railroad GX maintenance • Entrance/hauling permits 	Quality of roadway and bridge maintenance affects truck operations. Railroad grade crossing maintenance affects rail freight service.
Central District	<ul style="list-style-type: none"> • Roadway and roadside maintenance • Bridge and railroad GX maintenance • Entrance/hauling permits • Bridge inspection • Overweight (OW) hauling permits • Bridge management system • Sign Shop 	Quality of roadway and bridge maintenance affects truck operations. Railroad grade crossing maintenance affects rail freight service. Bridge inspections determine current conditions of bridges and may change restrictions. OW permit requests are reviewed for bridge impacts. Proper signage important for

Highway Operations Divisions	Freight-Related Responsibilities	Impact on Freight Operations
South District	<ul style="list-style-type: none"> • Roadway and roadside maintenance • Bridge and railroad GX maintenance • Entrance/hauling permits • Pavement design • Paving priorities 	<p>efficient/safe truck movement.</p> <p>Quality of roadway and bridge maintenance affects truck operations. Railroad maintenance affects rail freight service. Vehicular loads influence pavement design. Priorities affect pavement conditions on major truck routes.</p>
Toll Operations	<ul style="list-style-type: none"> • Collect tolls • Administer electronic toll accounts 	<p>Many truckers use EZPass. This group administers vendor contracts for EZPass.</p>

Delaware Transit Corporation. The Transit Corporation is comprised of two agencies: Transit Services and Rail Services. Transit Services is concerned with the planning and implementation of bus and rail passenger transportation in Delaware. Rail Services is responsible for operating the two state-owned rail lines and for monitoring regional rail freight service and safety issues. It also lends technical support to Transit Services on commuter rail operations. Rail Services works closely with the Division of Planning to carry out Delaware’s rail agenda and address safety and service deficiencies and enhancements. Table 2.5 outlines Rail Services’ freight role.

**Table 2.5
Delaware Transit Corporation Freight-Related Responsibilities**

Transit Corporation Section	Freight-Related Responsibilities	Impact on Freight Operations
Rail Services	<ul style="list-style-type: none"> • Administer state-owned short-line and tourist railroads • Support the oversight of commercial rail service • Monitor regional rail freight service issues • Promote rail safety • Administer grade crossing protection program 	<p>Rail Services leases state-owned short-line rail facility to commercial operators and ensures that commercial rail operators are operating within FRA standards. The agency is also responsible for rail crossings, HAZMAT incident management, track inspection, and state rail legislation.</p>

In June 2003, the Department of Motor Vehicles (DMV) became part of the Department of Transportation. The DMV is responsible for single-state truck registration and commercial driver licensing. The DMV now includes the Motor Fuel Tax Administration, which was formerly under the Finance section. Freight operations are affected by all of these activities; however, transportation taxation and tolls have the most direct impact on freight. Table 2.6 further outlines these relationships.

Table 2.6
MFTA Freight-Related Responsibilities

Finance	Freight-Related Responsibilities	Impact on Freight Operations
Motor Fuel Tax Administration	<ul style="list-style-type: none"> • International Fuel Tax Administration (IFTA) • International Registration Program (IRP) 	Affects the cost of freight operations, especially truck freight, through the fees it collects. IFTA actions facilitate motor fuel taxation and revenue distribution across states, Canada, and Mexico. IRP allows motor carriers to register vehicles for operation in multiple states.

Other Agency Involvement

DelDOT cooperates with other state agencies in the planning, funding, implementation, and management of the transportation system. These include:

- Department of Natural Resources and Environmental Control:
- Delaware State Police;
- Delaware Solid Waste Authority
- Diamond State Port Corporation; and
- Economic Development Office.

The *Department of Natural Resources and Environmental Control (DNREC)* issues permits for hauling hazardous and non-hazardous wastes within Delaware.

The *Delaware State Police* enforce the state's truck safety and weight regulations. Although DelDOT owns the state's one fixed-location weigh station, the State Police operate the station, as well as mobile units that conduct spot weight and safety inspections throughout the state. Only the State Police are authorized to make citations.

Delaware Solid Waste Authority does not designate hauling routes, but it does influence truck traffic through the location of its landfills and transfer stations.

The *Diamond State Port Corporation* operates the Port of Wilmington. This includes managing the day-to-day operations, as well as long-range planning and capital improvements.

The *Delaware Economic Development Office (DEDO)* affects freight operations and service through its efforts to foster economic development and assist companies in locating and doing business in Delaware. The agency is in a position to influence site selection for new development to achieve a better relationship with existing freight infrastructure and maximize the use of existing freight facilities and services.

DelDOT Organizational Impact Summary

DelDOT has a major influence on truck freight operations in Delaware, because it plans, builds, and maintains the road system used by trucks and imposes and collects tolls and gas tax revenues from trucks and other vehicles. In effect, private freight carriers operate on a publicly provided, maintained, and regulated highway infrastructure for which the carriers have contributed part of the initial and continuing costs through fees and tolls.

DelDOT owns a small part of the freight rail infrastructure, which it leases to private operators, and it monitors rail safety for the entire rail system, including grade crossings.

Although DelDOT owns one airport and has an aeronautics staff, there is no scheduled airfreight service at any airport in Delaware, and thus, its influence on airfreight is limited to enhancing traffic movement in commercial and industrial areas that may be shipping or receiving airfreight by truck from major airports in adjacent states. Through its investments in airport improvements, DelDOT has a potentially important role to play in the future, if market conditions should warrant the development of airfreight service at Delaware airports.

Waterborne freight moves through the Port of Wilmington and private terminals, such as those serving the Motiva refinery and the Edge Moor DuPont plant. DelDOT's role in waterborne freight activity is primarily in the enhancement of landside access facilities, especially highways, but also rail facilities in cooperation with private rail carriers.

Other agencies, including DNREC, the State Police, DEDO, and DMV, affect freight operations and services across a broad spectrum through permitting of hazardous and non-hazardous waste transport, enforcement of highway regulations, influencing the location of new development, vehicle registration, and driver licensing.

National and Regional Context

It is important to understand the national and regional freight context in terms of major interstate movements to and from Delaware and how its facilities fit within the surrounding freight networks. Delaware is a small state and, compared with its neighbors, is not a major origin or destination of interstate freight. Because of its position on the Northeast Corridor between Washington and Boston, it is a "bridge" state for interstate, through-freight movement. Thus, a large share of the ton-miles of freight moved within the state are confined to the CSX and Norfolk Southern rail lines and the I-95/495 and U.S. 301 highway corridors that bisect the northern part of the state.

Interstate Freight Characteristics

There are many sources of information on interstate freight characteristics.¹⁶ Most are mode-specific, but some provide data on total freight movement between states and regions. Virtually all sources have limited usefulness for freight transportation planning, stemming from sampling and confidentiality constraints. The most comprehensive source of information on interstate freight movement is the national Commodity Flow Survey (CFS), conducted jointly by the U.S. Department of Transportation (Bureau of Transportation Statistics) and the U.S. Bureau of the Census. This national survey of freight shipments for a sample of 100,000 businesses from throughout the country is conducted roughly every 4 years. The survey results are expanded to represent a universe of approximately 800,000 businesses. The most recent survey was conducted in 1997.¹⁷

Nationally, industries covered by the 1997 CFS shipped more than 11 billion tons of freight worth almost \$7 trillion and producing 2.7 trillion ton-miles of freight movement on the nation's highway, railroad, waterway, pipeline, and aviation systems. Approximately \$13 billion in interstate freight originated in Delaware, and \$17 billion in interstate freight was destined to Delaware. Another \$4 billion had both its origin and destination in the state (intrastate freight). Delaware's \$34 billion in freight value accounted for approximately one-half of one percent (0.5 percent) of the national freight value of \$7 trillion. The value of interstate freight shipments *into* the state is larger than that of freight shipments *from* the state. Inbound movements account for 56 percent of the total *interstate* freight value and tonnage having an origin or destination in Delaware (not including *intrastate* freight).

Freight Originating in Delaware

The value of freight generated in Delaware has been growing in recent years, but not as rapidly as national freight growth. State and national freight growth rates between 1993 and 1997 are compared in Table 2.7. Over this 4-year period, the value of freight originating in Delaware increased by 5 percent, but lagged behind the national growth rate of 19 percent. During this same period, freight tonnage produced in Delaware has remained stable, while ton-miles of freight movement have declined nearly 13 percent. In contrast, the national freight tonnage and ton-miles have grown by approximately 15 and 10 percent, respectively. These data suggest a modest increase in the value of freight generated in Delaware, while the decline in ton-miles in the face of stable tonnage generated indicates that freight is being shipped shorter distances.

¹⁶ A good overview of the content, potential uses, and limitations of various sources are: *Volume 1 Intermodal Freight Transportation (December 1995)*, prepared for the Federal Highway Administration by Cambridge Systematics, Inc. and others. The U.S. Bureau of Transportation Statistics is perhaps the best overall source and clearinghouse of freight data (see the Bureau's website at www.bts.gov).

¹⁷ The CFS does not include all freight movement in the U.S. Out-of-scope freight movements include (1) shipments by governments, most retail and service industries, households, construction, and utilities, (2) imports that may not have been received and re-shipped by within-scope businesses at the port of entry, (3) U.S. mail other than parcels, (4) first shipments of agricultural products off the farm, and (5) imports prior to reaching the port of entry and exports immediately after leaving the port of exit. Estimates of out-of-scope freight movements would add at least 25 percent to the CFS national numbers.

Table 2.7
1993 and 1997 Freight Characteristics for the U.S. and Delaware

	Freight Value (\$ Billions)	Tons (Thousands)	Ton-Miles (Millions)
Delaware			
• 1993	16.1	24,325	4,179
• 1997	16.9	24,149	3,654
• percent Change	+ 5.0	- 0.7	-12.6
United States			
• 1993	5,846.3	9,688,493	2,420,915
• 1997	6,944.0	11,089,733	2,661,363
• percent Change	+18.8	+ 14.5	+9.9

Note: Delaware data includes both interstate and intrastate freight originating in the state.
Source: 1993 and 1997 Commodity Flow Surveys.

Delaware's principal trading partners are its neighboring states. Table 2.8 lists the top 10 destination states in terms of the value of interstate freight shipped from Delaware. These 10 states attract 75 percent of Delaware's interstate freight in terms of value and account for nearly 60 percent of its interstate ton-miles. Except for California and Ohio, all of the states in Table 2.8 are Eastern Seaboard states. Three states (Pennsylvania, New Jersey, and New York) attract 37 percent of the freight shipped from Delaware. Georgia and New York are strong markets beyond the tier of states that border Delaware and rank among the top five destinations for both value and ton-miles of freight.

Table 2.8
Primary Destinations of Interstate Freight Originating in Delaware (1997)

Destination State	Value (\$ millions)	% of Total	Ton-Miles (millions)	% of Total
Pennsylvania	1,839	14.2	348	9.9
New Jersey	1,613	12.5	209	6.0
New York	1,347	10.4	185	5.3
Georgia	992	7.7	203	5.8
Ohio	865	6.7	76	2.2
<hr/>				
Destination State	Value (\$ millions)	% of Total	Ton-Miles (millions)	% of Total
Maryland	806	6.2	141	4.0

California	682	5.3	611	17.4
North Carolina	649	5.0	131	3.7
Massachusetts	464	3.6	52	1.5
Virginia	366	2.8	100	2.9
All Others	3,298	25.5	1,449	41.3
TOTAL	12,921	100.0	3,505	100.0

Note: Data do not include intrastate freight.
Source: 1997 Commodity Flow Survey.

Table 2.9 provides a breakdown of distance shipped (all modes) for freight originating in Delaware (both interstate and intrastate freight). As noted earlier, data on freight value and ton-miles suggest that the trend for freight originating in Delaware appears to be toward higher-value freight being shipped shorter distances. The average length of shipment for freight originating in Delaware was 238 miles in 1997, down slightly from 244 miles in 1993. The change in trip length for interstate trips only (i.e., intrastate freight excluded) was not available.

Nearly 30 percent of Delaware's freight value is shipped less than 50 miles and nearly 60 percent travels less than 250 miles. Only 24 percent is shipped more than 500 miles. Because Delaware is a relatively small state (its longest dimension is just over 100 miles), most of the ton-miles generated by freight originating within the state occurs outside the state. More than 80 percent of the ton-miles of originating freight is associated with trips in excess of 100 miles.

These relatively short shipping distances are consistent with the strong orientation of freight generated in Delaware to destinations in states along the Atlantic coast (see Table 2.8). These distances also suggest a strong reliance upon trucking as a freight mode. In fact, the CFS indicates that 73 percent of the freight originating in Delaware travels by truck alone. This figure rises to more than 83 percent when intermodal shipments involving trucks in combination with other modes are considered.

Table 2.9
Distance Shipped for Freight Originating in Delaware (1997)

Distance Shipped	Value (\$millions)	% of Total	Ton-Miles (millions)	% of Total
Less than 50 miles	5,230	30.9	306	8.4
50 – 99 miles	1,664	9.8	296	8.1
100 – 249 miles	2,967	17.5	462	12.7
Distance Shipped	Value (\$millions)	% of Total	Ton-Miles (millions)	% of Total
250 – 499 miles	3,016	17.8	534	14.6

500 – 749 miles	1,906	11.2	498	13.6
750 – 999 miles	694	4.1	460	12.6
1,000 – 1,499 miles	553	3.3	324	8.9
1,500 miles or more	919	5.4	772	21.2
TOTAL	16,949	100.0	3,654	100.0

Source: 1997 Commodity Flow Survey

Freight Destined to Delaware

The preceding section noted the importance of neighboring states as destinations of freight originating in Delaware. They are also major generators of freight destined to Delaware. More than 41 percent of the value of interstate freight shipped into Delaware originates in the neighboring states of Pennsylvania, Maryland, and New Jersey. However, it is interesting to note that Texas is the fourth-largest generator of freight in value to Delaware, followed by California and Ohio. Table 2.10 lists the top 10 states in terms of the value of interstate freight destined to Delaware.

Table 2.10
Primary Origins of Interstate Freight Destined to Delaware (1997)

Origin State	Value (\$millions)	% of Total	Ton-Miles (millions)	% of Total
Pennsylvania	3,296	19.7	435	8.0
Maryland	1,911	11.4	234	4.3
New Jersey	1,678	10.0	S	S
Texas	1,562	9.3	925	17.0
California	713	4.3	S	S
Ohio	677	4.0	447	8.2
New York	647	3.9	80	1.5
Michigan	567	3.4	S	S
Virginia	548	3.3	272	5.0
Illinois	538	3.2	79	1.5
All Others	4,598	27.5	2,970	54.5
TOTAL	16,735	100.0	5,442	100.0

S = Data do not meet Census Bureau publication standards due to high sampling variability or other reasons.

Source: 1997 Commodity Flow Survey.

The 10 states listed in Table 2.10 account for nearly 75 percent of the value of all interstate freight destined to Delaware. Pennsylvania is by far the most significant shipper of freight to Delaware, accounting for 20 percent of the total. Four of the top ten states are not on the Eastern Seaboard and are more than 500 miles from Delaware.

Intrastate Freight

The preceding tables and discussion relate to interstate freight that crosses the Delaware state line. As noted earlier, the 1997 CFS estimated intrastate or local freight with both origin and destination within the state at just over \$4 billion. Delaware is one of only three states that have more than 80 percent of the shipments terminating in the state originate out-of-state.

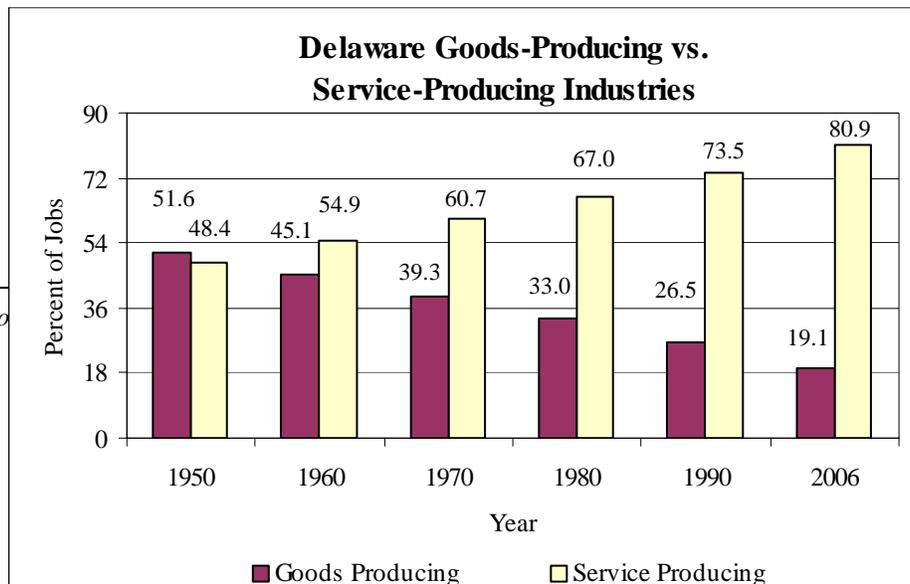
Nevertheless, the value of Delaware's *intrastate* freight is larger than that of any individual *interstate* freight movement. Because of the relatively short trips associated with this freight, ton-miles of intrastate freight ranked well below several interstate movements at 149 million ton-miles.

Freight Trends and Issues Affecting Freight Operations in Delaware

Freight traffic originating, terminating, or having an intermodal transfer within Delaware has been relatively stable in recent years. Industries or logistics activities accounting for most of the freight traffic are mature in the sense that growth is at a modest rate. These include electric power generation, chemicals, automotive, and poultry processing. This stability necessarily remains dependent on numerous macroeconomic factors and corporate decisions.

Since the 1950s, Delaware has been re-making itself economically. In 1950, more than half the jobs in the state were in goods-producing industries, such as manufacturing and construction. For the last 50 years, however, there has been a consistent trend toward growth in service industries, accompanied by stable or declining activity in the manufacturing sector of the state economy (see Figure 2.2).

Most of Delaware's job growth has come from the service industries -- wholesale and retail trade, finance, insurance, services, government, and transportation/utilities/communications. Goods-producing industries account for less than 25 percent of jobs today, and this trend is expected to continue in the 21st century.¹⁸ In the 10-year period between 1996 and 2006, manufacturing jobs in Delaware are projected to drop by 3 percent, while jobs in wholesale and retail trade and in finance, real estate, and insurance are expected to rise by 30 and 27 percent, respectively. This Delaware trend is consistent with national data that show job growth in the U.S. to be predominantly in the service sector.



¹⁸ Delaware To 1999.

Figure 2.2
Employment Distribution Between Goods-Producing and Service-Producing Industries in Delaware (1950-2006)

There are many reasons for this trend. Technological advances, especially in robotics and electronics, allow industries to produce more products with fewer employees. The two auto assembly plants in Delaware have made extensive use of new technology to increase their output with the same or fewer employees.

Manufacturing firms are outsourcing some functions, such as engineering, advertising, and computer support, which enlarges the services sector, while reducing employment attributed to the goods-producing sector. For example, Playtex Products, Inc. in Dover has outsourced its distribution function to a third-party distributor in Harrisburg, Pennsylvania, which will change the characteristics of its freight operations in Delaware.

Global competition is another factor, resulting in increasing imports of steel, electronics, and other products from the developing economies of other countries.

Finally, many manufacturing companies are shifting into new business areas, particularly into high technology and biotechnology, which significantly change their freight service needs. DuPont in recent years has moved into the pharmaceutical field and various areas of new technology, while divesting itself of its Conoco oil and petroleum products operations.¹⁹

The growth of service industries, including financial services and research and development, compared with manufacturing and other sectors that are freight transport-intensive, has altered the role of trucking and rail freight service in Delaware's economy. The decline in the past 10 years in manufacturing sector employment for both durable and non-durable goods has had a significant impact on regional common carrier trucking, which at the same time was undergoing the market turbulence of economic deregulation. Long-haul national carriers have extended their operations to provide much of the regional distribution function formerly carried out by regional less-than-truckload (LTL) carriers. Moreover, some of the largest wholesale and retail trade companies are operating their own truck fleets, which reduces markets formerly served by

¹⁹ *Delaware Business & Economic Development*. Delaware Department of Labor, Office of Occupational and Labor Market Information. Third Quarter 1999.

regional carriers.²⁰ Finally, the growth of integrated logistics and distribution service providers, as reflected in the Playtex experience, represents a major change in the management of the procurement of transportation services.

The Delaware-based common carrier trucking companies that seem to have made the best adjustment to changes in manufacturing and distribution patterns are those that have become more niche-market oriented, primarily as interstate, medium length-of-haul carriers and often with a major client to whom they offer special services.

For the most part, railroads are already serving those industries in Delaware that can best benefit from the unique service characteristics of freight rail service. These current rail customers include industries that ship and/or receive bulk commodities, such as the Motiva refinery, DuPont's two plants, the two auto assembly plants, and the poultry industry's feed mills. If service consistency can be maintained and capacity constraints in the Northeast Corridor eased, there appear to be opportunities to increase both the quality and volume, including at the Port of Wilmington. The ability to attract new customers to rail freight service may be constrained by the lack of new development sites in the state's rail corridors. The development of new intermodal facilities in Delaware could offer one way to provide effective rail freight service to existing and new customers. Potential opportunities and issues associated with intermodalism are discussed further in a later section of this chapter.

Another trend that will affect future freight needs and infrastructure investments in Delaware is the phenomenal growth in electronic commerce (e-commerce), commencing in the late 1990s. There are two areas in e-commerce: business-to-consumer transactions and business-to-business purchases. While business transactions in both areas benefit from the speed and access provided by the Internet, products that cannot be digitized for transmission over the Internet must be transported by conventional freight modes from the manufacturer, typically to a distribution center, and then to the customer.

E-commerce can generate significant freight demands upon the state and local transportation systems. In 1997 one of the primary e-commerce business-to-consumer companies, Amazon.com, Inc., located its East Coast distribution center in a 200,000 square-foot facility in New Castle. Some 25 to 30 tractor-trailer-trips/day transport books and other materials into this facility from publishers and other suppliers, while a similar number of truck-trips/day carry these products from the warehouse to Amazon.com's customers via air freight service and other carriers.

The business-to-business sector of e-commerce is expected to grow even faster than business-to-consumer commerce. Growth in this sector is being driven by several factors, including lower purchasing costs, reduced inventories, lower cycle times, more efficient and effective customer

²⁰ Wal-Mart, the nation's largest retailer, and Sam's Club, the largest membership warehouse club operator in the country, supply their stores through a network of 54 distribution centers in the U.S. and the nation's largest private fleet of over 3,000 trucks.

service, decreased sales and marketing costs, and new sales opportunities.²¹ Key players in business-to-business transactions are corporate purchasing and logistics staff, transportation and warehousing companies that move the purchased commodities, and the supplier's logistics, sales, and marketing staff.

Producers of goods largely function in a just-in-time (JIT) manufacturing environment, in which the meshing of suppliers' deliveries is accomplished without the maintenance of significant inventories. For example, Daimler-Chrysler operates with approximately a two-day inventory of components, with a supply line extending into Michigan, Ohio, and Indiana. Transportation must therefore be both reliable and cost-effective. Rail service is most challenged in this regard, but generally can provide a cost advantage. Rail intermodal container service has had reasonable market penetration in the JIT environment, particularly where the supply line is relatively long.

Both areas of e-commerce emphasize quick, efficient, and reliable delivery of goods and, increasingly, the ability of customers to track electronically the status of their shipments. E-commerce will place growing demands upon freight transportation systems at all levels, global to local. Because of the key roles played by trucks in the supply and delivery chain, e-commerce operations are vulnerable to any future highway congestion that may impede commodity supply and distribution.

Freight Implications of Delaware's Growth Strategies

During the 1990s, Delaware experienced rapid growth in residential, commercial, and industrial development, which in turn placed increasing pressure on the state's public infrastructure, especially its transportation system. The Delaware Population Consortium estimates that over the 30-year period from 1990 through 2020, New Castle County's population will grow by almost 21 percent, Kent County's by nearly 32 percent, and Sussex County's by more than 56 percent. Concern over the possible effects of this growth on the future quality of life of Delaware's residents led Governor Thomas Carper in 1994 to create the Cabinet Committee on State Planning Issues (CCSPI). This group was charged with the responsibility for "...considering matters relating to the orderly growth and development of the state, including recommending the most desirable general pattern of land use in the state and making recommendations on the location of public facilities."²²

The CCSPI carried out its mandate through an intensive, statewide planning effort in the mid-1990s, culminating in the 1995 publication of *Shaping Delaware's Future*, which identified 10 development goals for the state. The primary theme of these goals called for Delaware's future growth to be guided toward, and encouraged in, existing cities and towns where costly infrastructure already exists. They also called for the development of the state's transportation, water, and telecommunications networks to serve the desired patterns of new development and redevelopment.

²¹ David Henry. *Electronic Commerce in the Digital Economy: An Overview*. Presented at the Delaware Policy Forum on E-Commerce. University of Delaware. February 4, 1999.

²² *Shaping Delaware's Future: Managing Growth in 21st Century Delaware, Strategies for State Policies and Spending*. The Governor's Cabinet Committee on State Planning Issues. Delaware Office of State Planning Coordination. December 1995.

Over the last 5 years, the development goals have been refined and expanded, and implementation strategies have been developed to guide state decisions about growth. These strategies are based on the following premises:

- State spending should promote quality and efficiency, not sprawl.
- State policies should foster order and resource protection, not degradation.

While most decisions concerning land use are made at the municipal and county levels, the state's investments in major transportation and other infrastructure improvements exert significant influence on development decisions. Delaware clearly proposes to use state investments and management policies to promote future development in areas where adequate infrastructure exists or is planned. The most recent version of "*Shaping Delaware's Future*" describes strategies to guide growth in the following areas: communities, urban centers, employment centers, developing areas, environmentally-sensitive developing areas, secondary developing areas, and rural areas.²³ The strategies describe the types and levels of transportation options and projects that support the desired development objectives for each area. However, the strategies say nothing specifically about freight transportation investments except to say that transportation projects in communities, urban centers, employment centers, and developing areas should support economic development.

What are the freight implications of the state's growth management goals and strategies? The following observations are offered:

- By focusing future growth in existing communities and constraining sprawl, the state and local jurisdictions will be creating more-compact communities that can be served more efficiently and cost effectively by delivery vehicles carrying commodities to homes, businesses, and industry. However, unless strategic investments and policies are applied to provide alternatives to the private auto and future land uses are arranged to minimize the need for vehicular travel, compact communities can become severely congested. This, in turn, compromises the efficient distribution of goods and services.
- Concentrating growth in existing major corridors and urban centers will make it even more important for transportation facilities to be provided to ensure the efficient *through movement* of freight by rail and truck. In this instance, *through movement* is defined to include not only long-haul interstate traffic, but more importantly for Delaware, the longer, intrastate and local segments of interstate truck and rail trips. For example, poultry industry shipments must be able to move efficiently across the state to markets in the Northeast without getting bogged down in congestion. At the same time, the provision of new roadways and bypasses to accommodate these transportation needs could stimulate sprawl, unless land use and other investment decisions are coordinated to constrain growth around the new transportation facilities. This concern also applies to existing transportation facilities. Attention should be given to the careful planning and control of land use in the

²³ Ibid.

vicinity of SR 1 interchanges to avoid choking the approaches to this route and further contributing to sprawl.

- By focusing future development in existing communities, the state’s growth strategies may constrain opportunities for economic development requiring direct freight rail access. Few vacant commercial and industrial development sites are still available with direct rail access in existing urban areas. This suggests that state and local planners should look for opportunities to create new, rail-related development sites outside existing communities. These sites should be supported with appropriate transportation investments, and land use controls should be implemented to restrict other development in the vicinity, consistent with state and local land use objectives for the surrounding area.
- The intensive waterborne commerce on the Delaware Bay/River has potentially serious implications for the environmental quality of the state’s sensitive shoreline and recreational beaches. The heavy traffic in crude petroleum and partially-refined petroleum products carries with it the possibility of oil spills and the inherent danger of flammable cargo. The greatest hazard in terms of possible spills is associated with the lightering of oil from tankers to barges at the Big Stone Beach Anchorage off Lewes.²⁴

DelDOT is in the key position of providing an essential statewide or “macro” perspective to transportation and land use decisions to help ensure that system integrity and effectiveness are not unduly compromised by micro-level, local development proposals and decisions. Preserving and enhancing the state’s freight transportation network is critical to achieving Delaware’s overall growth and economic development objectives.

Freight Trends and Characteristics of Key Industries in Delaware

As described in Chapter 1 and referenced at several points earlier in this report, a series of interviews were conducted with key freight stakeholders in Delaware. These interviews provided extensive insights and information on the present freight characteristics of major industries and the relative importance of efficient freight service to their businesses. This section provides an overview of freight characteristics and needs for Delaware’s major industry groups obtained from those interviews. Although it is not a major industry, solid waste transport in Delaware is also briefly discussed, because of the concentration of truck activity it produces in certain parts of the state.

Automotive Industry

The Daimler-Chrysler and General Motors (Saturn) plants in Delaware employ more than 5,000 people and produce more than 1,700 vehicles a day, 5 and sometimes 6 days a week. Local suppliers, such as New Castle Machine, Lear, and Automodular, add several hundred employees to the state’s automotive industry work force. Both the Daimler-Chrysler and Saturn sites have significant space constraints that have forced them (especially Saturn) to locate warehousing and

²⁴ *Delaware Waterborne Hazardous Material Transportation Flow Study*. Prepared by the Doyle Group for the Delaware Emergency Management Agency. December 1998.

sub-assembly facilities at remote sites up to 5 miles from the plant.²⁵ The trend is toward more sub-assembly of components off site, requiring trucks to provide local distribution among facilities.

Daimler-Chrysler has direct rail service by NS, while CSXT serves the Saturn plant. Efficient and reliable rail service is crucial to the automotive industry in Delaware, because the principal suppliers of parts and raw materials for auto assembly are in the Midwest at an average distance of more than 700 miles from the plants. At these distances, rail should be highly competitive, especially for large components such as body panels. Scheduled delivery reliability is important because of limited on-site space to store materials and the industry trend toward JIT delivery of parts and components noted earlier.

Both automotive companies were significantly affected by rail service deterioration after the Conrail acquisition which forced them to shift from rail to truck for the delivery of many time-sensitive components. This increased truck activity produced problems, because of the lack of space to accommodate additional trucks on-site and community complaints about increased truck traffic and truck parking on streets around the plants. The two plants and related local operations attract 500 to 700 truck trips/day from out-of-state suppliers. Shipments of vehicles from the plants were also affected by the rail service deterioration. Typically, up to 70 percent of the vehicles had been shipped by rail, but greater use of trucks was required after the Conrail acquisition. By the fall of 2000, rail service had improved but was still not at pre-acquisition levels.

The automotive companies need effective rail service and appear to offer a market for even greater rail traffic, if service levels improve. The potential for NS to capture more of this market will also depend upon future actions to increase freight capacity in the NEC, including direct access to Delaware by its Triple Crown Service, without the need for a highway haul to and from Harrisburg.

Chemical Industry

Delaware is home to DuPont, one of the world's largest chemical companies. Aside from administrative staff, DuPont has research and development facilities in Delaware and two manufacturing plants. Its Edge Moor Plant produces titanium dioxide for the paper and paint industries. The plant receives ilmenite ore via intermodal truck deliveries from CSX's TransFlo facility at Wilsmere Yard. It also receives rail shipments (chlorine, caustic soda, and petroleum coke) directly from NS. Its product is shipped in slurry form, mostly by rail (NS) but also by truck, to customers lacking rail access.

DuPont's Seaford nylon plant receives more than 3,000 railcars per year of coal, adipic acid, and other chemicals, as well as 20 barges per year of fuel oil on the Nanticoke River. Except for

²⁵ One of the remote sites assembles engines not only for the Delaware plant, but for other plants in the U.S. and Canada as well.

some rail shipment of waste products, the plant's products are shipped by truck, totaling more than 10,000 annual truck trips.

Neither of the DuPont plants' operations or output is expected to grow significantly. Both have been adversely affected by the deterioration in rail service, necessitating emergency arrangements to receive raw materials by truck and even by air. The extended turnaround time for empty railcars has also been a problem.

A major concentration of chemical industries is located in the vicinity of Delaware City, including the Motiva Enterprises refinery, OxyChem, Air Liquide, and others. These industries generate approximately 1,000 truck trips/day (inbound plus outbound) with gasoline being the principal truck commodity. Total rail traffic includes 10 to 15 inbound and 30 to 35 outbound railcars/day. Motiva receives 61 million barrels/year of crude and partially refined oil by barge and tanker. OxyChem has a dock, but it is not used.

As for nearly all rail users in Delaware, NS service was unacceptable for a prolonged period starting in mid-1999, resulting in both poor rail equipment utilization and an increase in trucking, where feasible. Service has improved but is still deficient in some respects. The chemical shippers expressed a strong interest in the restoration of the Christina River rail bridge as a potentially important service improvement factor.

Delaware's chemical industry has been restructuring its product line to place more emphasis on biotechnology and electronics industry-related products. This has resulted in the spin-off of pharmaceutical businesses and the sale or consolidation of smaller business activities.²⁶ The freight requirements of these new businesses and product lines are different from the traditional chemical industry. There is a greater emphasis on smaller shipments of raw materials and products, frequently on a just-in-time basis, using trucks and airfreight.

Poultry Industry

The poultry industry is focused in downstate Delaware, primarily in Sussex County, but extending into Kent County as well. Mountaire Farms, Inc., Perdue Farms, Inc., and Allen Family Farms, Inc. are the major chicken processing companies in Delaware.

The poultry industry is a major NS rail customer by virtue of the grain shipments it receives from the Midwest. The industry is expected to continue to "import" Midwest grain for more than 80 percent of its feed requirements. Grain is delivered in 50-car unit trains, and NS would like to increase the trains to 75 cars to assure faster service by avoiding engine transfers en route.

Extensive truck activity occurs at all levels of poultry production and processing. Trucks bring grain to feed mills for the 15 to 20 percent of the grain requirement that is met by local farmers. Trucks also transport grain from the feed mills to the poultry farms, chicks from hatcheries to the

²⁶ *Delaware Tomorrow*. Department of Labor, Office of Occupational and Labor Market Information. 1999.

poultry farms, poultry from the farms to the processing plants, and packaged poultry from the plants to market.

The logistics associated with this industry in Delaware are impressive:

- One feed mill receives 50 to 100 railcars of grain per week from the Midwest and generates roughly 110-truck trips/day hauling feed to the poultry farms.
- One processing plant attracts nearly 100 trucks/day that haul poultry from the farms to the plant, processes about 200,000 birds/day, and generates 25 truckloads/day of processed poultry destined to market.

When these numbers are multiplied by the number of feed mills and plants in Delaware alone, not to speak of similar Delmarva operations in nearby Maryland and Virginia, the resulting volume of rail and truck activity is very significant. The poultry industry is the largest generator of truck-miles of traffic on Delaware roads. Delaware plants serve primarily a northeastern market, stretching north to Maine, south to Virginia, and west to Ohio. Thus, most of the trucks carrying poultry to market travel north-south through Delaware on U.S. 13 and 113 and SR 1, although the poultry industry has been a vocal critic of the toll rate on SR 1 and boycotted that route for a while.

About 15 percent of the processed poultry is frozen for foreign export, and this product is trucked to port facilities in Baltimore, Philadelphia, or New York. The Port of Wilmington is not used, because the appropriate shipping lines do not call there.

A relatively new development in the poultry industry is Perdue Farms' construction of a plant near Laurel to make fertilizer out of poultry manure. The fertilizer in pelletized form will be shipped back to the Midwest in some of the railcars used to bring grain to Delaware, which also produces a backhaul commodity for the railroad.

The proximity of Delaware's poultry industry to major urban area markets contributes to the stability of that industry in the state. It is expected to remain relatively stable at its present level of operations in Delaware with the possibility for modest growth.

Pharmaceuticals Industry

Delaware is fast becoming one of the leading pharmaceutical manufacturing and research centers in the country. AstraZeneca, Inc., the nation's third largest pharmaceutical firm, has its U.S. headquarters, a manufacturing plant, and a major distribution center in the Wilmington-Newark area. DuPont Pharmaceuticals, Inc. has its world headquarters and an experimental station in the Wilmington area. Several other companies have smaller, local operations related to the industry.

The pharmaceutical industry makes extensive use of trucks and airfreight to transport raw materials and finished products. Shipments tend to be small in size or bulk, and some may require a temperature-controlled environment. Raw materials or partially processed materials may travel long distances, including from overseas locations. Some pharmaceuticals may be manufactured overseas and repackaged in the U.S. for distribution in this country. Some raw materials and manufactured material arrive in the U.S. by ship and/or airfreight and are trucked to plants and distribution centers.

For example, AstraZeneca receives both raw materials and finished products from such diverse locations as Japan, Germany, Italy, and Britain by airfreight through New York (JFK), Philadelphia, and Baltimore-Washington International Airport, as well as waterborne container shipments through New York and Baltimore. The shipping lines that carry this freight do not call at the Port of Wilmington. Truck activity includes both truckload and LTL shipments, with slightly more LTL shipments for direct distribution to customers. AstraZeneca generates 15 to 20 large truck trips (single-unit trucks and/or trailers) on a typical weekday and numerous panel truck trips (Fed Ex and others). Truckload shipments are made to stock two distribution centers in the U.S. Rail service is not utilized.

While the pharmaceuticals industry is growing in Delaware, its demands upon the state's freight transportation system should be modest in scale. However, its reliance upon trucking creates susceptibility to potential delays in shipments and deliveries as a result of increasing congestion, especially in the northern part of the state.

Distribution Industry

For purposes of presentation in this report, the distribution industry is described as a catch-all segment of package express and private trucking operations, including trucking operations between distribution centers and retail facilities. Interviews in this category were conducted with representatives of Wal-Mart Stores, Food Lion Stores, United Parcel Service, and Fed-Ex Freight.

Wal-Mart. In a period of only 12 years, Wal-Mart has become the largest food retailer in the United States. Until Wal-Mart opens its new distribution facility in Smyrna in 2004, its seven stores in Delaware, including two Supercenter stores at Seaford and Georgetown, will continue to be served from Sutherland, Virginia, near Petersburg. This distribution center dispatches to Delaware approximately 70 trailers per week, with some variance by season. Wal-Mart trucks typically use US 301, US 50, 404, and US 13/US 113 to reach stores in Delaware. Limited use is made of the Chesapeake Bay-Bridge Tunnel because of the wind gust effect on empty trailers.

The planned Wal-Mart Distribution Center at Smyrna will be a 1,200,000-square-foot facility, handling approximately 600 trucks per day to and from the Smyrna Industrial Park, one mile west of US 13. This facility will provide stock to all Wal-Mart retail locations within a 200-mile radius.

Wal-Mart drivers use on-board, message-oriented computers. Driver logs are manually prepared. Operating plans utilize established transit times based on distance, speed limits, and traffic congestion experience factors. According to Wal-Mart, one road improvement that would facilitate operating to and from Rehoboth is upgrading Route 24.

According to the Food Marketing Institute's 2002 *Food Industry Transportation and Fleet Maintenance Report*, the rapid growth of Wal-Mart continues to be the biggest influence on the food industry.

Food Lion. Food Lion operates 13 stores in Delaware: Harrington, Milford, Middletown, Smyrna, Rehoboth, Matthews Landing, Millsboro, Seaford, Bridgeville, Millsville, Selbyville, and two in Dover. These stores are supplied 6 days a week from the Food Lion Distribution Center in Greencastle, Pennsylvania (near Hagerstown, Maryland), 185 miles from Dover. Trucks typically travel via the Chesapeake Bay Bridge to Route 14 and US 13 in Delaware.

The company typically dispatches 10 trucks per day from Greencastle to Delaware, with an average gross vehicle weight between 72,000 and 75,000 lbs. in 45-, 48- and 53-foot (102-inch wide) trailers. The fleet trend is to 53-foot trailers. The operating plan calls for deliveries to arrive at stores by 6 a.m. and for trucks to return to Greencastle the same day, with some limited backhauls, where feasible. Unloading time is about two hours. Grocery movements are on Monday, Wednesday, and Friday, with perishables on Tuesday, Thursday, and Saturday.

Food Lion trucks are equipped with GPS systems at a cost of about \$3,500 per tractor, permitting much data to be electronically acquired, such as driver logs, speeds, fuel tax apportionment, and even the number of brake applications.

Food Lion officials consider the Delaware road network to be "a very good system, with redundancy" to deal with emergencies. Food Lion considers the roads to be in "good shape" with some increasing congestion on US 13 and US 113.

FedEx Freight. FedEx Freight is one of the three major groups comprising the FedEx Corporation (the other two are FedEx Express and FedEx Ground). FedEx Freight has a terminal on Lambson Lane in New Castle, dispatching about 34 trucks per day, near evenly divided between road haul and local pick-up and delivery. Sussex County is served from a smaller terminal in Federalsburg, Maryland.

Operations are tightly scheduled, requiring a phone call from drivers if they are more than 15 minutes late arriving at a terminal. Trucks are not GPS- or computer-equipped.

FedEx Freight officials consider the intersection at Pigeon Point Road and Terminal Avenue to be a safety concern because of container truck speeds to and from the Port. Similarly, Route US 202 is considered to be in need of improvements, and congestion on US 13 is also a matter of concern.

United Parcel Service. United Parcel Service’s (UPS) principal facility in Delaware is the sort center at Christiana, with a small satellite facility at Newark. UPS operates approximately 10 “feeder” trailer trucks per day from the UPS air hub in Philadelphia (one of seven, nationally), using I-95 and US 202. These trucks are in addition to all other pick-up and delivery operations, such as to/from the Christiana sort center. The feeder trailers generally operate through Delaware from the Philadelphia air hub between 7 a.m. and 10 a.m. and to the Philadelphia air hub between 11 p.m. and 1 a.m. on scheduled route runs.

UPS feeders use IVIS (In-Vehicle Information System) technology, which produces automated driver logs, tracks fuel consumption, and provides other data. CB radios are also employed. There is a company emphasis on minimizing engine idling.

Traffic delays at the merge of I-95/I-495 are becoming an increasing problem for UPS trucks in meeting schedules. Construction programs on I-95 almost guarantee gridlock, according to UPS interviewees.

Solid Waste Transport

Some of the most significant and concentrated truck movements in the state are associated with the transport of hazardous and non-hazardous solid waste to transfer stations and landfills. The transporting of *hazardous waste* in the following discussion is distinguished from that of *hazardous material* (manufactured products such as explosives, chemicals, etc.), which is regulated and permitted by the federal government, with possible input on routing of hazardous cargoes by the Delaware Department of Public Safety.

The Delaware Solid Waste Authority (DSWA) operates a landfill in each of the state’s three counties, a recycling center in New Castle County, and a transfer station in southern New Castle County.²⁷ DNREC issues permits for the transport of hazardous waste as well as permits for non-hazardous waste transport by vehicles having a manufacturer’s Gross Vehicle Weight Rating of 26,000 pounds or more.

The DSWA facilities operate Monday through Saturdays. Total traffic is highest on Saturdays, but truck volumes are highest on weekdays when contract carriers are most active. Trucks (classified from DSWA data as vehicles with a gross weight in excess of 10,000 pounds) account for 53 percent of the weekday trips and 15 percent of the weekend trips to solid waste disposal sites. Table 2.10 summarizes total vehicular and truck activity at the DSWA’s five sites. The Cherry Island Landfill in New Castle County was by far the busiest facility, with 638 total vehicles on a typical weekday, including 407 trucks.

Table 2.10
Total Vehicular and Truck Traffic at Solid Waste Disposal Sites in Delaware

Site	Average Weekday	Saturday
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²⁷ There is also a private used-oil recycling facility in Wilmington, International Petroleum Corporation, which is served primarily by vacuum-equipped trucks.

	Trucks	Total Vehicles	Trucks	Total Vehicles
Cherry Island LF	407	638	168	543
Sandtown LF	83	201	27	376
Jones Crossroads LF	151	362	55	605
Pine Tree Corners TS	41	128	22	233
Recycling Center	47	52	NA	NA
TOTAL	729	1,381	272	1,757

LF - Landfill, TS – Transfer Station, NA – not open

While Delaware currently has landfill capacity to accommodate the solid waste that is generated within the state, future growth and the increasing difficulty in finding sites for new landfills may force the use of disposal sites outside the state. This practice is already a necessity for several major urban areas on the Eastern Seaboard. The bulk nature of this material lends itself to shipment by railroad, and it is strongly urged that Delaware consider rail transport, should out-of-state disposal sites become necessary in the future.

Freight Network Performance Measurement

Because one of DeIDOT’s principal goals is to ensure that Delaware’s transportation infrastructure supports the safe and efficient movement of freight throughout the state, optimizing the costs related to congestion are consistent with this goal. DeIDOT’s *1998 Customer Satisfaction Survey* of those who ship, carry or transport freight by truck indicates that two of the top four most important attributes are that the highways be free from congestion and have well-planned sequencing and timing of traffic lights. Only 9 percent and 8 percent of respondents, respectively, thought the network’s performance is excellent in these regards. The other two most important network attributes are ramps that trucks can negotiate and wide intersections with turning lanes. These two attributes had a performance rating of excellent by 13 and 14 percent, respectively, by respondents.

The primary locations of congestion and safety concerns are discussed in Chapter 3. Nevertheless, carriers and shippers, in the constant pursuit of productivity improvements, can at least partially offset the economic cost of congestion. As mentioned earlier, the Food Marketing Institute’s *2002 Food Industry Transportation and Fleet Maintenance Report* indicates efficiency improvements in terms of average operating cost per mile and average cost per stop compared with the previous year. According to the Federal Highway Administration’s Office of Freight Management & Operation, average expenses per mile for all types of for-hire truck transportation, including truckload, LTL, and specialized carriage, declined 11 percent in constant dollars between 1990 and 2000. In addition, motor carrier rates paid by shippers have declined about the same amount in constant dollars in the same period. While congestion and diesel fuel prices are majors debits against productivity improvements, the cost variables are numerous and dynamic. Nationally, according to the Federal Highway Administration, given the close correlation of truck tractor miles to Gross Domestic Product, truck tractor miles are growing at about 4 percent annually. This continuing growth presents a challenge not only to

Delaware's infrastructure capacity, but also to a network of aging infrastructure, with the important exception of the Route 1 Toll Road.

Interviews with trucking operators and shippers indicate that they have either informal or established standards for transit times between established points to, from, or within Delaware. These transit times are also according to the hours of the day that a specific route is operated. Trucking operators rarely have the luxury of deciding which hours of the day to use a route that is characterized by predictable level of congestion. Customers' needs or demands of the marketplace, as well as equipment and driver utilization, normally dictate operations. Nevertheless, interviewees indicated that Delaware generally has a reasonable amount of route redundancy that permits alternative routings in certain circumstances, including road construction work.

A Logistical Profile of Delaware

In 1997, \$34 billion in freight originated in or was destined to Delaware. Of this total, the state attracted more freight (50 percent) than it generated (38 percent), with 12 percent totally internal to Delaware. While the value of freight originating in Delaware grew by 5 percent between 1993 and 1997, its growth lagged behind national freight growth (19 percent). Delaware's five principal trading partners were Pennsylvania, New Jersey, New York, Maryland and Texas. In terms of the value of freight originating in Delaware, trucks were the predominant freight mode (73 percent), while water was the next highest individual mode (9 percent). Rail (3 percent) and air (1 percent) had limited, but strategically important, roles in the state's freight system. Ten percent of the freight originating in Delaware involved multiple modes or intermodal transfers.

Because of its strategic location in the center of the East Coast corridor, Delaware serves an important regional and national freight function as a conduit for through freight traffic. For example, the value of through-truck traffic crossing Delaware is estimated at three times the value of truck freight originating in and/or destined to the state.

As a result of the sale of Conrail in 1999, NS has emerged as the principal railroad serving Delaware's freight market and is estimated to account for 90 percent of the state's rail freight business. Delaware's interstate rail freight traffic is heavily oriented to inbound movements (80 percent of the total rail freight value), consisting primarily of coal, chemicals, grain, and autos/auto parts.

The Delaware River and Bay is the principal gateway for imported oil in the northeastern U.S. There are six refineries in the Delaware Basin, including the Motiva Enterprises refinery at New Castle. Petroleum and petroleum products comprise 80 percent of the 116 million tons of waterborne commerce on the river and bay. Waterborne traffic is heavily oriented to imports, mostly foreign crude oil. The ports of Wilmington and New Castle (the Motiva refinery) processed 10.3 million tons of waterborne freight in 1998, representing 9 percent of the Delaware Basin's water commerce. Minor amounts of waterborne freight are carried by barge on the Nanticoke and Mispillion rivers.

Because of proximity to major, international airports in Philadelphia and Baltimore, Delaware has no scheduled airfreight service. There is limited, unscheduled airfreight activity at the New Castle County Airport, primarily oriented to flying in auto parts for the two auto assembly plants, as needed.

Chapter 3 – MOTOR CARRIERS

Most of the freight tonnage originating or terminating in Delaware includes movement over highways in whole or in part. A small percent of this tonnage is local to Delaware. Major truckload (TL) and LTL carriers handle the longer-haul interstate traffic.

Trucks Registered In Delaware

Truck registrations in Delaware include a wide range of vehicle types, such as pickups, minivans, station wagons, sport utility vehicles (SUVs), panel trucks, and various types of multi-axle medium- and heavy-weight trucks. Table 3.1 provides a percentage breakdown of truck types by single-unit and combination and number of axles.

Table 3.1
Types of Trucks Registered in Delaware (1992 and 1997)

Truck Type	1992 Percent of Trucks	1997 Percent of Trucks
Single-Unit Trucks	(74.2)	(77.6)
• Two axles	62.9	67.0
• Three axles or more	11.2	10.6
Combination	(25.8)	(22.4)
• Three axles	1.7	0.6
• Four axles	7.3	3.4
• Five axles or more	16.9	18.4
Total	(100.0)	(100.0)

Note: Does not include pickups, panels, minivans, SUVs, and station wagons.

Source: *Vehicle Inventory and Use Survey*. 1997 Economic Census. Bureau of the Census. U.S. Department of Commerce.

In 1997, there were 206,300 trucks registered in the state. However, if pickups, vans, panel trucks, station wagons, and SUVs are excluded, there were only 16,300 in-state registrations of light, medium, and heavy trucks. The two most common types of large trucks registered in Delaware were two-axle single-unit trucks (67 percent) and large trucks with five or more axles (18 percent).

The leading use of trucks registered in Delaware is for construction work (30 percent). Utilities and services are the primary use for another 21.5 percent of the state's trucks (see Table 3.2).

Table 3.2
Major Use of Trucks Registered in Delaware (1997)

Major Use	Percent of Trucks
Construction	30.0
Utilities and service	21.5
Wholesale and retail trade	16.1
Agriculture	14.0
For-hire	5.5
Manufacturing	5.1
Other and not reported	7.8
Total	100.0

Note: Does not include pickups, panels, vans, SUVs, and station wagons.

Source: *Vehicle Inventory and Use Survey*. 1997 Economic Census. Bureau of the Census. U.S. Department of Commerce.

Most of the Delaware-registered trucks do not travel long distances. The range of operations or typical trip length is 50 miles or less for 61 percent of these trucks. Only 6.7 percent have typical trip lengths in excess of 200 miles. These numbers suggest that trucks registered elsewhere carry much of the long-haul freight originating in or destined to Delaware. This is consistent with Delaware being a major destination for freight from other states, rather than a major generator of freight shipments.

The 1997 Economic Census produced data on the characteristics of businesses engaged in truck transportation. In 1997 there were 279 establishments in Delaware engaged in providing truck freight-related transportation services.²⁸ Roughly 60 percent of the establishments were involved in specialized freight trucking services, while the other 40 percent provided general freight trucking services. General freight establishments handle a wide variety of commodities, generally transported in a container or van trailer within a localized area and with most trips being same-day returns. Specialized freight typically requires specialized equipment, such as flatbeds, tankers, or refrigerated trailers, and may serve both local and long haul trips. Table 3.3 summarizes the characteristics of freight trucking establishments in Delaware.

Table 3.3
Characteristics of Truck Freight Establishments in Delaware (1997)

²⁸ The economic census was conducted on an establishment basis. Companies operating at more than one location were required to file separate reports for each location or establishment. Each establishment was assigned a separate industry classification, based on its primary activity and not that of its parent company.

Kind of Business	Establishments	Revenue (\$millions)	Employees
General freight	(110)	(\$138.0)	(1,241)
• Local	31	20.3	215
• Long-distance truckload	65	76.0	742
• Long-distance less-than-truckload	14	41.7	284
Specialized freight	(169)	(\$137.1)	(1,680)
• Used household & office moving	31	36.5	597
• Other local	80	45.8	480
• Other long-distance			
- Hazardous materials	25	16.3	131
- Agricultural products	11	8.9	124
- Other specialized	22	29.7	348
Total trucking	(279)	(\$275.1)	(2,921)

Source: *1997 Economic Census for Delaware: Transportation and Warehousing*. Bureau of the Census. U.S. Department of Commerce.

As might be expected, most freight trucking establishments were located in the more urbanized part of the state. New Castle County had 172 establishments, or 62 percent; Kent County had 62 establishments, or 22 percent; and Sussex County had 45 trucking establishments, or 16 percent of the total.

Intermodal Drayage

The possible location of an intermodal terminal in Delaware may or may not represent an opportunity for Delaware-based trucking firms. Railroads often establish working relationships with trucking firms that handle their intermodal business in various parts of their system, particularly where bulk quantities are involved. For example, CSX arranges local drayage as part of its deal to transport ilmenite ore from Florida to DuPont's Edge Moor Plant. Increasingly, companies are working through third-party consolidators or logistics firms, who arrange transport for their customers' raw materials and/or products, using the most efficient and cost-effective modes or modal linkages. These firms would likely use an intermodal facility in Delaware for some of their clients' freight needs.

Regional trucking companies may be able to compete for some of the local drayage associated with the terminal. This would represent a new business opportunity for them, because these freight movements are now being served by national, long-haul common carriers, where the entire freight movement is by truck, or by out-of-state carriers associated with existing intermodal terminals in Pennsylvania and Maryland.

Interstate Truck Access

Trucking is the predominant and most ubiquitous freight transport mode in the U.S. The trucking industry has taken advantage of accessibility provided by the nationwide system of interstate highways. Delaware's strategic location on I-95, the major north-south highway along the East Coast, facilitates truck access to the state, as well as accounting for the substantial through-truck movements across the state (see Figure 3.1). More than 25 percent of the U.S. population can be reached within a day's drive of Delaware. This accessibility by truck to a large consumer market has been critical to the state's economic growth, and maintaining effective truck access will be essential to future economic vitality.

Delaware has good truck access to the New England states. In addition to I-95, Delaware is served by I-295, which connects to the New Jersey Turnpike via the Delaware Memorial Bridge to provide a bypass around the Philadelphia area for traffic with origins or destinations in the New York area and beyond. There are at least four major trucking corridors to the south with I-95 being the most significant. However, I-81, which parallels I-95 to the west and avoids its pockets of urban congestion, is an important north-south truck corridor, and it is readily accessible to Delaware via I-70 and the Baltimore Beltway (I-695). The other north-south truck corridors are U.S. 301, which parallels I-95 to the east and bypasses Baltimore and Washington via bridges over the Chesapeake Bay and Potomac River, and U.S. 13, which bisects Delaware north-south and connects to Norfolk, Virginia, and points south via the Chesapeake Bay Bridge and Tunnel. Neither U.S. 301 nor U.S. 13 are access-controlled facilities; however, within Delaware, SR 1 is being developed as an access-controlled, toll alternative to relieve congestion on US 13 and US 113.

East-west interstate truck access to Delaware is constrained by the lack of good connections to I-76 (the Pennsylvania Turnpike), which is the principal route to western Pennsylvania and the Upper Midwest. A review of the regional highway system in Figure 3.1 indicates that there is no direct, access-controlled link between northern Delaware and I-76 for trucks destined to Harrisburg and points west. The closest approximation to such a connection is U.S. 202, some of which has been upgraded to expressway standards in Pennsylvania as it traverses the western Philadelphia suburbs. However, truck traffic from downstate Delaware and from the Newark area find it more direct to use SRs 41 and 896 as connecting routes into Pennsylvania, although these trucks conflict with local traffic and communities along these two-lane arterials. Table 3.4 lists truck volumes for routes crossing the Delaware-Pennsylvania line.

Table 3.4 contains truck volumes (AADTT) for different locations throughout the state of Delaware, as well as total traffic volumes (AADT). Due to limited truck data, traffic counts were collected using different sources and years. In general, trucks account for approximately 10 percent of all vehicles using the existing roadway network.

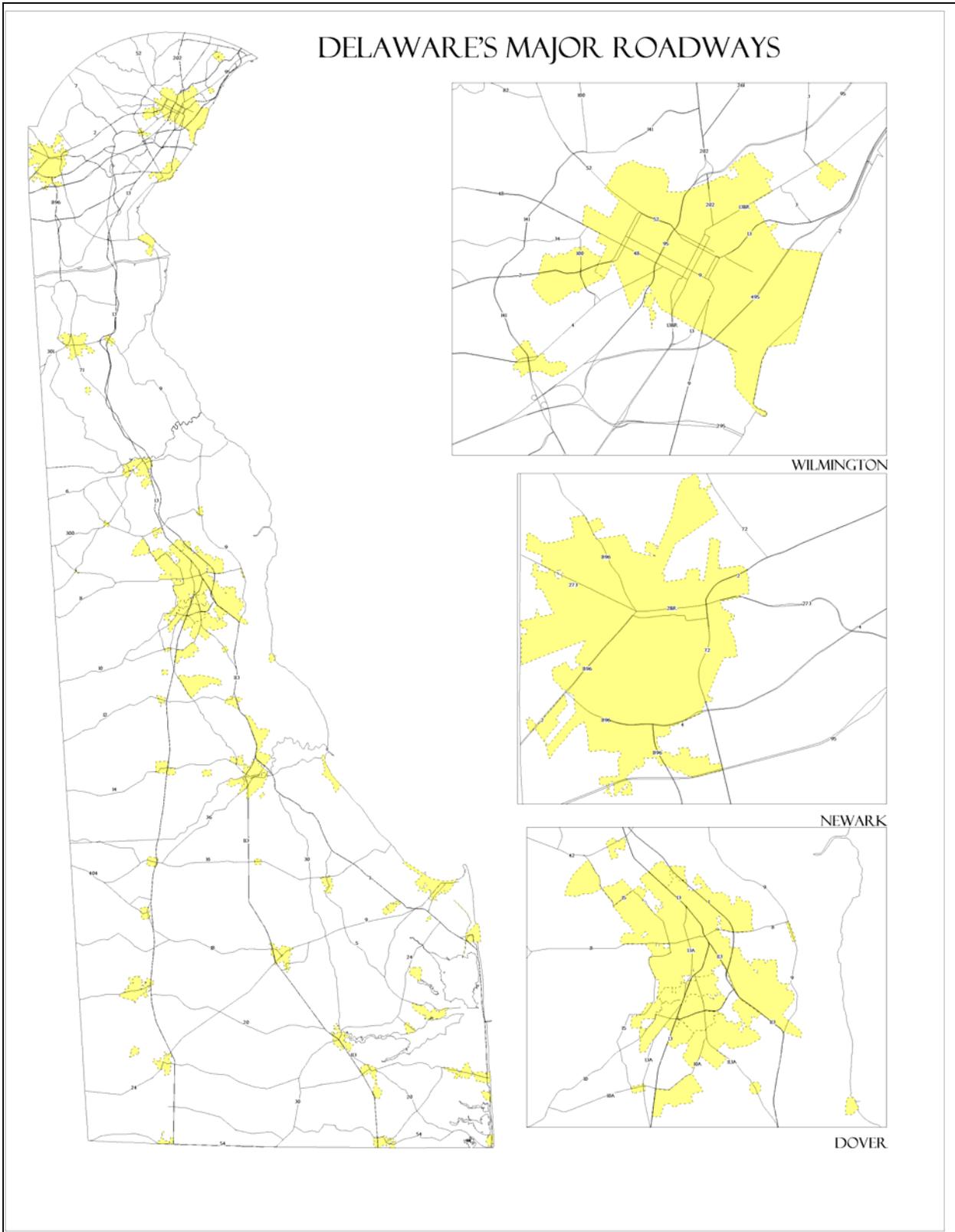


Figure 3.1 – Regional Highway System

Table 3.4
Average Annual Daily Truck Traffic throughout the State of Delaware

County	Location	Year*	AADT	AADTT	% Trucks
New Castle	I-95 and PA Line	1998	112,670	14,647	13.0
	U.S. 13 and PA Line	1998	6,055	1,549	25.6
	SR 41 and PA Line	1998	11,128	1,336	12.0
	SR 896 and PA Line	1998	8,977	718	8.0
	SR 52 and PA Line	1998	10,825	443	4.1
	SR 100 and PA Line	1998	2,735	383	14.0
	SR 261 and PA Line	1998	9,320	186	2.0
	SR 7 and PA Line	1998	674	59	8.8
	SR 82 and PA Line	1998	841	50	5.9
	I-95 and SR 7	2000	188,311	16,948	9.0
	U.S. 301, west of Middletown	2000	12,147	3,268	26.9
	SR 7 and Limestone Road	2000	12,637	695	5.5
	SR 1 and Paddock Road	2000	26,006	1,924	7.4
	U.S. 202 and PA Line	2001	30,410	1,551	5.1
Kent	SR 10, east of U.S. 113A	2000	20,300	1,238	6.1
	U.S. 113 and Barratts Chapel	2000	31,280	2,190	7.0
	SR 1 and 10 th Street, Milford	2000	17,935	861	4.8
	U.S. 13, Dover Downs	2001	46,330	1,992	4.3
Sussex	SR 1	2000	20,250	851	4.2
	SR 1, Fenwick Island	2000	11,457	458	4.0
	U.S. 113	2000	10,666	1,237	11.6
	U.S. 13, Bridgeville	2000	22,856	2,217	9.7
	U.S. 113	2001	17,965	1,401	7.8
	SR 404 and MD Line	2001	7,720	764	9.9
	SR 18 and MD Line	2001	9,015	514	5.7
U.S. 113, south of Lincoln	2001	34,278	10,318	30.1	

* Source for 1998 traffic counts: Pennsylvania Spatial Data Clearinghouse.

Source for 2000 and 2001 traffic counts: TRADAS, DelDOT's traffic database system.

Downstate Delaware lacks an effective interstate truck connection to the Chesapeake Bay Bridge, which is the key link to the Baltimore-Washington region and points west and south. This east-west truck movement is now served by several, two-lane rural highways, including SRs 300, 8, 404, 16, 18, 20, and 24. These routes connect to similar two-lane roads in Maryland that eventually tie into U.S. 50 and 301 to reach the Bay Bridge. In addition to the hazardous operation of large trucks on these rural roads, the trucks pass through the centers of small towns, such as Harrington and Seaford, creating conflicts with local traffic and land use.

Figures 3.2, 3.3, and 3.4 indicate the general location and distribution of DelDOT's Traffic Management Operations Study (TOMS) traffic counters in New Castle, Kent, and Sussex counties, respectively.

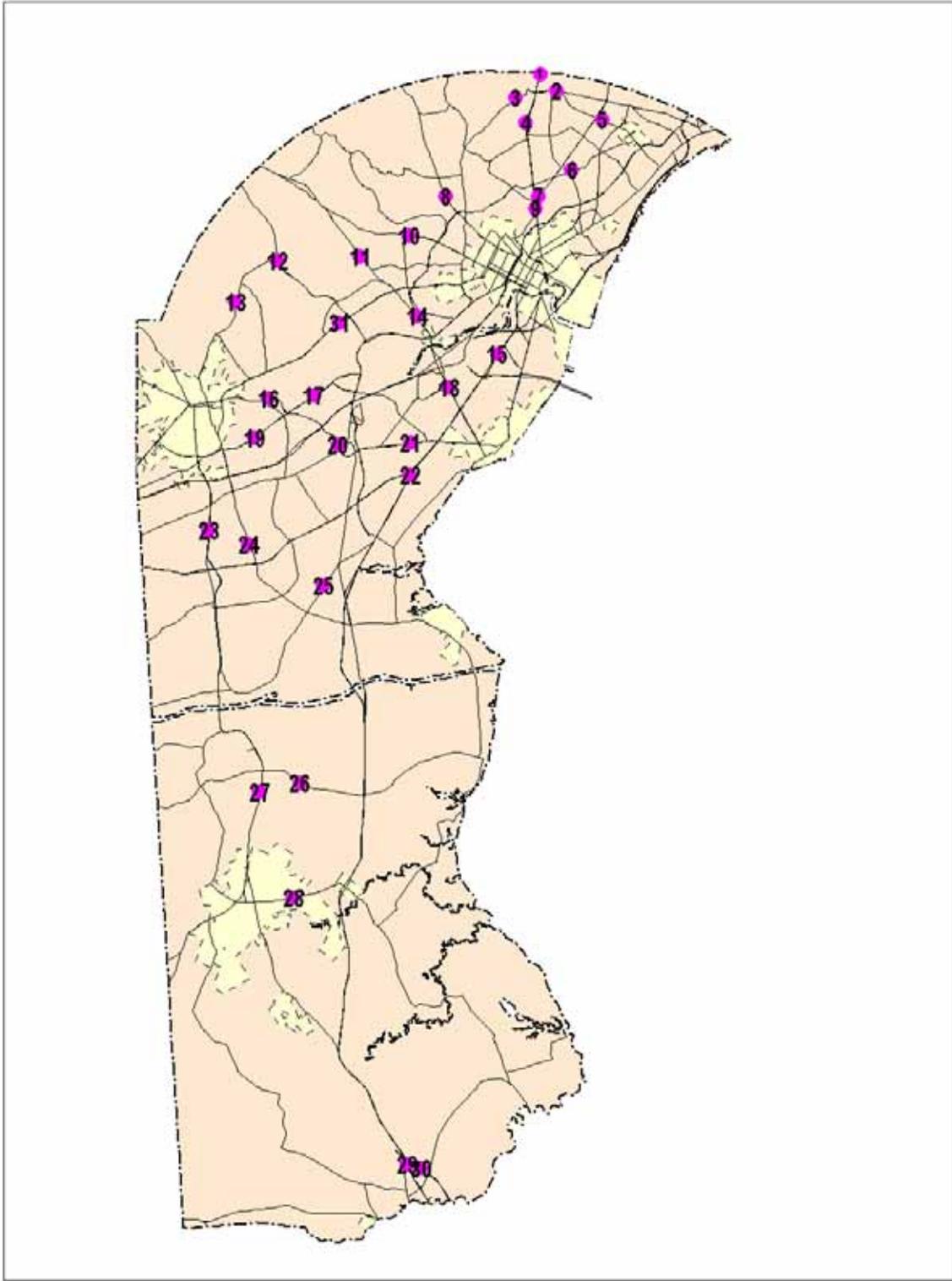


Figure 3.2 New Castle County TOMS Counter Locations (2001)

Table 3.5 – New Castle County TOMS Traffic Data (2001)

Counter	Total AADT	Passenger	%Pass.	All Trucks	%Trucks	Tractor-trailer	%TT
1	42761	40944	96%	1817	4%	775	2%
2	28612	27967	98%	645	2%	223	1%
3	8721	8139	93%	582	7%	341	4%
4	53845	52133	97%	1712	3%	834	2%
5	8654	8311	96%	343	4%	199	2%
6	10566	10082	95%	484	5%	290	3%
7	16567	16220	98%	347	2%	50	0%
8	13705	12639	92%	1066	8%	689	5%
9	66078	62641	95%	3437	5%	1765	3%
10	23407	22803	97%	604	3%	196	1%
11	13881	12112	87%	1769	13%	1264	9%
12	29971	28882	96%	1089	4%	407	1%
13	13088	12353	94%	734	6%	445	3%
14	47095	44846	95%	2249	5%	728	2%
15	42684	39801	93%	2883	7%	1167	3%
16	33084	31816	96%	1268	4%	475	1%
17	24870	21580	87%	3290	13%	2272	9%
18	36328	34591	95%	1737	5%	571	2%
19	30647	29813	97%	834	3%	199	1%
20	42702	41208	97%	1494	3%	672	2%
21	23571	22863	97%	708	3%	213	1%
22	38646	35279	91%	3367	9%	2061	5%
23	32163	29628	92%	2535	8%	1649	5%
24	15454	14172	92%	1282	8%	724	5%
25	7281	6908	95%	374	5%	157	2%
26	11899	9404	79%	2495	21%	1894	16%
27	20642	15992	77%	4650	23%	3726	18%
28	12055	11698	97%	356	3%	70	1%
29	19973	18137	91%	1836	9%	785	4%
30	27718	24844	90%	2873	10%	1729	6%
31	38620	37857	98%	763	2%	213	1%

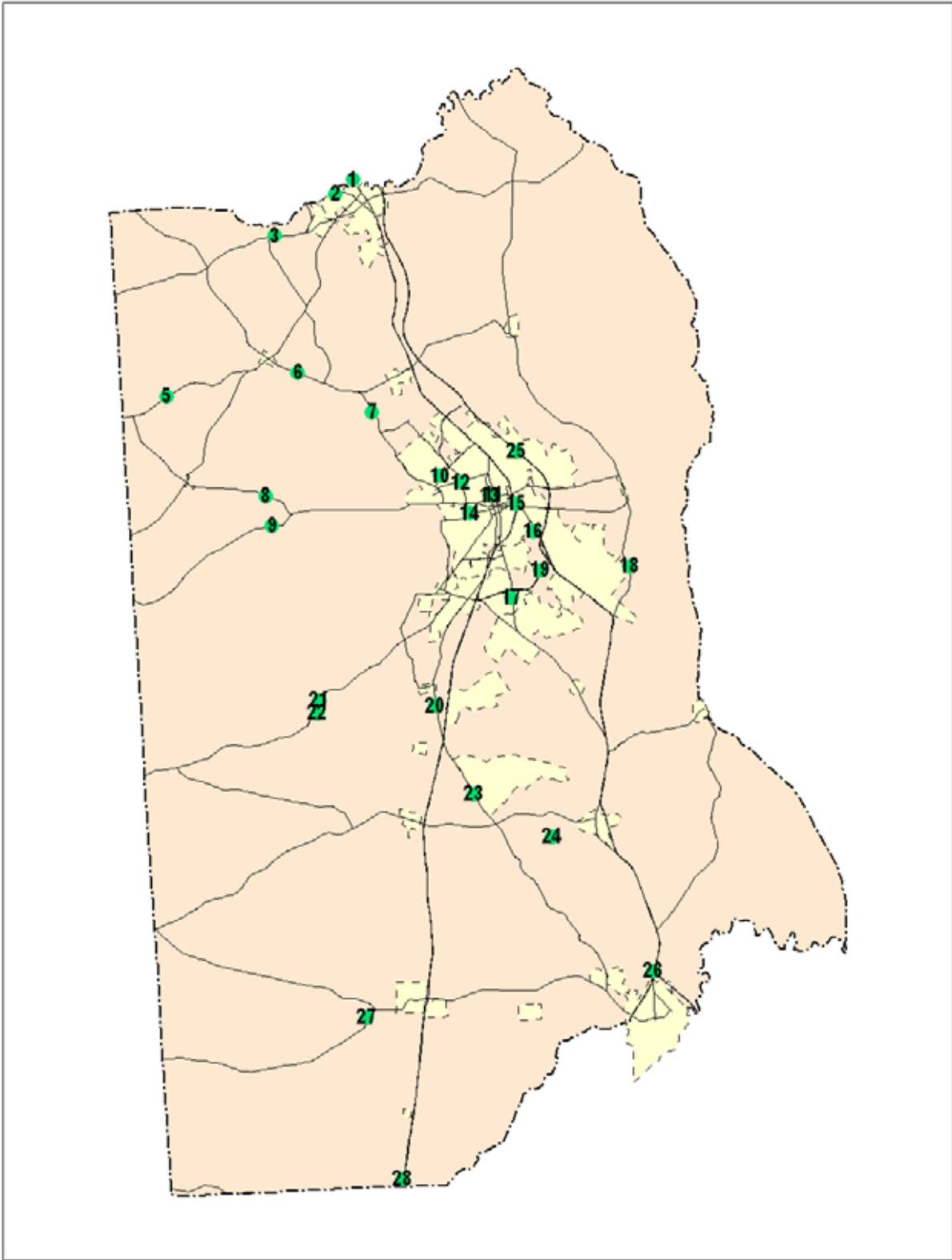


Figure 3.3 Kent County TOMS Counter Locations (2001)

Table 3.6 Kent County TOMS Traffic Data (2001)

Counter*	Total AADT	Passenger	%Pass.	All Trucks	%Trucks	Tractor-Trailer	%TT
1	50038	47121	94%	2918	6%	1799	4%
2	3058	2965	97%	93	3%	25	1%
3	2808	2664	95%	144	5%	45	2%
5	4002	3746	94%	256	6%	105	3%
6	4750	4418	93%	332	7%	107	2%
7	3816	3614	95%	202	5%	47	1%
8	3848	3670	95%	178	5%	75	2%
9	7583	7239	95%	344	5%	170	2%
10	8040	7917	98%	123	2%	26	0%
11	6732	6545	97%	187	3%	44	1%
12	17532	16715	95%	817	5%	372	2%
13	7212	7004	97%	208	3%	47	1%
14	15926	15234	96%	692	4%	146	1%
15	31830	30346	95%	1483	5%	625	2%
16	10255	9264	90%	991	10%	534	5%
17	9122	8859	97%	264	3%	55	1%
18	1531	1414	92%	117	8%	24	2%
19	19891	18111	91%	1779	9%	146	1%
20	2710	2593	96%	117	4%	26	1%
21	3678	3389	92%	289	8%	66	2%
22	1046	762	73%	284	27%	72	7%
23	3928	3785	96%	143	4%	29	1%
24	1941	1846	95%	95	5%	14	1%
25	28084	25543	91%	2541	9%	1491	5%
26	18597	17179	92%	1419	8%	833	4%
27	3525	3139	89%	386	11%	190	5%
28	18132	16256	90%	1876	10%	1108	6%

*There was no counter #4.

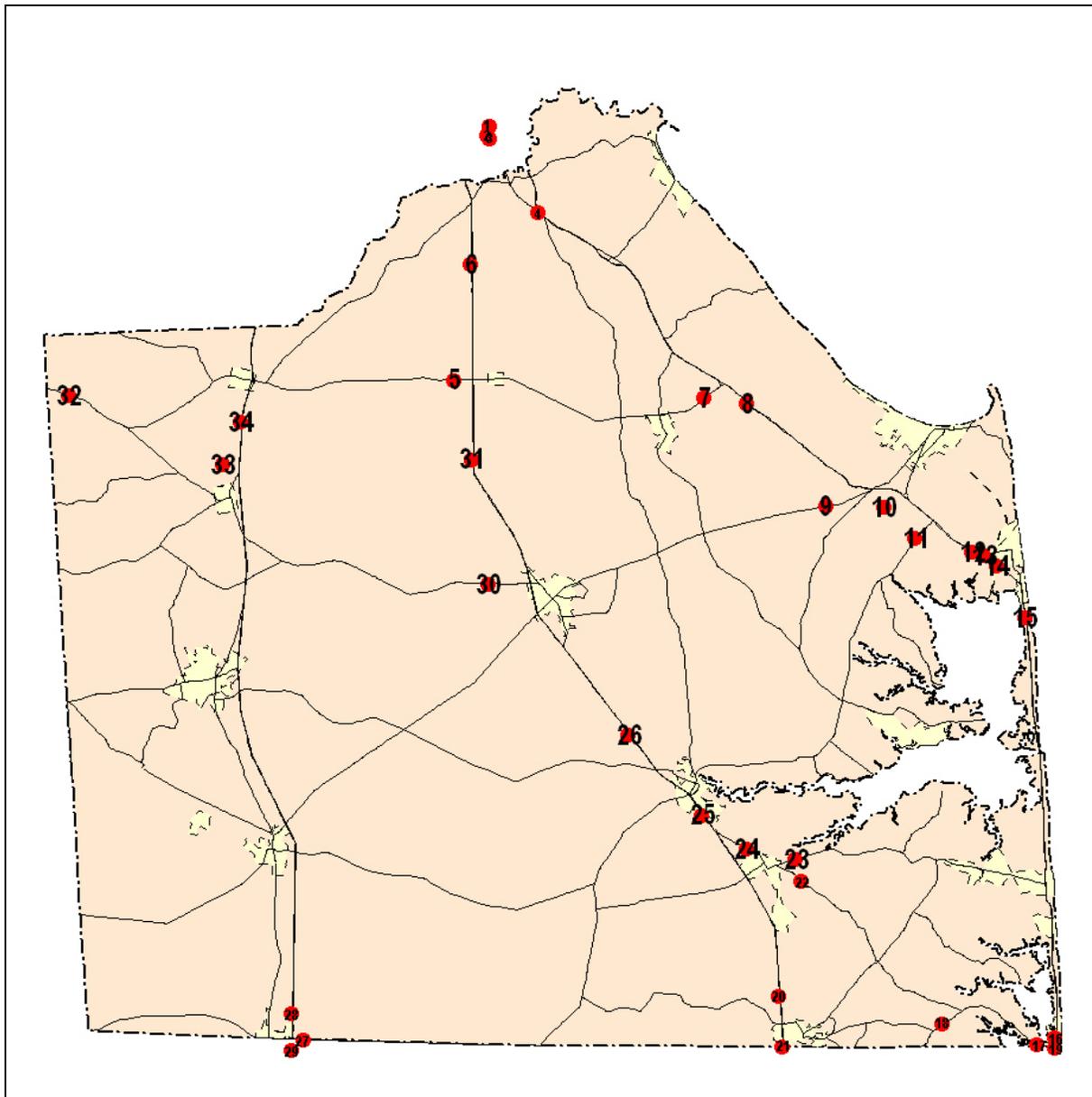


Figure 3.4 Sussex County TOMS Counter Locations (1999)

The TOMS was carried out to capture a large amount of traffic volume data to supplement DelDOT's regular traffic counting program. The traffic was measured by vehicle class, yielding a wealth of data on truck volumes and painting a picture of truck travel in Delaware. Tables 3.5, 3.6, and 3.7 list, by counter location for the respective counties, the average daily count of tractor-trailers in 2001, except for Sussex County, which is 1999 data. In New Castle County, the TOMS counter (number 27) at U.S. 301 north of Middletown recorded 3,726 tractor trailers, exceeded only by the Sussex County counter (number 32) at SR 404, near the Maryland state line, with 5,255 tractor trailers.

Table 3.7 – Sussex County TOMS Traffic Data (1999)

Counter	TotalAADT	Passenger	%Pass.	AllTrucks	%Trucks	Tractor-Trailer	%TT
1	4763	4563	96%	201	4%	71	1%
2	14804	14107	95%	697	5%	180	1%
3	8700	8450	97%	250	3%	44	1%
4	20201	19004	94%	1197	6%	725	4%
5	22203	21422	96%	781	4%	253	1%
6	29934	29066	97%	869	3%	333	1%
7	21142	20463	97%	680	3%	153	1%
8	18197	17738	97%	459	3%	83	0%
9	15566	15061	97%	506	3%	124	1%
10	14095	12816	91%	1279	9%	832	6%
11	13941	12761	92%	1180	8%	615	4%
12	5977	5481	92%	496	8%	196	3%
13	24738	20927	85%	3811	15%	3228	13%
14	21969	20056	91%	1913	9%	1246	6%
15	4997	4776	96%	221	4%	51	1%
16	10154	9584	94%	570	6%	150	1%
17	11085	10588	96%	497	4%	129	1%
18	26468	23909	90%	2560	10%	1747	7%
19	5924	5556	94%	368	6%	198	3%
20	21367	20376	95%	991	5%	475	2%
21	20152	18086	90%	2066	10%	1336	7%
22	6931	6678	96%	254	4%	48	1%
23	6892	5936	86%	956	14%	505	7%
24	10304	9330	91%	761	7%	492	5%
25	12372	11772	95%	600	5%	291	2%
26	18857	17248	91%	1383	7%	873	5%
27	27960	26372	94%	1037	4%	410	1%
28	55507	50821	92%	1317	2%	242	0%
29	16876	15102	89%	528	3%	70	0%
30	39852	34990	88%	2314	6%	1196	3%
31	23829	22715	95%	965	4%	406	2%
32	28816	18170	63%	8073	28%	5255	18%

Counter	TotalAADT	Passenger	%Pass.	AllTrucks	%Trucks	Tractor-Trailer	%TT
33	13262	11664	88%	1339	10%	813	6%
34	27038	24334	90%	2411	9%	1328	5%

Interstate Truck Freight Characteristics

The 1997 CFS revealed that 73 percent of the value and 65 percent of freight tonnage originating in Delaware was carried by truck. Truck freight was further categorized as (1) private trucks, which are operated by an establishment or the buyer/receiver of a shipment, and (2) for-hire trucks, which carry freight for a fee collected from the shipper, receiver, or an arranger of the transportation. In 1997 for-hire trucks carried about 66% of the value, 53 percent of the tons, and 77 percent of the ton-miles of truck freight originating in Delaware. During the five years between the 1993 and 1997 surveys, there was a substantial shift in tons and ton-miles of originating freight from private truck to for-hire truck, while the freight value shares stayed about the same. At the same time, the average miles per shipment by for-hire trucks dropped from 418 to 305 miles. Table 3.8 provides more detailed information on the distance shipped for truck freight originating in Delaware.

Table 3.8
Distance Shipped for Truck Freight Originating in Delaware (1997)

Distance Shipped	Value (\$Millions)	% of Total	Ton-Miles (Millions)	% of Total
Less than 50 miles	\$3,224	26.0	302	10.7
50 – 99 miles	1,466	11.8	272	9.6
100 – 249 miles	2,745	22.1	375	13.3
250 – 499 miles	2,580	20.8	454	16.1
500 – 749 miles	1,259	10.1	359	12.7
750 – 999 miles	318	2.6	253	9.0
1,000 – 1,499	221	1.8	139	4.9
1,500 miles or more	603	4.8	671	23.7
TOTAL	\$12,146	100.0	2,825	100.0

Source: 1997 Commodity Flow Survey

Local freight deliveries within less than 50 miles accounted for 26 percent of the truck freight value, and private trucks served about two-thirds of this local freight. In fact, such short trips accounted for most of the freight carried by private trucks. The average distance per shipment for private trucks was only 37 miles versus 305 miles by for-hire trucks. Long-haul truck shipments of more than 1,000 miles represented only 6 to 7 percent of the truck freight value.

At the time of this writing, not all of the data and planned summaries are available from the 1997 CFS. A summary from the 1993 survey presents interesting insights on truck freight traffic oriented to Delaware versus truck freight passing through the state from other origins to other destinations.²⁹ According to this summary, approximately \$9.1 billion in freight was shipped by truck from Delaware to other states, and \$12.5 billion in freight was shipped into Delaware from other states. Another \$2.8 billion was intrastate freight, resulting in a total of \$24.4 billion in truck freight having either an origin, destination, or both in the state. In contrast, truck freight passing through Delaware was valued at \$78.4 billion, attesting to the “bridge” function served by Delaware by virtue of its key location on the East Coast corridor. Most of this through-truck traffic was focused on the I-95, US 301, and US 13 corridors.

The characteristics of major interstate truck movements in and out of Delaware are difficult to describe because of the dispersed pattern of origins and destinations involved and the variety of goods and commodities carried. For example, bulk gasoline deliveries to service stations throughout Delaware come primarily from the Motiva Enterprises refinery near New Castle and refineries in the Philadelphia area. This means that I-95, I-495, US 13, SR 1, and US 113 become the routes of entry and downstate access before the trucks disperse to local routes to reach their destinations. A similar pattern exists for virtually all truck freight movements to and from the north, because US 13, US 113, and now SR 1 are the only route choices for north-south travel. As another example, the shipment of fresh or frozen poultry from processing plants in southern Delaware to the Baltimore-Washington markets may use any of several state routes mentioned earlier that connect west into Maryland.

Interstate truck freight operations in Delaware focus on a number of major shippers and receivers, such as the Daimler-Chrysler and Saturn auto assembly plants in New Castle County, the DuPont plants at Edge Moor and Seaford, the Port of Wilmington, Dover Air Force Base, Motiva Enterprises refinery and OxyChem near New Castle, Kraft Foods in Dover, several downstate poultry processing plants, and several other industries.

Some of Delaware’s major truck generator locations are shown in Table 3.9. Major shippers and receivers are mainly concentrated in northern New Castle County, the Dover area, and several downstate poultry processing plants and other industries.

Table 3.9
Selected Major Truck Generator Locations

County	Truck Generators	Truck Activity
New Castle	Port of Wilmington Dupont Edgemoor Plant	400-500 trucks/day = 3,000+ trucks/week 24-36 trucks/day from Wilsmere; 1,400 outbound trucks/year

²⁹ *TranStats.Truck Movements in America: Shipments From, To, Within, and Through States*. USDOT, Bureau of Transportation Statistics, May 1997. These data reflect adjustments to the 1993 CFS to include estimates of farm-based shipments from the 1992 Census of Agriculture.

County	Truck Generators	Truck Activity
	General Motors Plant	150+ inbound trucks/day
	Motiva Enterprises Refinery	25-30 inbound trucks/day; 350 outbound trucks/day
	OxyChem	18 inbound trucks/day; 22 outbound trucks/day
	Cherry Island Landfill in Wilmington	407 inbound trucks/day
	Pine Tree Corners Landfill	
	Yellow Truck Terminal in Wilmington	
	Cherry Lane/New Castle Industrial Parks	
	Daimler-Chrysler Auto Assembly	
	ICI Atlas Point	
	CSX Wilsmere Transflo	
	UPS in Ruthar Drive	
	Amazon.com	
	Avon in Newark	
	Gaylord Containers in Newark	
	WL Gore in Newark	
	AirLiquide	
Kent	Kraft Foods in Dover	300 inbound trucks/week; 350 outbound trucks/week
	Sandtown Landfill	83 trucks/day
	Dover Air Force Base	
	Delmarva Trucking in Dover	
	Roadway Truck Terminal in Dover	
Sussex	Mountaire Gravel Hill Rail Transfer	4,000-5,000 trucks/year to Millsboro
	Allen Foods – Harbeson	100 inbound trucks/day; 25 outbound trucks/day
	Allen Foods – Delmar Mill	110 outbound trucks/day
	Jones Crossroads Landfill	151 trucks/day
	Consolidated Freightways Truck Terminal – Seaford	
	American Freightways Truck Terminal in Seaford	
	Dupont Seaford Plant	

Truck Accidents and Major Conflicts

Annually, the Traffic Control Section of the Delaware State Police analyzes all Delaware traffic crash data regardless of the geographical areas in which they occur or the police agency conducting the investigation. This annual compilation of crash statistics shows information for all fatal accidents, injury-producing crashes, and property-damage collisions in which the damage was more than \$1,500.

In 2001, there were 20,408 reportable traffic accidents of which 118 were fatal, 6,021 were personal injury, and 14,269 were property damage crashes.³⁰ Figure 3.5 illustrates a comparison of the total recorded crashes distributed by county and statewide.

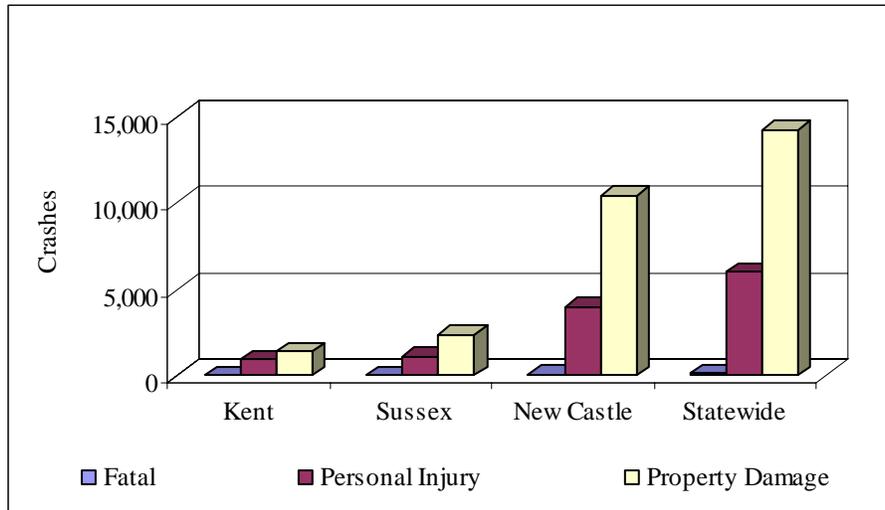


Figure 3.5 Crash Comparison by County and Statewide

There were 1,112 reportable traffic accidents that involved 6-wheel, 10-wheel trucks or tractors and semitrailers. These crashes were classified as: 12 (1%) fatal accidents, 299 (27%) personal injury crashes, and 801 (72%) property-damage collisions. A total of 16 people were killed and 510 persons were injured in truck accidents. The consumption of alcohol was a factor in only 6 of the 1,175 truck drivers involved in these crashes.

Figures 3.6, 3.7, and 3.8 present the number of crashes involving trucks by day of the week, time of the day, and driver age, respectively. Most truck-related accidents occurred on Fridays (224 crashes), between 12 p.m. and 4 p.m.(342 collisions), and involved truck drivers between 36 and 45 years old (301 accidents).

Major trucking problems in the existing roadway network have been identified by a representative group of stakeholders. Key factors that can cause accidents involving trucks include inadequate roadway geometric design and/or conditions at heavily congested intersections; heavy truck volumes on major interstate, commuter, and small routes; and seasonal congestion.

³⁰ 2001 Delaware's Annual Traffic Statistical Report, Delaware State Police. April 2002.

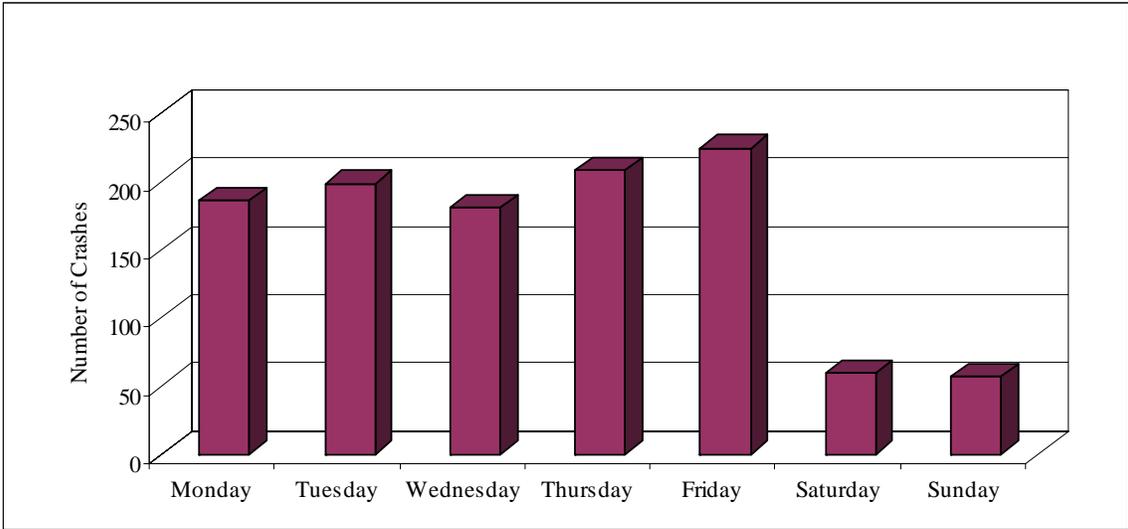


Figure 3.6 Truck-Related Crashes by Day of the Week

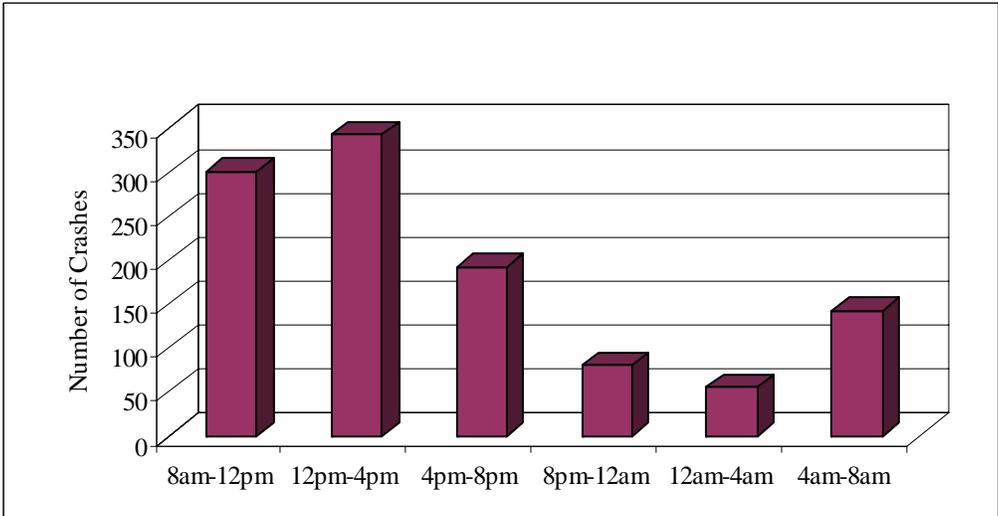


Figure 3.7 Truck-Related Crashes by Time of Day

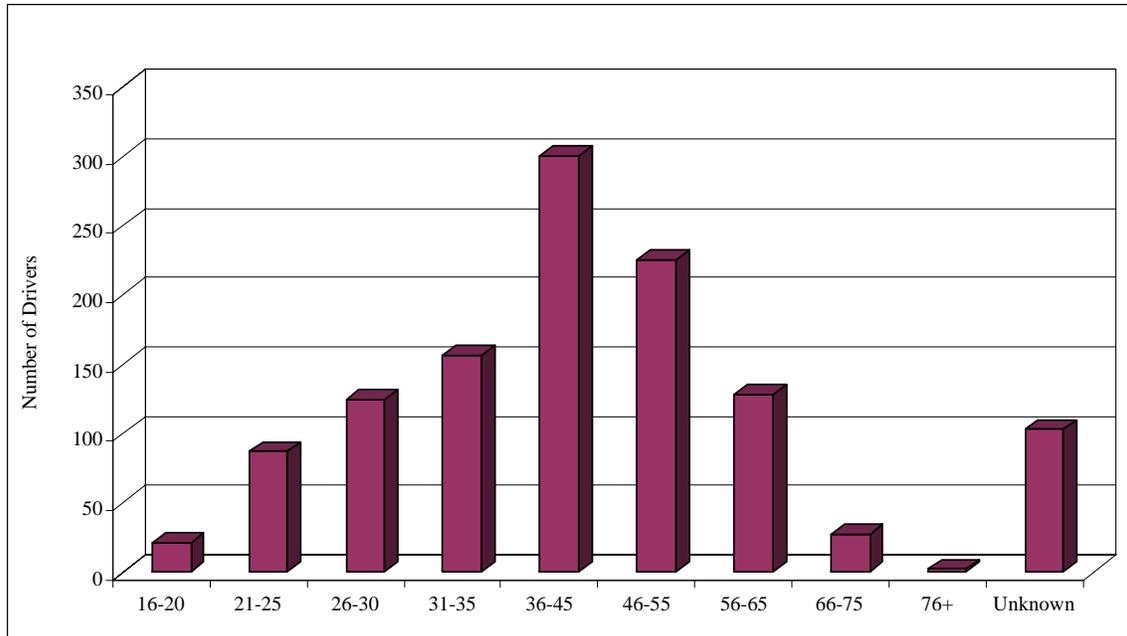


Figure 3.8 Truck Drivers Involved in Crashes by Age

Trucking Issues

In the course of interviews and discussions with a wide array of individuals and organizations, a number of key trucking issues have been identified.

- 1. Delaware has no system of designated truck routes.** The growth and proliferation of truck traffic in some areas of Delaware and its impacts on local communities has raised the issue of whether DelDOT and local jurisdictions should restrict trucks in those areas to certain designated routes. Most communities probably believe they have too much truck traffic in certain areas, but this issue is especially problematic in parts of New Castle County, most notably in the Newark area, and in selected downstate corridors and communities.

The closest Delaware comes to a system of designated truck routes are those highways designated in the National Network, established by the 1982 *Federal Surface Transportation Assistance Act* (STAA). This act prescribed national policies governing truck and bus size and weight on a National Network of highways. It authorized the use of this network by commercial vehicles, called STAA vehicles after the Act, within the specified size and weight limits. On STAA routes, no state may impose length limitations of less than 48 feet on a semitrailer operating in a truck tractor-semitrailer configuration, or less than 28 feet on any semitrailer or trailer operating in a truck tractor-semitrailer-trailer combination.³¹ The STAA also says that no state may impose a width limitation, either more or less, than 102 inches (8.5 feet) on vehicles using the STAA system. Safety devices may extend an

³¹ Delaware allows a maximum semitrailer length of 53 feet and a maximum trailer or semitrailer length of 29 feet on interstate and U.S. routes not otherwise posted.

additional 3 inches on each side of the vehicle. The following vehicles may also operate on STAA routes: maxicubes, triple saddlemounts, conventional auto carriers, and stinger-steered auto carriers.³² STAA routes in Delaware include:

- All interstate routes (I-95, I-295, and I-495)
- U.S. 13 (MD line to I-495)
- U.S. 40 (MD line to I-295)
- U.S. 113 (MD line to U.S. 13 in Dover)
- U.S. 301 (MD line to U.S. 40)

In addition to these routes, DelDOT has designated U.S. 202 from U.S. 13 to the Pennsylvania line and SR 1 from I-95 to U.S. 113 in Dover as routes open to STAA vehicles. DelDOT has already begun to work with other states in identifying a regional network of major truck corridors, which will identify possible inconsistencies between the plans and programs of adjacent states for the same route or corridor.

The STAA network was defined to encourage large trucks to use routes that have been built to high roadway design standards and that can accommodate large vehicles more safely than other routes. Generally, across the country, trucks that meet a state's legal size and weight limits are allowed to use all public roadways, unless concerns for safety and community disruption prompt the restriction of trucks above a certain size and weight on selected road segments and where there is reasonable alternative routing. Over-size and over-weight trucks are regulated through a permit process. Essentially, this is Delaware's current policy.

Local truck bans seem to be increasing on major traffic routes due to safety concerns and hazardous conditions. At present, trucks within the state's legal load and size limits may travel on any road in the state, except for certain segments that have been restricted by local and/or DelDOT resolution to vehicles of a certain size and weight. Typically, these actions have been in response to localized problems of trucks using residential or commercial streets as short cuts and where there is a reasonable alternative truck route. An example is SR 404 through Bridgeville, where DelDOT, by resolution and in response to local requests, used existing roads to define a truck route to divert trucks out of the center of town. Signs indicating the restrictions were placed on the old route through town, but other than SR 404 route markers, no signs were installed specifically designating the new route as a truck route.

Pennsylvania has an interesting variation to this approach. Pursuant to state statute (Act III in 1997), PennDOT inventoried all numbered state and U.S. routes, and based on their physical and operating characteristics, identified road sections that would be approved for use by vehicles of various sizes. The resulting route classifications were mapped, along with notes on weight-restricted bridges and roads, vertical clearances, and other information on road conditions. Roads having the most severe constraints were posted in the field. Fines for violations range from \$50 plus court costs on most restricted roads to \$300 plus court costs

³² 23 CFR Ch. 1, Part 658 – Truck Size and Weight Route Designations, Length, Width, and Weight Limitations.4-1-99 Edition.

for illegal operations on roads with posted restrictions. In Pennsylvania, the rugged topography and extensive mileage of mountainous roads with narrow lanes and limited shoulders were undoubtedly a major factor in taking this action in cooperation with the state motor carrier association. Maps and materials have been broadly distributed and are readily available at truck stops, welcome centers, and rest areas. The response of the trucking industry has been positive and appreciative of the information provided by the state on road conditions.

Pennsylvania's approach uses the existing physical and operating constraints of its highway system to determine whether certain vehicles can use certain road segments safely. Another dimension that could be considered in Delaware is to establish which highway corridors carry large volumes of truck traffic and then identify and assess possible constraints, community impact issues, and safety concerns that could be corrected through capital and/or operational improvements. Having such corridors identified could affect the prioritization of improvements, such as upgrading bridges to eliminate weight limit constraints in major truck corridors.

- 2. Trucking costs and service are adversely affected by increasing highway congestion in major corridors, especially in peak summer months.** In downstate areas near the seashore, heavy summer vacation traffic intensifies conflicts with truck traffic. There is a need to ensure that truck traffic is able to provide effective freight service to these areas during their months of greatest activity. Both capital and operational improvements will be needed both in major truck corridors and on connecting routes into the communities. The scheduling of deliveries in off-peak or evening periods to avoid peak traffic conditions may be part of a package of improvement strategies. Efforts to mitigate single occupant vehicle (SOV) travel by encouraging alternatives such as carpooling, transit, bicycling, and walking will also play a crucial part in relieving congestion to allow freight shipments to operate efficiently.
- 3. Toll levels discourage the use of SR 1 by truckers, resulting in continued, heavy truck traffic on U.S. 13.** While there was initial adverse reaction by truckers (especially the poultry industry) to the SR 1 tolls, that reaction has abated somewhat as a result of allowing a 50 percent discount for all five- and six-axle vehicles using EZPass automatic toll technology.³³ Nevertheless, the trucking industry generally persists in the belief that DelDOT built SR 1 to divert truck traffic from congested U.S. 13 and then lessened the attraction of the route to trucks by charging high tolls.

DelDOT recently sponsored a survey of three-axle truck traffic on U.S. 13 between the Chesapeake & Delaware Canal and U.S. 113 southeast of Dover to calculate the amount of such traffic that is deliberately avoiding the tolls on SR 1. The survey showed that only 14 percent of the three-axle truck traffic on this section of U.S. 13 would be equally or better served by SR 1.³⁴

³³ This discount is conditional, based on an 8.1 percent increase in current annual usage.

³⁴ *Delaware Motor Carrier Fee System Early Toll Policy Assessment for SR 1 (3-Axle Vehicles)*. Prepared for DelDOT by Parsons Transportation Group Inc. March 2000.

- 4. Lack of rest areas in major truck corridors creates a potential truck safety hazard through increased driver fatigue.** There are only two official rest areas for trucks in Delaware: one on I-95 near Christiana and one on U.S. 13 near Smyrna. The results of the 1998 *DelDOT Customer Surveys* and recent stakeholder interviews with shippers and carriers suggest that these rest areas are not sufficient to accommodate growing truck traffic in Delaware. “Rest areas that can accommodate trucks” was rated as extremely important by half of the shippers and carriers in the 1998 surveys. When asked how well the current transportation system was performing, “rest areas that can accommodate trucks” received the third-lowest marks. In the stakeholder interviews, representatives of the poultry and the trucking industries called for more truck rest areas and cited increasing problems with driver fatigue. New federal rules regulating driver hours of service will only exacerbate this problem.

Failure to meet the need for safe parking for truckers will result in increased illegal parking along highway shoulders and entrance and exit ramps. The need for more parking and driver amenities for truckers in public rest areas and/or private truck stops is a national problem, especially in major interstate trucking corridors. A recent study estimates a shortfall of over 28,000 truck parking spaces in rest areas nationwide.³⁵

- 5. Lack of safe roadside weigh-in-motion and inspection areas for trucks creates a safety hazard.** Trucking interests have said this is a problem in Delaware and other states. DelDOT currently collects weigh-in-motion data from 20 sites around the state. All of the locations are on major numbered interstate, U.S., and Delaware routes. DelDOT also plans to update all of its automatic traffic counter sites (over 30 locations) to full weigh-in-motion sites. This would give DelDOT an extensive system of weigh-in-motion sites throughout the state that could be paired with portable scale enforcement areas. The location of safe, roadside locations for these facilities must be done on a site-by-site basis.
- 6. Lack of technology to discern between trucks that have been pre-cleared and those that are in violation of credentials, out-of-service, and safety record requirements results in delays and increased costs for carriers and enforcement personnel.** Performing roadside vehicle inspections is time-consuming for both law enforcement and trucking personnel, and reducing the number of inspections of carriers that have proper credentials and safe and legal performance records would save time and costs for both groups. As part of its Integrated Traffic Management Program (ITMS) and as recommended in its *Intelligent Transportation System/Commercial Vehicle Operation (ITS/CVO) Business Plan*, DelDOT has initiated efforts to develop data systems to provide roadside enforcement personnel with real-time information on the status of a vehicle’s permits, taxes, safety record, and other required information. New data from field inspections will be uploaded automatically to be shared with other enforcement personnel in Delaware and other states. This will minimize the number of times a “safe” truck must stop.³⁶

³⁵ *Commercial Driver Rest Area Requirements: Making Space for Safety*. Prepared for the Federal Highway Administration by the Trucking Research Institute, Apogee Research, Inc., and Wilbur Smith Associates. May 1996.

³⁶ *Delaware ITS/CVO Business Plan*. Prepared for DelDOT by De Leuw, Cather & Company. May 1999.

- 7. Inadequate off-street storage for trucks at major shipping and receiving points creates hazardous conditions and adversely impacts adjacent communities and freight costs.** This has been cited as a problem by some shippers and receivers having limited site areas for temporary truck storage. The Daimler-Chrysler plant in Newark is a prime example. Such problems appear to require unique solutions on a case-by-case basis, depending upon local options for safe temporary parking areas. In some cases DelDOT may be able to make available excess highway right-of-way or other nearby state land for such purposes. More enforcement of traffic regulations may also be needed so that truck parking is not allowed to encroach on pavements and produce unsafe operating conditions for pedestrians and vehicles.
- 8. Current truck registration and licensing procedures require too much time and money and should be streamlined.** Trucking companies complain about the paperwork and time required to comply with registration, taxation, and report-filing requirements in order to do business in Delaware and other states. A national survey of motor carriers indicated that the average annual labor cost for such activities ranged from \$145/ vehicle for large fleets of 100 vehicles or more to \$918 for small fleets of 10 vehicles or less.³⁷ DelDOT's *ITS/CVO Business Plan* includes a set of recommended actions under the heading of Streamlining Administration that will cover registration and licensing procedures. Specifically, the development of an electronic credentialing system is proposed to allow motor carriers to submit data electronically via the Internet or Bulletin Board System to request/renew credentials and to exchange other information with regulatory agencies. Aspects of electronic credentialing could include International Registration Plan registrations, International fuel tax Agreement, quarterly reports, over-size/over-weight (OS/OW) permit and route information, hazardous and/or solid waste hauling permits and route information, and Heavy Vehicle Use Taxes to the IRS.³⁸ Some DelDOT electronic credentialing is already available, such as applications for OS/OW permits.
- 10. More information on truck volumes and freight movement patterns is needed in setting priorities for road and bridge maintenance and reconstruction.** In preparing this report, it has become apparent that an expanded program to routinely collect truck traffic volume data is needed in Delaware. Expansion of volume counting to include weigh-in-motion locations across the state will improve the database substantially. However, an even broader series of traffic counts will be needed to fully define a system of major truck corridors, especially those relatively short route sections that connect major truck trip generators or attractions with major truck routes, such as U.S. 13.

The database that is being developed as part of the statewide freight plan will provide a continuing source of information on freight characteristics and will include truck volume data from whatever sources are available. While it would be useful in freight planning to have detailed information on commodity flow by mode within major in-state travel corridors,

³⁷ *Assessment of ITS/CVO User Services: Qualitative Benefit/Cost Analysis*. Prepared by the ATA Foundation for the Federal Highway Administration.

³⁸ *Ibid.*

that level of detailed information is unlikely to be forthcoming from national surveys, such as the CFS, because of sampling and confidentiality constraints. This is especially the case for small states such as Delaware. However, because Delaware is a small state, it is easier to gain an understanding of major freight movements through other means, such as the stakeholder interviews employed for this project. Such information could be updated periodically through re-contact of stakeholders, which would serve the further purpose of keeping the lines of communication open between DelDOT and these key freight interests.

Chapter 4 – RAILROADS

Chapter 4 describes the railroad network, infrastructure limitations, principal commodity flows, the key role of NS in Delaware, and railroad freight issues.

Infrastructure

There are approximately 260 active, freight railroad route-miles in Delaware. NS operates about 75 percent of this network and carries approximately 90 percent of the 6.5 million tons of freight originating or terminating by rail in Delaware annually. Nearly 80 percent of this rail tonnage is terminating traffic. Rail lines are indicated in Figures 4.1 and 4.2.

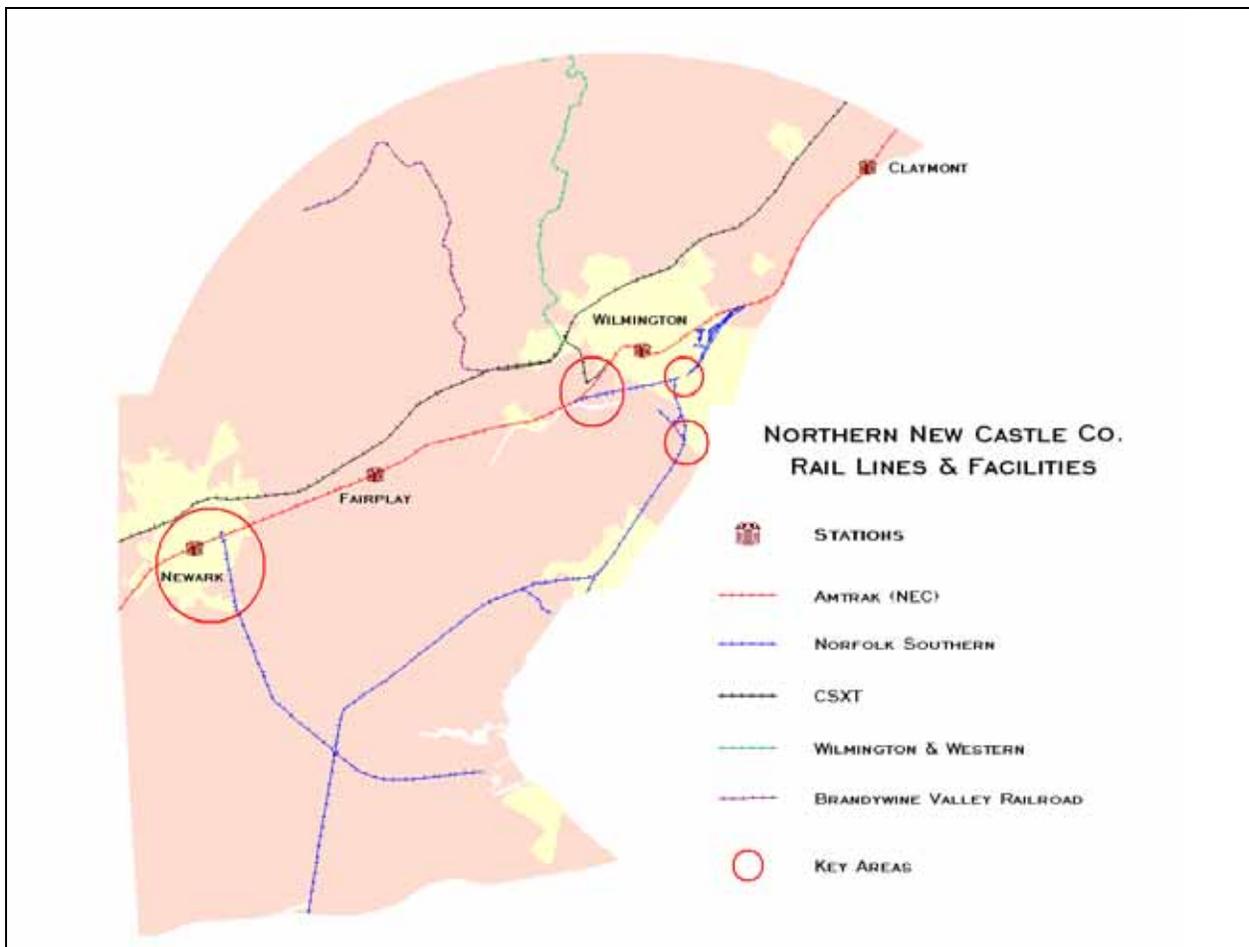


Figure 4.1

CSXT operates only 23 freight route-miles in Delaware but has the greatest density (tonnage/mile) of rail freight traffic in the state, most of which passes through Delaware on CSXT's Philadelphia/Baltimore line segment via Wilmington and Newark. Approximately 26

freight trains per day use the CSXT route, including four NS trains, which bypass the NEC with its limited availability for freight train movement. In accordance with the trackage rights agreement, the four NS trains are not permitted to serve CSXT customers.

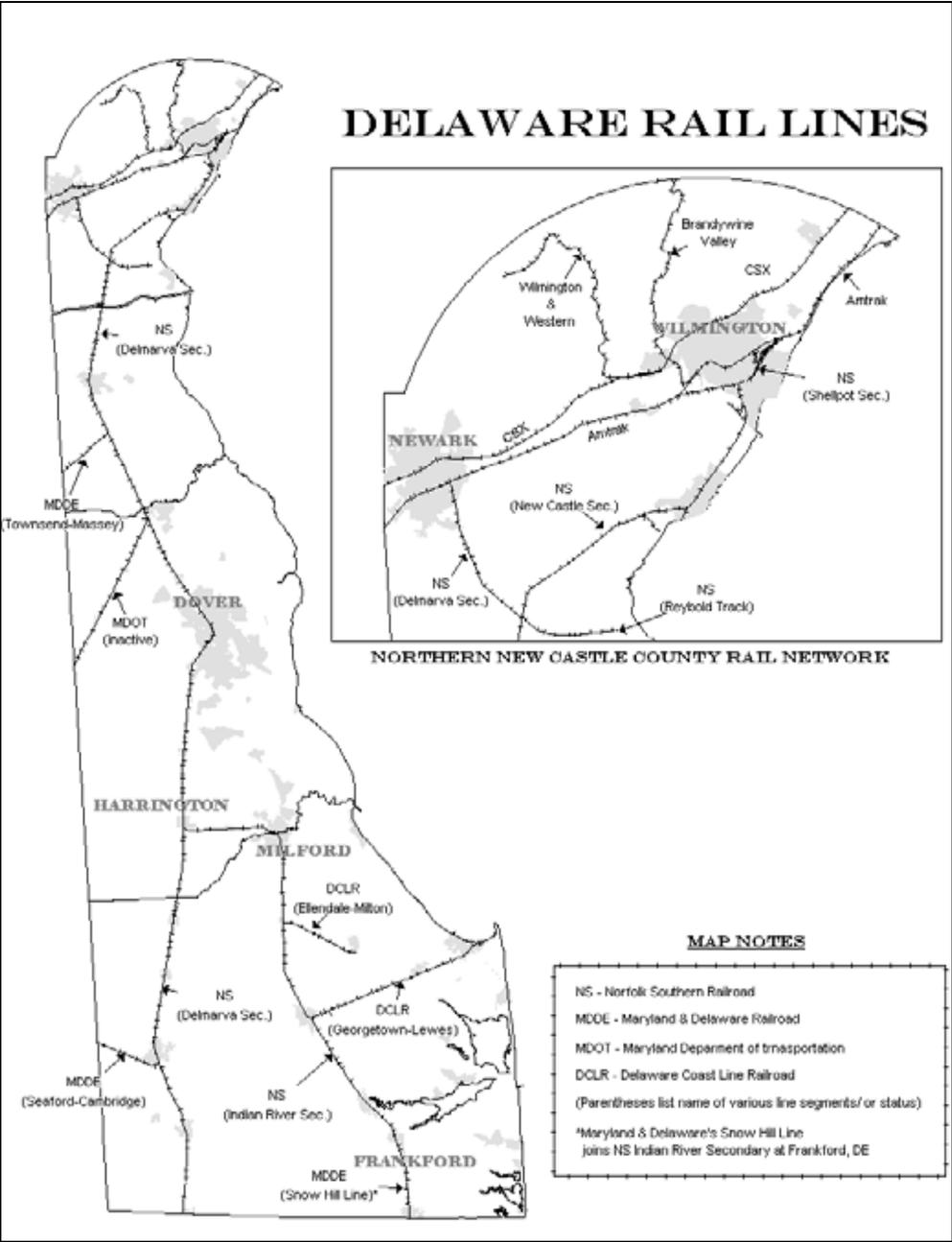


Figure 4.2

NS access to Delaware customers is via Amtrak’s NEC, on which NS has trackage rights. Generally, NS operations on the NEC are confined to a 10 PM to 6 AM ‘window,’ when high-speed intercity passenger train and commuter train movements are minimal. Most NS traffic

originating or terminating in Delaware, as well in the Maryland and Virginia portions of the Delmarva Peninsula, uses the NEC between Newark, Delaware, and Perryville, Maryland. At Perryville, NS trains use the NS Port Road Branch to and from Harrisburg, Pennsylvania, to connect to the extensive NS system. The remaining and minor portion of NS traffic to and from Delaware is via Philadelphia and the NEC. The terminal for these trains is the Edgemoor Yard in Wilmington, north of the Christina River. The railroad movable bridge across the Christina River has been out of service for approximately 8 years. A local freight train moves cars through the Wilmington passenger station to access NS customers located north and south of the Christina River.

The principal NS network within Delaware consists of several line segments. The New Castle Secondary Track extends 17 miles, from the NEC in west Wilmington to Porter, Delaware, via the Port of Wilmington and Bear, with a connection in Porter to the Reybold Industrial Track to Delaware City. The Delmarva Secondary Track traverses 89 miles down the ‘spine’ of Delaware from the Newark Yard, adjacent to the Daimler-Chrysler plant, to Seaford, via Porter, Dover, and Harrington. The Indian River Secondary Track is 39 miles in length, branching off the Delmarva Secondary at Harrington and connecting to Frankford via Ellendale, Georgetown, and the Indian River power generating station near Dagsboro. The NS network connects with the Maryland & Delaware Railroad lines at Townsend, Seaford, and Frankford.

Traffic can be interchanged between NS and CSXT through the West Yard in Wilmington. A major restriction here is the vertical clearance beneath the NEC viaduct. The clearance is inadequate for the covered tri-level railcars used by automobile assembly plants. Also, double-stack intermodal containers and certain tri-level rail cars cannot be operated on the NEC because of vertical clearance restrictions imposed by the overhead electric catenary system.

The present operating rail network is generally in a state of good repair as a result of periodic capital program work, consistent with the individual line segment’s level of utility or tonnage handled. The majority of the network has continuously welded rail, which reduces maintenance costs compared to jointed rail. The network will accommodate freight cars of 286,000 lbs. gross weight. This is becoming the “new” standard, particularly for bulk commodities such as coal and grain, which are the principal commodities on the Delmarva and Indian River Secondary lines.

Rail Commodity Flows

Rail tonnage for commodities originating or terminating in Delaware is considerably imbalanced, principally accounted for by inbound coal, grain, and other commodities. In 2000, a total of 6.9 million revenue-tons (contents of cars) either originated or terminated in Delaware. Total rail tonnage has been stable in recent years, ranging between 6.4 and 6.9 million tons, with the year 2000 reporting the highest tonnage within 5 years. The improved rail traffic performance was driven by coal and chemical shipments. Since 1997, chemical tonnage has exceeded coal. Nearly 80 percent of Delaware rail traffic is terminating traffic. Chemicals were the largest commodity originating in Delaware, representing 38 percent of the total traffic. Grain shipments into the state to support the poultry industry are classified under farm/food products in Table 4.1

CSXT has a relatively small market share of the tonnage originating or terminating in Delaware. Its principal tonnage is automotive, either at the GM/Saturn assembly plant or interchanged with NS in Wilmington, including traffic through the Port of Wilmington. CSXT operates a bulk intermodal distribution service (TRANSFLO) terminal with 35 car spots at Wilsmere Yard, as well as intermodal trailer and container terminals in Baltimore and Philadelphia.

Table 4.1
Rail Revenue-Tons of Commodities and Percent Originating and Terminating in Delaware - 2000

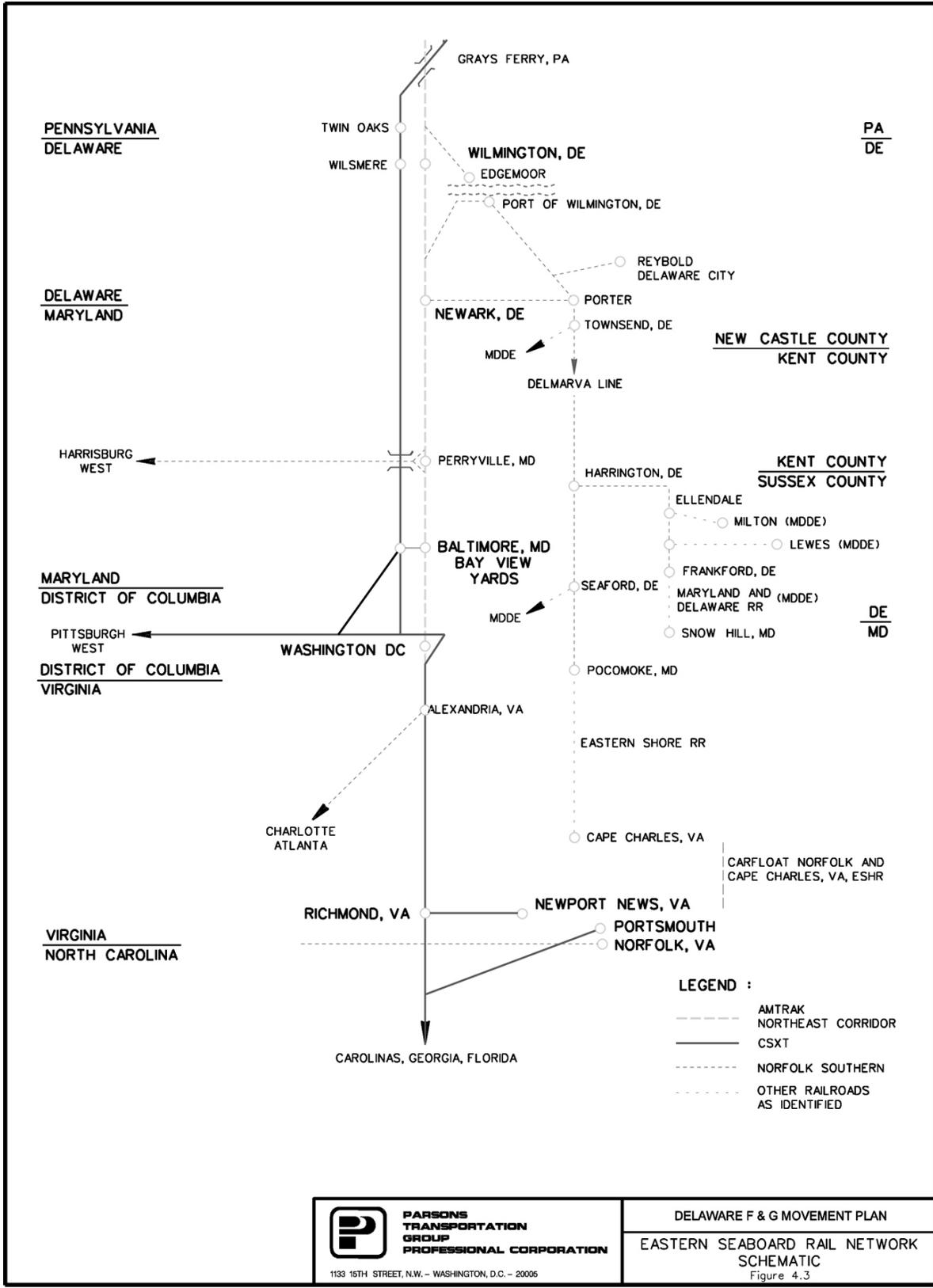
Commodity	Tons (Millions)	% Originated	% Terminated
Chemicals	2.21	38	62
Coal	1.56	0	100
Nonmetallic	0.62	27	73
Minerals	0.54	8	92
Farm/Food Products	0.45	18	82
Transportation Eqpt.	1.48	11	89
All Other	6.86	23	77
TOTAL			

Source: Compiled by the American Association of Railroads from the Surface Transportation Board Carload Waybill Sample for 2000.

Interstate Rail Freight Access

Rail operating schedules and procedures in Delaware are greatly affected by railroad operations outside the state, particularly in relation to freight train routes and en-route switching of freight cars. The NS and CSXT systems dominate the eastern rail markets, including Delaware. Prior to 1999, Conrail was the predominant rail freight service provider in Delaware, but as a result of the acquisition of Conrail's operating assets by NS and CSXT, NS was allocated Conrail's operations in Delaware and has emerged as the major rail operator in the state. CSXT's service in Delaware is limited to its line paralleling the NEC across the northern part of New Castle County.

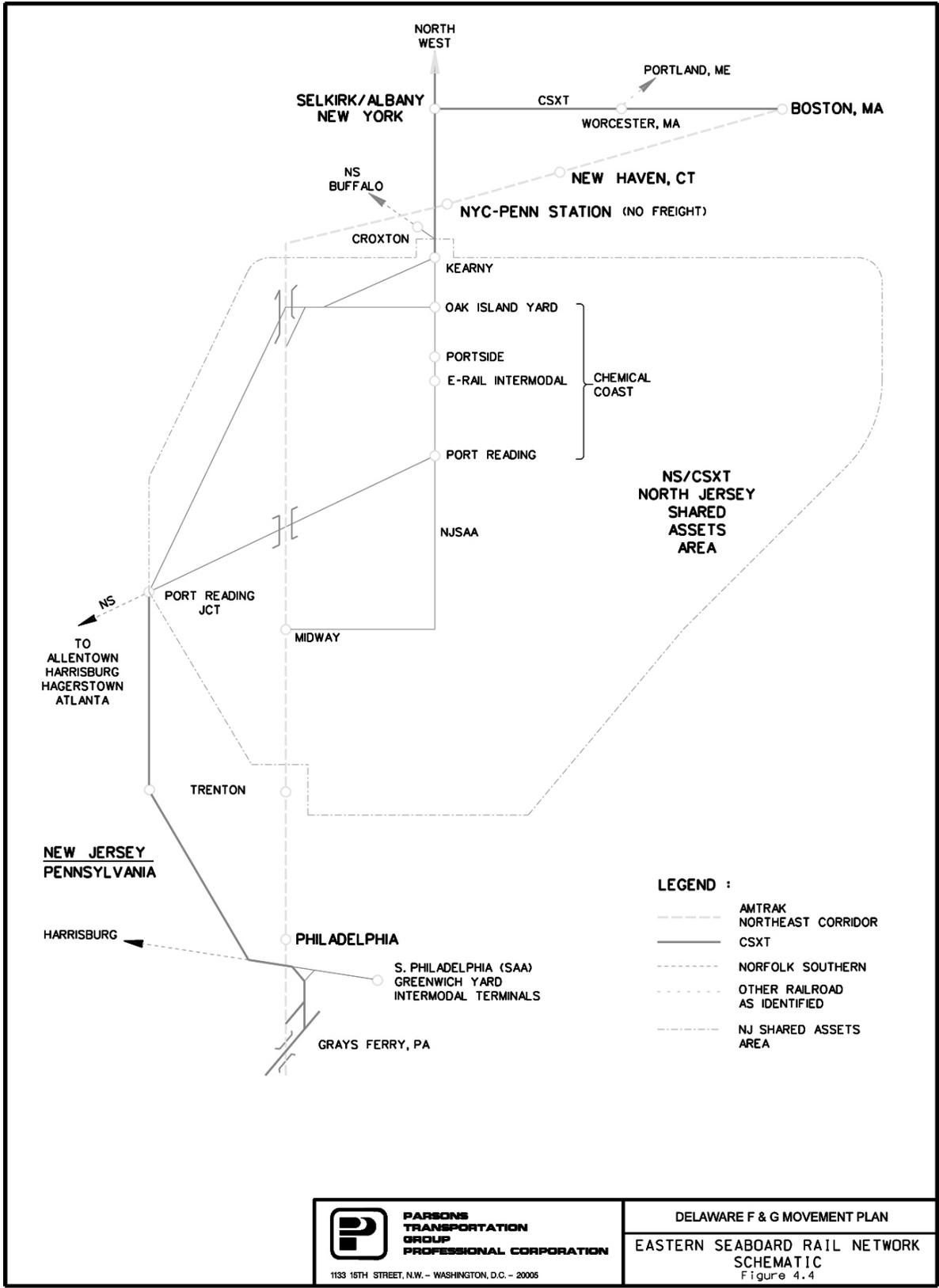
Figures 4.3 and 4.4 indicate the Eastern Seaboard rail network in schematic form. Figure 4.3 shows the rail network from the Virginia-North Carolina border to a point (Gray's Ferry, Pennsylvania) just north of Wilmington, while Figure 4.4 continues the network north to beyond New York City. The two primary rail corridors are Amtrak's NEC between Washington, DC and Boston, and CSXT's freight corridor between Baltimore and the North Jersey Shared Assets Area. This area is one of three shared asset areas set up as part of the Conrail acquisition to



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DELAWARE F & G MOVEMENT PLAN
 EASTERN SEABOARD RAIL NETWORK SCHEMATIC
 Figure 4.3

Figure 4.3



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DELAWARE F & G MOVEMENT PLAN
EASTERN SEABOARD RAIL NETWORK
SCHEMATIC
Figure 4.4

Figure 4.4

enable access to key rail complexes by both NS and CSXT. Both rail systems have limited trackage rights on the NEC, but freight traffic in the Amtrak corridor is greatly constrained by intercity and commuter rail service. The Delmarva Secondary, which is now operated by NS, serves downstate Delaware. Three short-line railroads also operate limited freight service in Delaware.

As a result of the Conrail acquisition, the formerly dominant east-west emphasis of Conrail has been re-oriented to both an east-west and north-south network. There are now two single-line rail systems on the Eastern Seaboard, each with lengths of haul between the southeast and northeast that are attractive rail markets for the respective rail systems. Similarly, east-west service is strong, with NS offering single-line service as far west as Kansas City and CSXT having service to St. Louis and other western gateways.

Growth in freight traffic as a result of the Conrail acquisition is expected to be greatest for intermodal traffic on the north-south routes. However, to achieve this growth, the rail infrastructure will require considerable improvements in capacity and clearances, particularly from north of Richmond, Virginia through the Philadelphia area. The NEC Improvement Project, begun in the 1970s by the Federal Railroad Administration and the states, did not have a freight operations improvement component. Freight operations were expected to decline or be routed off the corridor, such as to the CSXT line or westward through Harrisburg, Pennsylvania and Hagerstown, Maryland to the NS Shenandoah Valley route. As a result, the utility of the NEC as an artery for modern, high-clearance freight equipment has greatly declined. For example, covered tri-level automobile railcars can be operated on the NEC only between Perryville, Maryland and Newark, Delaware, and double-stack containers cannot be accommodated anywhere on the corridor. The major capacity and clearance constraints are the tunnels in the Washington and Baltimore area, and the catenary system also imposes vertical clearance constraints along much of the NEC.

The efficiency and cost of interstate rail access to the Port of Wilmington and downstate Delaware has been strongly affected by the closure several years ago of the Christina River rail-bridge on the Shellpot Branch. This route had functioned as a bypass for NEC freight traffic around downtown Wilmington and its Amtrak station, and as an access route to the port and the Edgemoor Yard. NS is in the process of repairing the bridge and restoring service on the Shellpot Branch, with financial support from DelDOT, which will especially improve rail access to the port and downstate Delaware from the northeast. CSXT does not have direct access to the port; CSXT interstate traffic destined to the port must use the West Yard interchange with the NS in Wilmington.

While the Conrail acquisition dramatically changed rail transportation opportunities along the Eastern Seaboard and in Delaware, infrastructure and capacity limitations may preclude NS and CSXT from capitalizing on new rail markets. Additional high-speed Amtrak service and proposed increases in commuter rail operations in the NEC will adversely affect local freight operations during daylight hours, as well as compress the night-operating window for time-sensitive intermodal and through freight service.

Interstate Rail Freight Characteristics

The limited sampling of businesses for a small state reflected in the CFS constrains any analysis of specific commodity data from that survey. Rail waybill data compiled by the Surface Transportation Board is the best source for data on rail commodities originating and terminating in Delaware. From that data, the top five rail freight commodities originating and terminating in Delaware for 1997-99 are shown in Table 4.2.

Table 4.2
Rail Freight Originating and Terminating in Delaware (1997 - 1999)

Commodity	Tons	%	Commodity	Tons	%
Tons Originating 1997			Tons Terminating 1997		
Chemicals	772,440	60	Coal	1,732,227	34
Nonmetallic minerals	129,040	10	Chemicals	1,217,496	24
Petroleum products	111,644	9	Transportation equipment	489,320	10
Transportation equipment	108,040	8	Food products	361,172	7
Farm products	64,388	5	Farm products	350,468	7
All other	108,965	8	All other	914,236	18
Total	1,294,517 ³⁹	100	Total	5,064,919	100
Tons Originating 1998			Tons Terminating 1998		
Chemicals	791,880	54	Coal	1,708,665	34
Nonmetallic minerals	238,600	16	Chemicals	1,070,776	21
Transportation equipment	145,744	10	Farm products	637,384	13
Petroleum products	118,420	8	Nonmetallic minerals	505,300	10
Glass and stone	75,440	5	Transportation equipment	307,296	6
All other	105,736	7	All other	853,644	17
Total	1,475,820	100	Total	5,083,065	100
Tons Originating 1999			Tons Terminating 1999		
Chemicals	750,800	56	Coal	1,370,547	27
Transportation equipment	213,920	14	Chemicals	1,246,916	24
Nonmetallic minerals	166,000	12	Nonmetallic minerals	528,588	10
Petroleum products	127,200	8	Farm products	474,285	9
Primary metal products	29,500	2	Food products	376,212	7
All other	42,736	3	All other	1,096,424	22
Total	1,330,216	100	Total	5,092,972	100

Source: Compiled by the American Association of Railroads from the Surface Transportation Board Carload Waybill Sample for 1997-99.

³⁹ The 1.295 million tons of rail freight originating in Delaware in 1997 as drawn from the Carload Waybill Sample compares favorably with the estimate of 1.012 tons by rail from the 1997 CFS, which did not include crude oil and some petroleum products.

Delaware's interstate rail freight traffic is heavily oriented to shipments terminating in the state (nearly 80 percent). Coal and chemicals are the leading inbound rail commodities, accounting for over half of the rail freight tonnage terminating in Delaware. Principal destinations for coal are the NRG Energy, Inc. and Conectiv power plants, as well as DuPont's Seaford nylon plant. The two DuPont plants (Seaford and Edge Moor) are the major recipients of inbound chemical shipments. Farm products (primarily grain destined to poultry farms) and transportation equipment (auto parts for the two assembly plants and autos for export through the port) are also significant inbound rail commodities.

Chemicals accounted for 50 to 60 percent of the rail freight originating in Delaware. Major generators of outbound chemical traffic by rail include OxyChem near New Castle and DuPont's Edge Moor plant. As indicated in Table 4.1, transportation equipment from the two auto assembly plants ranks third in originating tonnage, behind nonmetallic minerals. Petroleum products (mostly from the Motiva refinery) were consistently among the top five outbound rail commodities.

Approximately 90 percent of the rail freight traffic originating and terminating in Delaware is served by NS. Delaware shippers using intermodal trailers or containers are served from terminals in Baltimore (NS or CSXT), Philadelphia (NS or CSXT), and Harrisburg (NS), with trucks providing the short-haul connection between Delaware and the intermodal terminal.

Norfolk Southern Operations in Delaware

NS is the principal rail carrier in Delaware, directly serving nearly all coal, chemical, farm, and food shippers, and the Port of Wilmington, as well as connecting to the Maryland & Delaware Railroad Company (MDDE), the Delaware Coast Line Railroad, and the Eastern Shore Railroad. Tonnage is about evenly divided north and south of the C&D Canal. Chemical and automotive traffic is largely concentrated in the north and provides NS with high unit revenues. Lower unit revenue traffic to the south also requires more train-miles and switching. Coal destined to the NRG Energy electric-power generating station at Indian River (most of the 1.6 million tons of coal destined to the state) is a critical part of the strategic value of the Delmarva lines to NS. This high-volume traffic, while having a low rate per unit, can be handled efficiently with a unit-train operation from origin to destination without intermediate switching at classification yards, and, just as important, the efficient return of empty cars.

NS serves independent bulk transfer terminals at Edgemoor (130 car spots) and Newark (25 car spots) and operates intermodal trailer and container facilities in Baltimore, Harrisburg, and Philadelphia. The nearest NS Triple Crown Service (expedited intermodal service) facilities are in Harrisburg, from which both General Motors at Wilsmere and Daimler-Chrysler at Newark receive automobile parts by truck on a JIT inventory basis, and in Bethlehem, Pennsylvania.

MDDE is a major Delmarva customer of NS. All MDDE traffic originates or terminates in Maryland and is more than 90 percent related to the poultry industry, principally inbound grain shipments. In 2000 MDDE handled more than 5,000 carloads on its three line segments.

The NS freight service pattern is primarily as follows. A general merchandise through-train in each direction operates daily between Enola Yard, near Harrisburg, Pennsylvania, and Harrington, Delaware, with either set-offs or pick-ups of blocks of traffic en route at Newark and Dover. Weekday automotive industry trains between the Enola Yard and Newark with multi-level cars and auto parts boxcars supplement these two trains. In addition, unit coal and grain trains are operated as required between Enola Yard and points on the Indian River and Delmarva Secondary, bypassing intermediate yards. Through-train service to Edgemoor Yard operates six days a week from Abrams Yard near Norristown, Pennsylvania, using the NEC south of Philadelphia, with intermediate service to Marcus Hook, Pennsylvania. In addition, a unit stone train operates, as required, between Abrams Yard and the Indian River Secondary.

A service network of approximately 16 yard and local trains per weekday (with some daily service) provides customer service (including the Port), as well as interchange with CSXT and MDDE at three active locations, and the Eastern Shore Railroad at Pocomoke, Maryland. Newark and Harrington are principal local train bases with four locals typically on a weekday. Reybold and Delmar have three locals each. Dover, Seaford and Edgemoor have one local. Cars for the Reybold Running Track industries, such as the Motiva refinery and OxyChem, are delivered by locals from both the Newark and Edgemoor yards, the latter requiring operation on the NEC through the Wilmington passenger station without the availability of the Shellpot Secondary. A local from Newark serves New Castle Secondary industries, including the Port. The Dover local provides interchange with the MDDE's Chestertown/Centreville line. A Harrington local serves the Indian River Secondary to Frankford, including MDDE's interchange for the Snow Hill line.

Rail Freight Issues

Based on the *Delaware Freight Rail Plan Update* (December, 1999) as well as interviews with railroads, shippers, the Port of Wilmington, DelDOT, and local government officials, a number of issues were identified.

- 1. National freight rail access to Delaware is constrained by limited NEC capacity for freight traffic.** NEC limits on hours of freight operation is the principal barrier faced by NS in improving and expanding freight service to the entire Delmarva region, including the Port of Wilmington. Trip time, reliability, and freight car utilization could be significantly improved with less wait time for access to, and departure from, the region.

The principal through-freight train route for industries located on the NEC and NS lines in Delaware is via the NS Port Road Branch, linking Harrisburg, Pennsylvania, and the interlocking with the NEC at Perryville, Maryland. Freight trains are effectively restricted to the 10 p.m. to 6 a.m. operating "window" on the NEC, except in operating emergencies. The Port Road Branch, a single-track freight-only line with controlled passing sidings, carries an average of 14 freight trains per day, including Baltimore trains, according to the NS Operating Plan. On weekdays the number of freight trains is considerably higher, because 14 is an average over seven days and weekend freight trains are fewer in number. Nearly all of these trains must operate in the 10 p.m. to 6 a.m. window.

- 2. Loss of the Shellpot Secondary as a result of the Christina River Bridge closure constrains Port access and local freight service in the Wilmington area by requiring circuitous routings and increased operations under NEC constraints.** Service to Delaware industries, including the Port of Wilmington, is adversely affected to the extent that the capacity and natural function of Edgemoor Yard is not being utilized. This is particularly true for the chemical and oil industries near Delaware City, such as OxyChem and the Motiva refinery. Rail service for those industries is degraded by the need for local trains to operate on the NEC between Edgemoor Yard and the Reybold Running Track and pass through the Wilmington passenger station on the NEC. That section of the NEC has 108 passenger train movements per day, and a substantial increase in commuter trains is planned by the year 2015.

It is probable that NS will not initiate general merchandise trains on the NEC without an efficient set-off and pick-up of traffic at Edgemoor Yard. This cannot be accomplished without restoration of the Christina River swing bridge. If NS does not initiate merchandise service trains, present and potential Delaware shippers, including the Port of Wilmington, will lose the opportunity to reverse some of the adverse service effects of “demarketing” by Conrail. Shippers also would lose the opportunity to improve rail service to and from points south on the NS system that have become a single-line haul. If NS does not initiate these trains on the NEC, there would be less opportunity to divert freight traffic to rail or slow the growth of truck traffic in the I-95 corridor.

Restoring its general freight through service on the NEC, including restoring the Christina River swing bridge and service at Edgemoor Yard, would allow NS to make a connection to its Southern Tier line in New York and direct service to the North Jersey Shared Assets Area. It would also improve service between Delaware and Allentown, Pennsylvania, where connections can be made to NS service into New England and Canadian Pacific service to Canada.

A major factor in NS considerations for use of the NEC is the relatively high per-car-mile charge by Amtrak for trackage rights. To absorb this charge, rather than route all possible traffic away from the NEC, NS must find offsetting advantages. Moving its freight trains expeditiously at night on the NEC to and from northern New Jersey, while handling traffic at Edgemoor, requires that NS restore the Shellpot route. Significant car-mile savings can be had by using the more-direct NEC route rather than the NS route via Hagerstown and Harrisburg.

Restoring the Shellpot route is necessary for achieving quality rail freight service to Delaware and the Delmarva Peninsula, as well as promoting greater use of the rail mode. The proximity of Edgemoor Yard to the Port of Wilmington would have the potential to improve service and the attractiveness of the Port to potential shippers, as well as ocean and intracoastal carriers. Restoring this route also favorably alters rail access to and from Delaware and its present circumstance of being a terminal at the end of a 90-mile branch from Harrisburg. The more through-freight trains that can access Delaware rail yards, the

greater the service options across the NS network and its connections that are available to Delaware industries.

In 2002 DelDOT and NS reached an agreement for the rehabilitation and restoration of the Shellpot route. Work is expected to be completed in 2004. For a period of 20 years, NS will annually pay a usage fee to DelDOT

- 3. Delaware's freight rail system is underutilized.** While there are capacity-limiting elements in the freight rail system--such as the NEC, the out-of-service Christina River movable bridge, yard capacity, and passing sidings--the network could, under certain circumstances, handle considerably more traffic. The difficulty is in matching available rail capacity with a marketable demand for service.

One potential market would be an Iron Highway-technology intermodal service between the Chesapeake Bay Bridge-Tunnel at Cape Charles, Virginia and northern New Jersey, via the Eastern Shore Railroad, Delmarva Secondary, New Castle Secondary, and the NEC. The Iron Highway is a relatively short train, with a 1,200-foot platform and built-in ramp. The ramp splits into two parts to provide loading and unloading of highway trailers simultaneously from both sides. Twenty 53-foot trailers can be loaded or unloaded in less than one hour.

Canadian Pacific presently operates an intermodal service under the brand name *Expressway*, which is a short-haul intermodal product in partnership, rather than in competition, with common carrier trucking companies and private trucking. This service uses articulated platforms with hostler tractors for loading and unloading. Space can be reserved, with multiple departures daily between Montreal, Toronto, and Detroit.

- 4. New markets for freight rail service are constrained by the lack of industrially zoned parcels adjacent to rail lines.** In addition, many industries which typically use rail service for bulk commodities are increasingly less attractive to localities for industrial development by being perceived as environmentally unfriendly.
- 5. Weight restrictions limit some freight service on part of the Delmarva.** In 1999 NS raised the weight restriction from 263,000 pounds gross weight on rail (GWR) on that segment of the Delmarva Secondary between Harrington and Pocomoke, Maryland to 286,000 pounds GWR. The Indian River Secondary of NS connecting to the MDDE at Frankford is rated at 286,000 pounds GWR. The secondary line owned by MDDE between Frankford and Snow Hill, Maryland currently remains rated at 263,500 pounds GWR. This segment of track will need to be upgraded to 286,000 pounds GWR to accommodate the heavy unit trains of grain inbound to customers on this line segment. The State of Maryland funded engineering work to raise the state-owned line segments operated by MDDE to 315,000 pounds. This work was completed in 2003. Weight restrictions on the Eastern Shore Railroad (south of Pocomoke) have not been a source of concern because a net weight of 100 tons per car can be accommodated.

6. **The Delmarva Secondary is heavily dependent upon two businesses, unit coal train service to the Conectiv (NRG Energy, Inc.) power plant at Indian River and grain to the poultry industry. The loss of one of these would significantly alter future rail service in downstate Delaware.** If the Indian River coal traffic were lost or if the plant were to be used primarily for surge capacity, NS may reassess its strategic interests and may prefer that some or all of the Delmarva lines below the C&D Canal be operated by a regional connecting carrier. However, a regional carrier may not be capable of generating revenues sufficient for necessary capital expenditures in the long term. Thus, a source of public funds might become necessary, either to acquire properties or to fund major capital improvements. It should be noted that NS has made no statement regarding what its actions might be in the event of a loss of coal traffic to the Indian River power plant. A recent development favorable to the expansion of the NS rail traffic base is the Perdue-AgriRecycle fertilizer facility adjacent to the Delmarva Secondary, near Seaford, which has the potential to create a significant backhaul for NS grain trains.
7. **Yard constraints at Harrington and Frankford limit the efficiency of switching operations and block street traffic.** The Town of Harrington is concerned with roadways in Harrington being blocked by trains and yard switching at highway/railroad intersections. The Delmarva Secondary has four at-grade highway/railroad crossings in the Harrington downtown area (Center Street, Liberty Street, Clark Street/State Route 14 and Fairground).

When Conrail conveyed the 27-mile line between Frankford and Snow Hill to Worcester County, which in turn conveyed the line to the Snow Hill Shippers Association (now MDDE-owned), an interchange of traffic between rail carriers was created where none had existed previously. No changes to the track configuration--needed to efficiently accomplish this interchange--were undertaken. When traffic exceeds even modest volumes, the interchange is slow, inefficient, and blocks six street grade crossings in Frankford. The Mountaire Farms' grain elevators are served from an interchange track at Frankford, adding to the switching complexity and delay.

8. **Rail is not considered to be competitive for JIT deliveries.** Many industries, either because of space constraints or to reduce expenses and improve efficiency, employ JIT delivery for materials used in their manufacturing processes. The risk in using JIT is disruption to plant production if deliveries are delayed. Obviously, this places a great demand on the transportation carrier for reliability in delivery schedule. Most commodities for which JIT service is used are shipped in boxcars, if transported by rail, and often not in large quantities per shipment. Even when priority-service trains and service lanes are employed, railroads have difficulty in gathering boxcars from numerous origins and destinations and delivering the boxcars on a *consistent* schedule, not to mention a transit schedule competitive with truckload motor carriers.

Rail carriers have sought a larger share of the JIT market through the substitution of intermodal service for boxcar service. As evidence of rail's inability to provide the highest quality service in an all-rail mode of operation, the number of plain boxcars in service has declined 70 percent in the past 15 years. However, the number of specially equipped boxcars

has increased during this period, as rail carriers select specific markets in which to provide a specialized service.

The two auto assembly plants in Delaware make extensive use of JIT, employing both direct rail deliveries to their plant sites of specially equipped boxcars and Triple Crown service.

Chapter 5 – WATER TRANSPORT

Delaware has excellent international water freight access provided by the Delaware River and Bay. Considering all water freight activity between Trenton, New Jersey and the Atlantic Ocean, ports on this waterway processed 120 million tons of freight in 2000. Commerce with foreign countries (including Canada and Mexico) accounted for 64 percent of this total (76.6 million tons), while domestic commerce with other parts of the U.S. represented only 15 percent (17.8 million tons) of the total. The remaining 21 percent of the tonnage consisted of internal traffic between points within the Delaware Bay and River system. Foreign commerce was heavily oriented to imports (98 percent), with crude petroleum being the predominant commodity at 68 million tons, or 77 percent of total waterborne imports.⁴⁰

More than 75 million people – one third of the entire U.S. population – live within a 400-mile radius of the Port of Wilmington, making it the ideal port-of-import/export and distribution hub for general, dry, and liquid bulk commodities. According to a 1992 study conducted by the University of Delaware, the port generates over \$500 million annually for the state's economy.

Regional/Delaware Shipping Characteristics

The Delaware River and Bay is the most important gateway for imported oil in the northeastern U.S., accounting for 10 to 15 percent of all U.S. oil imports. There are six refineries along the Delaware River, and each refinery uses an average of 200,000 barrels of crude oil a day, representing a tanker delivery every three to four days.⁴¹ Loaded tankers may have a draw of 45 to 60 feet, while the river's channel is only 40 feet deep and some dock areas have even less depth. Therefore, some of the oil must be unloaded and barged or lightered between a deep-water anchorage for tankers off Big Stone Beach and upstream refineries and other terminals. This reduces the vessels' draught to a depth that can be accommodated by the river channel and docking areas. Barges carry the lightered oil from the anchorage to the refineries. As much as a quarter to a third of all crude oil arriving at the bay is lightered.⁴²

Domestic waterborne commerce on the bay and river is also heavily oriented to the oil industry (72 percent). Petroleum products, mostly fuel oil and gasoline, are shipped from local refineries to other states. About one-third of the domestic traffic is actually through

⁴⁰ 2000 *Waterborne Commerce of the United States, Part 1: Waterways and Harbors on the Atlantic Coast*. Waterborne Statistics Center. U.S. Army Corps of Engineers. As noted earlier, the 1997 CFS did not include shipments of crude oil and some petroleum products in its tabulations. The Waterborne Commerce statistics from the Corps of Engineers do include these commodities, which are significant for the Delaware River and Bay.

⁴¹ *Delaware Waterborne Hazardous Material Transportation Flow Study*. Prepared by the Doyle Group for the Delaware Emergency Management Agency. December, 1998. This report is a good source of information on water traffic on the river and bay and associated environmental hazards.

⁴² Interview with Olav S. Urheim, President, Delaware Terminal Company in 2000.

traffic that is transiting the bay and/or river between origins and destinations outside this area. Most of this through traffic also uses the Chesapeake & Delaware Canal, which has a channel depth of 34 to 37 feet and connects the Delaware and Chesapeake Bays. More than 4,000 annual barge trips are estimated for the canal.

The 120 million tons of freight carried on Delaware River and Bay were processed through the nine marine terminals listed in Table 5.1 that are designated as “ports” by the Corps of Engineers.

Table 5.1
Freight Tonnage for Ports on the Delaware River and Bay (2000)

Port	Freight in Millions of Tons		
	Domestic	Foreign	Total
Philadelphia, PA	14.1	29.8	43.9
Paulsboro, NJ	9.2	17.7	26.9
Marcus Hook, PA	8.9	13.7	22.6
Camden-Gloucester, NJ	2.4	2.8	5.2
New Castle, DE	5.4	3.3	8.7
Wilmington, DE	1.1	4.1	5.2
Chester, PA	0.4	1.8	2.2
Penn Manor, PA	0.1	3.4	3.5
Trenton, NJ	1.6	0	1.6
TOTAL	43.2	76.6	119.8

Source: 2000 Waterborne Tonnage for Principal U.S. Ports and All 50 States and U.S. Territories. Waterborne Commerce Statistics Center. U.S. Army Corps of Engineers.

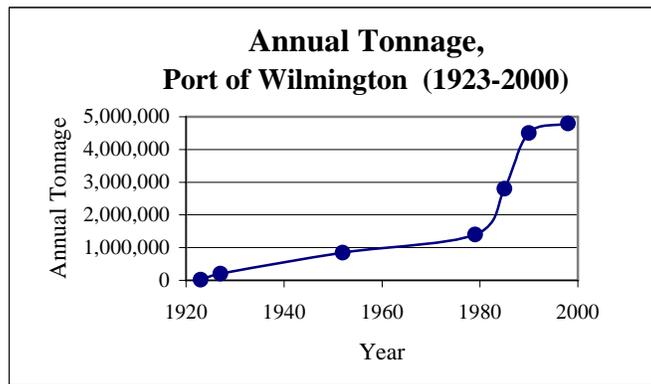
Approximately 44 million tons of freight passed through the Port of Philadelphia in 2000. This is slightly more than its nearby rival, the Port of Baltimore at 40 million tons, but far below the 138 million tons processed by the Port of New York & New Jersey. Delaware’s two ports handle 13.9 million tons, or about 11 percent, of the Delaware River’s water commerce. The port at New Castle consists primarily of dock and lightering operations for the Motiva Enterprises refinery. It handles incoming crude oil and feed stock (partially-refined petroleum). Motiva is the only refinery in Delaware.

The Nanticoke River, which empties into the Chesapeake Bay, carried 1.1 million tons of freight in 2000 with origins or destinations in Delaware. Sand and gravel was the largest commodity, followed by fertilizer, fuel oil, and grain. DuPont’s Seaford plant receives 20 barges/year of fuel oil via the river. The Corps maintains a channel 10.5 feet in depth from the mouth of the river to Seaford. The Mispillion River carried 9,000 tons freight, classified as food products.

Delaware Waterborne Freight

Delaware's water freight transportation activities are carried out along the Delaware Bay and River. The bay/river system is part of the Intracoastal Waterway that runs along the entire Eastern Seaboard and carries about 2,700 ships per year to and from several public port facilities and private industries, particularly oil refineries. The bay/river system is the second leading center for crude oil imports and petrochemical refining in the U.S., trailing only the Gulf of Mexico region

Most of Delaware's non-petroleum waterborne freight is handled by the Port of Wilmington. Founded in 1923 at the confluence of the Delaware and Christina rivers, 65 miles from the Atlantic Ocean, it is the first inbound port along the Delaware River that offers 3,900-foot marginal berthing with a 38-foot channel depth. It is a full-service deepwater port and marine terminal and has been owned and operated since September 1995 by the Diamond State Port Corporation, a subsidiary corporation of the State of Delaware. In 2000, it accommodated more than 400 vessels and nearly 5 million tons of cargo. Figure 5.1 charts annual waterborne tonnage through the port.



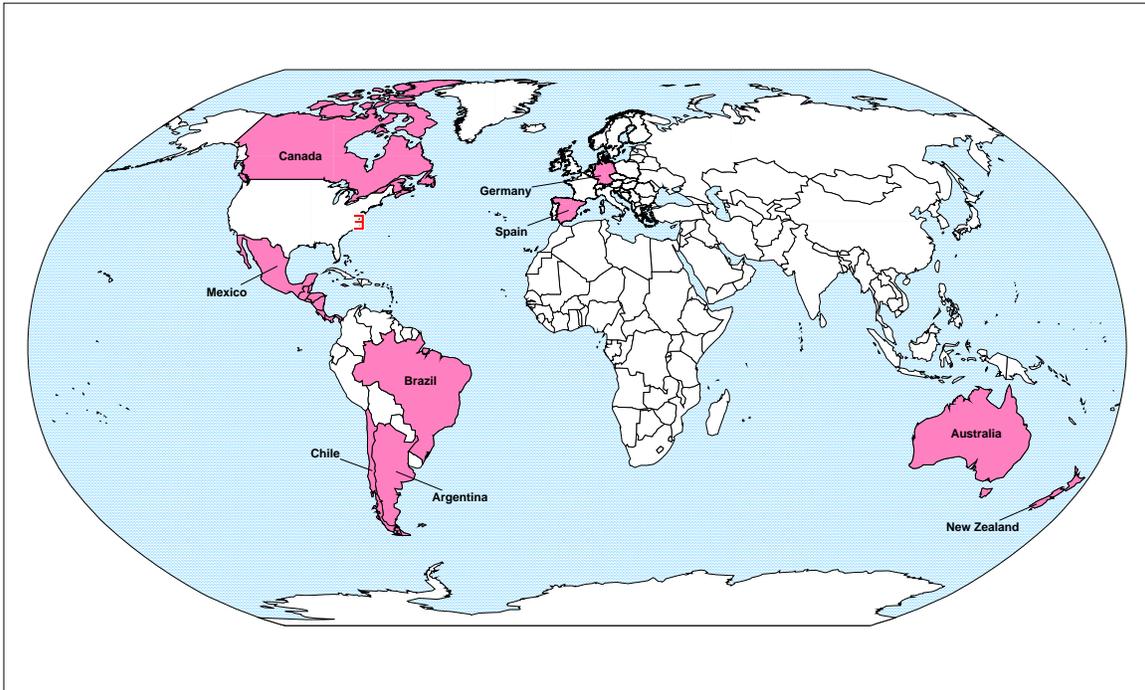
Source: Port of Wilmington

Figure 5.1: Annual Tonnage Processed by the Port of Wilmington (1923 to 2000)

The port's waterborne traffic is predominantly inbound in direction and foreign in origin. Approximately 3.9 million tons, or 79 percent, of its total tonnage is in receipts and imports, and 76 percent of these imports are of foreign origin.

The Port of Wilmington covers more than 350 acres and is readily accessible to East Coast markets by truck via I-495 and by rail via NS lines. The primary local access road is Terminal Avenue, which has an interchange with I-495 within a quarter-mile of the port. Port facilities include seven deepwater berths, a tanker berth, and a floating pier for roll-on/roll-off vessels. Loading and unloading equipment includes: two gantry cranes, each with 100-ton capacity; two 40-ton mobile container cranes; one 50-ton capacity shore-side container/bulk crane; and a bulk cargo unloader. Storage facilities include 2 million square feet of open space that is used for automobiles, steel, aluminum, and containers. In addition, the port has nearly a million square feet of warehouse space, and about 800,000 square feet of temperature-controlled terminals. These facilities accommodate importation of fruits and other perishable and frozen goods. Related

businesses at the port include 10 tenants and 18 shippers, suppliers, and service companies.

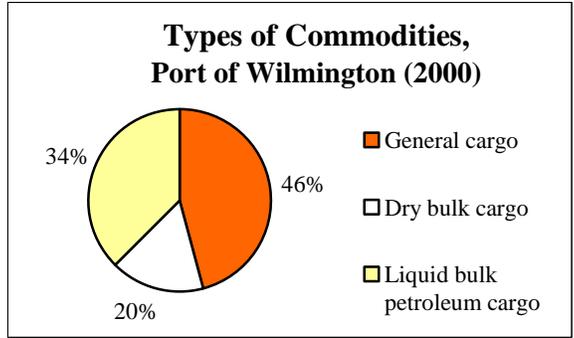


Source: Port of Wilmington

Port of Wilmington Trading Partners

The Port of Wilmington serves as a major mid-Atlantic Coast import/export gateway for a wide variety of cargoes and international maritime trades. Shipping activity includes three general types of commodities: general cargo, dry bulk, and liquid bulk (see Figure 5.2). General cargo includes fruits, frozen meats, steel, automobiles, paper products, and other containerized and breakbulk commodities. Dry bulk cargo includes salt, gypsum, and ores, while liquid bulk cargo includes concentrated orange juice, fuel oil, and petroleum products.⁴³ In 2000 1.9 million tons of fuel oil and other petroleum products were processed through the port, almost all of it by the Delaware Terminal Company, which has a 1.5 million-barrel storage facility adjacent to the port.

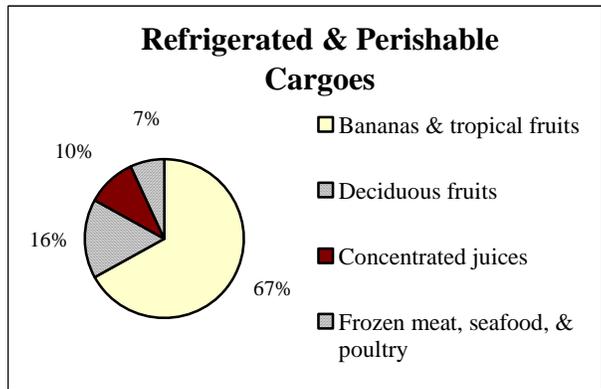
⁴³ *Port Traffic Overview*. Diamond State Port Corporation. 2000.



Source: Port of Wilmington, DE – Port Statistics - 2000.

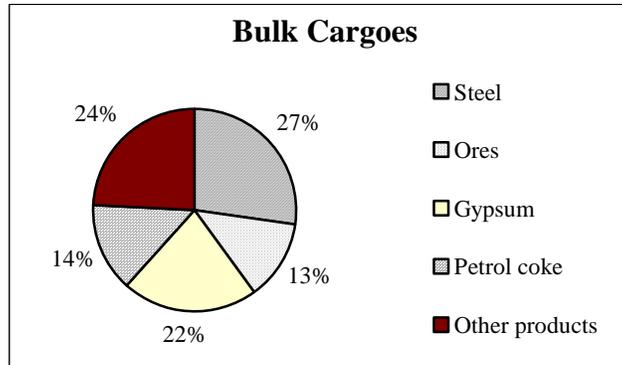
Figure 5.2: Shipping Activity at the Port of Wilmington

Imported products received at the port include: bananas and other tropical fruits; deciduous and citrus fruits; frozen and fresh juice concentrates; frozen meat, poultry and seafood; lumber, steel, paper and pulp; and salt, gypsum, petroleum products, bulk ores and minerals. Bananas account for much of the container traffic, totaling approximately 200,000 TEUs (20-foot equivalent units) in 2000. Principal export cargoes include automobiles, heavy equipment and machinery, and Kraft linerboard paper. Figures 5.3 and 5.4 illustrate the percentages of various commodities shipped to and from the port.



Source: Port of Wilmington, DE – Port Traffic Overview 2000.

Figure 5.3: Refrigerated and Perishable Cargoes Shipped to and from the Port of Wilmington



Source: Port of Wilmington, DE – Port Traffic Overview 2000.

Figure 5.4: Bulk Cargoes Shipped to and from the Port of Wilmington

The Port of Wilmington has one of North America’s largest shipside cold-storage terminals, and it ranks among the top ports worldwide for imports of bananas and tropical fruits. In addition, Wilmington is a principal East Coast port and distribution hub for import/export vehicles. It is the primary port-of-import for Volkswagens and Audis (87,000 vehicles in 2000) in the East and a leading port-of-export for American-made cars and trucks shipped by General Motors to Europe and the Middle East. Autoport, Inc. handles the export of vehicles, while Volkswagen of America, Inc. has its own facilities within and adjacent to the port for its import operations. A total of 125,000 autos were shipped through the port in 2000; about two-thirds were imports and one-third exports.

Trucks are the predominant mode for landside shipping and receiving. An estimated 400 to 500 trucks enter and leave the port daily, not counting several thousand trips per year by tank trucks serving the adjacent Delaware Terminal Company tank farm. Trucks carry most of the imported vehicles and perishable goods processed through Wilmington. Because this port serves essentially a regional market in the middle-Atlantic states (Delaware, Pennsylvania, New Jersey, New York, Maryland, West Virginia, and Northern Virginia), trucks offer the most cost-effective mode for accessing this market. Approximately 10 percent of the Volkswagens arriving by ship are transported to the Midwest (Ohio, Indiana, Illinois, and Michigan) via rail because of the greater shipping distance. Tri-level and bi-level railcars are used to ship autos and vans. The port does not have double-stack or certain tri-level rail car access, because of vertical clearance constraints on rail links in the Wilmington area.

In September 2002, Port officials inaugurated a new Auto and Ro-Ro (Roll on – Roll off) berth 900 feet offshore on the northern Port boundary, with a dedicated roadway. This berth will enable the port to capture new auto and rolling stock cargo, as well as better serve Volkswagen of America, General Motors, Volkswagen Transport, and Oslo-based Ro-Ro carrier HUAL North America, as well as shipping lines.

Waterborne Freight Issues

The previous section has described the nature of marine traffic on the Delaware Bay and River, especially the extensive transport of petroleum and chemicals. The lightering of crude oil and petroleum feed stock at the Big Stone Beach Anchorage is a special environmental hazard, with the potential for significant spills.

Aside from this issue, most of Delaware's waterborne commerce concerns center around the Port of Wilmington. A new Master Plan is in preparation, including the projection of likely future markets and the share of those markets that Port officials hope to capture.⁴⁴ The following issues surfaced during discussions with freight stakeholders, including Port staff and customers.

- 1. The Christina River requires frequent dredging, which will deplete spoil disposal sites in a few years. The trend toward larger, deep-draught vessels and deeper channel and berth requirements will exacerbate this problem.** The Master Plan calls for the development of future berths on the Delaware River side of the port, which will be easier to maintain at appropriate depths.
- 2. The Port has customers who want to grow, but there is limited space for growth; a potential expansion area is an environmental Superfund site.** The Master Plan needs assessment indicated the Port will need 14 additional acres related to its container operations, 45 additional acres for its auto operations, and 15 acres of open storage, as well as expansion of its dry and refrigerated cargo warehousing and fumigation facilities. The Plan also describes a program of property expansion to meet these needs through a combination of purchase of some parcels, possible land swaps, and the further filling and stabilization of dredge disposal areas.

⁴⁴ *Strategic Master Plan for the Port of Wilmington*. Prepared by Vickerman Zachary Miller for the Diamond State Port Corporation. June 1999.

Chapter 6 – AIR FREIGHT

Air freight carries the least amount of tonnage of the various freight modes serving Delaware. The 1997 CFS indicated that 2,000 tons of airfreight valued at \$182 million originated in Delaware. This represents 1.1 percent of the total value of all freight originating in the state in 1997.⁴⁵ Approximately 25 percent of the air freight value and 16 percent of the tonnage was in the form of shipments of less than 50 pounds. These statistics are consistent with the typical profile of air freight as being focused on time-sensitive, high-value, small shipments that warrant the higher ton-mile cost of transport by airplane.

Most of Delaware's air freight arrives or departs through the Philadelphia International Airport, with some carried through the Baltimore-Washington International Airport and Newark (NJ) International Airport. The New Castle County Airport experiences some traffic by unscheduled air freight carriers, associated primarily with inbound parts for the nearby Daimler-Chrysler and General Motors auto assembly plants. There is no scheduled air freight service into any Delaware airport.

The proximity of the Philadelphia airport and the limited size of the Delaware market mitigate against direct air freight service into Delaware airports. Nevertheless, several Delaware airports (most notably, the New Castle County Airport and Dover Air Force Base) have runways capable of accommodating large cargo aircraft. Continued economic growth, especially in downstate areas that are more distant from the Philadelphia airport, may create the market for direct air freight service into a Delaware airport.

Air Freight Characteristics

As noted, air freight service in Delaware is provided primarily through the nearby Philadelphia airport, with local pick-up and delivery by truck. Although there are nine public-use airports and one helistop in Delaware, there is no scheduled air passenger service or significant air freight movement through these facilities. The proximity of the Philadelphia airport (approximately 25 miles from Wilmington via I-95) and the limited size of the Delaware market have constrained direct commercial air service to the state. Moreover, Baltimore-Washington International Airport and Salisbury-Wicomico County Regional Airport in Maryland are within an hour's driving time of most of Delaware's population and businesses.

The Delaware River and Bay Authority (DRBA) manages three of Delaware's airports, including the state's largest – the New Castle County Airport (NCCA) southwest of Wilmington.⁴⁶ This facility covers 1,100 acres and includes three runways, two of which

⁴⁵ The limited sample of businesses reflected in the CFS constrains the statistical reliability of data on small segments of the freight universe, such as air freight.

⁴⁶ The Delaware River and Bay Authority is a bi-state agency of Delaware and New Jersey and also manages other major transportation assets in the region, including the Delaware Memorial Bridge and the DRBA Travel Center.

are more than 7,000 feet long and capable of serving large cargo planes. It includes hangar and related business-rental space, a flight school, aircraft rentals, and aircraft repair services. In 1999 NCCA accommodated 130,000 aircraft arrivals and departures, down from an estimated 188,000 operations in 1994. This is far below the airport's estimated capacity of 230,400 operations. Approximately 65 percent of the operations are for business purposes and the remaining 35 percent for recreational and other purposes. Nearby business-industrial areas offer sites for companies that need or can benefit from convenient access to business aircraft facilities.

There is no scheduled air freight service into NCCA. However, there is some air freight activity, primarily incoming freight carried by various contract air carriers. This freight consists primarily of JIT shipments of auto parts for the nearby Daimler-Chrysler and GM-Saturn auto assembly plants and averages about 50,000 pounds per week. Most of the shipments are small (less than 10,000 pounds), but occasionally a planeload of auto parts may arrive, totaling 60,000 pounds in one shipment.⁴⁷

The DRBA also operates two downstate airports in the Dover area: the civil air terminal (closed since September 11, 2001) at Dover Air Force Base and the Delaware Airpark in Cheswold. Dover Air Force Base is the largest aerial port on the East Coast. The Air Force's largest cargo planes operate to worldwide destinations from this airport. It has two runways, the longest of which is 12,900 feet long. Until September 11, 2001, as part of a joint-use agreement with DelDOT, up to 13,000 civilian aircraft operations per year were allowed to use the base via the Civil Air Terminal. Current civilian operations have been well under that constraint, with the current security requirement that Prior Permission Requests be filed and approved. Kent County has developed a 115-acre industrial-business park (Kent County AeroPark) adjacent to the Civil Air Terminal to attract aviation-related businesses.

In August 2000 the DRBA began managing the Delaware Airpark in Cheswold for the State of Delaware. The existing 3,780-foot runway will be lengthened to 5,000 feet over the next two years. This extension will increase its potential use by business aircraft, including possible JIT air freight operations. Delaware Airpark has capacity for 145,500 operations, but present use is far below that level.

The principal airport in the southern third of the state is the Sussex County Airport near Georgetown. This facility has two runways, the longest of which is a 5,000-foot paved runway. Its estimated capacity is 171,000 annual operations. An adjacent business-industrial park provides sites for aviation-related businesses.

Other Delaware aviation facilities with paved runways include the Summit Airport, with a 5,000-foot runway just north of Middletown (capacity: 172,900 operations), and the Chandelle Estates Airport, with a 2,500-foot runway northeast of Dover (capacity: 45,200 operations). All other airports are turf runways, suitable only for light planes.

⁴⁷ Interview with Raymond Anderson of Dawn Arrow Aviation, fixed-base operator of New Castle County Airport.

Air Freight Issues

The growth of pharmaceutical and high-technology industries in Delaware will increase the demand for air freight service, because both the raw materials used by these industries and the products they produce are costly and can be shipped in relatively small lots and parcels. They are able to bear and pass on to consumers the higher costs associated with the use of air freight. The key question for freight planning in Delaware is whether local air freight business will grow to the point of making it desirable for air freight carriers, such as Federal Express and UPS, to fly directly into Delaware airports. This key question is reflected in the following issue statements developed as result of interviews with air freight stakeholders.

- 1. Proximity to Philadelphia International Airport limits the potential for air freight activity at Delaware airports.** NCAA has good facilities, excess capacity, and good access to I-95 and Delaware's major highway system. If highway and air traffic congestion increases around the Philadelphia airport, there may be more pressure on local businesses and air freight carriers to avoid potential time loss and schedule uncertainty by initiating service out of NCCA. The state and (most notably) the Delaware River and Bay Authority, which operates the NCCA, should continue to market the assets of NCCA to existing and prospective businesses to whom air freight service is important.

- 2. The downstate or Delmarva market may not be big enough to support the development of air freight service at Dover Air Force Base's civil aviation facility.** This is another location for which the market for air freight service must be monitored to determine when a threshold demand may warrant such service. DEDO and DRBA, in association with Kent and Sussex counties, are the key players in this process.

Chapter 7 – INTERMODAL FREIGHT TRAFFIC

Intermodal transportation in Delaware has long existed in fact, if not in name. Intermodal freight transportation is customer-driven so that the inherent efficiencies of each mode can be realized for the benefit of customers' business processes, whether the commodity is bananas from Central America, dry bulk minerals from the Bahamas, or auto parts from Ohio. Agents of change that drive the evolution in this mode of transportation include global trading patterns, technology improvements (including materials handling, computerization and Internet business processes), and the regulatory/deregulatory environment. Nevertheless, intermodal transportation must be responsive to the customers' service needs at a price the customer will pay and that will earn an adequate return for the service providers.

An intermodal terminal is a point of interchange between freight modes, where freight is transferred from one mode to another (rail to truck, ship to rail, etc.). Intermodal business requires the cooperation of freight carriers, shippers, and intermodal marketing or logistics companies, working together to provide the most efficient and cost-effective movement of freight. Intermodal shipments involving rail service must generally be over 500 miles in length in order to capitalize on rail's favorable line-haul costs and to outweigh intermodal terminal and transactions costs. There must also be a sufficient volume to warrant frequent trains on service-competitive rail routes, which means that intermodal service is usually found in high-volume corridors between major urban regions.⁴⁸

Intermodal opportunities in Delaware associated with the Port of Wilmington, railroads, and trucking are discussed in the following sections.

Intermodal Transportation in Delaware

The purpose of intermodal freight transportation is to capitalize upon the inherent efficiencies associated with individual modes by linking the most efficient modes in a seamless, continuous origin-to-destination shipment to serve a particular freight movement. Seamless freight movements result in a single freight bill that the shipper can use to both monitor the traffic movement and efficiently process payment and/or loss and damage claims. The following discussion focuses primarily on intermodal transportation where the intermodal transfer *occurs in Delaware*. For example, although they are important, traffic moving by truck between points in Delaware and the Packer Marine Terminal at the Port of Philadelphia; NS's intermodal terminals in Harrisburg and Bethlehem, Pennsylvania, and Baltimore, Maryland; CSXT's auto distribution terminal in Twin Oaks, Pennsylvania; or CSX Intermodal's terminals in Philadelphia or Baltimore are not the primary focus of this intermodal discussion.

Port of Wilmington

⁴⁸ Frank R. Harder. "MPOs and Railroad Intermodal Terminals: Successful Development Strategies". *Transportation Quarterly*. Vol. 53, No.2, Spring 1999.

The Port of Wilmington is Delaware's most significant intermodal facility. It accommodates the transfer of waterborne freight between ships and landside rail and truck modes. As noted earlier, trucking is the predominant landside mode, with some 400 to 500 daily truck trips. Rail service is provided by NS, which transports steel and paper into the port and hauls wallboard and some Volkswagen autos from the port (about 10 percent of the Volkswagens passing through the port). NS has no container or trailer-on-railcar service at the port.

The port has proven to be a durable competitor in its chosen markets, given both the aggressiveness of port competition, the relative mobility of ship lines' assets for redeployment to other ports, and shippers' options. The Port of Wilmington is projected to increase its market share, provided the required investment in infrastructure expansion and maintenance is made and adequate channel depth is provided.

Rail intermodal activity is constrained by several factors. These include limitations on rail access to the port (and to Delaware, in general) related to the NEC's limited freight service hours and vertical clearances, as well as the port being served by only one (NS) of the two major eastern rail carriers. Because not all potential rail traffic at the port is necessarily remunerative to NS, the revenue requirements of one or more potential, participating rail carriers can cause freight traffic to move by other logistical arrangements. For example, General Motors vehicles destined to the Port of Wilmington for export are transported by truck from CSXT's Twin Oaks, Pennsylvania, rail terminal to the port's auto processor, rather than using an all-rail route involving a transfer from CSXT to NS. Presumably, the revenue requirements and possibly the service levels of both NS and CSXT for providing an all-rail route would not be acceptable to shippers.

Trucks provide landside transport for all container traffic (mostly bananas) that is imported through the port and for most of the imported autos (Volkswagens and Audis). NS serves 22 multi-level railcar spots at the port that are used primarily to ship Volkswagens to the Midwest. CSXT does not directly serve the port; autos are transported to or from the CSXT auto terminal at Twin Oaks by highway.

Volkswagen will soon initiate a new intermodal service using new freight technology to ship Audis imported through the Port of Wilmington to Washington State. Auto-stack intermodal containers, each carrying 4 to 5 autos, will be trucked from Wilmington to Baltimore, where they will be placed on rail cars to become part of a run-through train to Tacoma, Washington. The unit train will also carry other commodities in its 3-day trip to the West Coast, cutting 6 days from the alternative route trip time of going through the Panama Canal. A logistics broker will arrange the transport and supply the containers, which will be used to haul other merchandise on the return trip from the West Coast. Equipment to load and unload the containers at the port will be supplied by a contractor.

Rail Intermodal

No railroads operate terminals in Delaware for the intermodal transfer of either containers or trailers. Both NS and CSXT have terminals in Philadelphia and Baltimore.

NS also has a terminal in Harrisburg at the former Rutherford Yard, which also handles NS's Triple Crown Service (RoadRailer® technology) in addition to highway containers and trailers. General Motors in Wilmington, Daimler-Chrysler in Newark, and other Delaware shippers use the Harrisburg Triple Crown Service.

For dry bulk commodities, CSXT operates a TransFlo® dry bulk transfer terminal at its Wilsmere Yard on Centerville Road in Wilmington. This multi-commodity facility has 200 car spots. In one of the largest intermodal movements in Delaware, more than 5,000 annual truck trips, or 20 trips per weekday, are made to haul ilmenite ore between the CSXT facility and DuPont's Edge Moor Plant. This ore, which comes from mines in Florida, is a raw material used in making titanium dioxide at the Edge Moor Plant.

NS serves two independent dry bulk transfer terminals in Delaware. One is a 130-car-spot facility at Edgemoor. The other is a 25-car-spot facility at the Harmony Industrial Park in Newark. NS intermodal service in Delaware also includes service to independent distribution centers, where freight is transferred directly to trucks or temporary storage facilities. These facilities and their locations are described in Table 7.1.

Table 7.1
NS Intermodal Service to Independent Distribution Facilities

Facility Type	Location
Lumber Reload	New Castle - Terminal Avenue Wilmington - Ludlow Industrial Park
Steel Distribution	New Castle – Pigeon Point Road
Paper Distribution	Newark – Harmony Industrial Park
Warehousing	Milford – SR 14 New Castle – Terminal Avenue New Castle – Dock View Drive New Castle – Pigeon Point Road Newark – SR 2 Newark – Harmony Industrial Park Wilmington – Christiana Avenue Wilmington – Ludlow Industrial Park

Source: Norfolk Southern

The Delmarva poultry industry is a major importer of feed grains by rail from the Midwest; about 85 percent of the grain used by the industry is obtained in this manner, with the remainder coming from local farms on the Eastern Shore by truck. The Midwest grain is delivered to Delaware feed mills in Millsboro, Frankford, and Delmar by 50-car grain trains. In 2000, approximately 850,000 tons of grain were terminated by rail in Delaware. Grain for the Millsboro mill is transferred from rail to truck at the Gravel Hill intermodal facility on the Delaware Coast Line Railroad. The Frankfort and Delmar mills have direct rail access. Feed produced by the mills is then distributed by truck to poultry farms, primarily in Sussex County and to a lesser extent in Kent County, as well as to nearby Maryland and Virginia.

A significant part of rail freight traffic that terminates in Delaware has a local intermodal movement. These commodities include nonmetallic minerals, feed grains, chemicals, lumber, steel, and paper. In northeast Wilmington, about 5,000 dump trucks/year of nonmetallic ore are transported between the CSX TransFlo® terminal and the DuPont Edge Moor white pigments plant (a distance of about 3 miles). In Sussex County about 4,000 to 5,000 truck trips/year transport grain between Mountaire's (formerly Townsend's) Gravel Hill unloading site on the Delaware Coast Line Railroad and the Millsboro feed mill (a distance of about 9 miles). As noted earlier, NS serves two independent bulk distribution centers in Delaware at Edgemoor Yard and Newark in addition to lumber, steel, and paper distribution warehouses, primarily in New Castle County.

Rail intermodal transportation of containers is the fastest growing market segment in the country for the railroad industry. To a large extent, this growth has been driven by international trade and opportunities for efficient, double-stack train service with very long hauls between terminals. Delaware is essentially surrounded by rail intermodal container terminals. The likelihood of either NS or CSXT locating a conventional intermodal terminal in Delaware is small in the foreseeable future. However, the potential volume of Triple Crown RoadRailer service to the GM and Daimler-Chrysler plants merits an examination of the potential of locating a Triple Crown terminal near Newark. This would reduce the volume of line-haul highway movements between Harrisburg and Wilmington/Newark and the associated, adverse community impacts of this truck traffic. For Daimler-Chrysler in particular, the prospect of a Triple Crown terminal at Newark Yard has the potential to reduce trailer traffic on local roads in the Newark area.

Intermodal Freight Issues

As a result of interviews with a wide range of stakeholders, including shippers who make the actual purchase of transportation services, the following issues have been identified.

- 1. NEC constraints on freight rail traffic result in increased truck traffic, which adversely affects communities.** The NEC constrains freight operations in the form of hours of access, as previously described. These limitations reduce both the competitiveness of rail transportation and the marketability of a container intermodal terminal in the proximity of major truck users, such as Daimler-Chrysler and General Motors. These limitations also constrain the operation of premium service intermodal trains to and from Delaware. This fact, combined with the proximity of NS and CSXT intermodal terminals in Pennsylvania and Maryland, makes it difficult, if not impossible, to divert truck traffic to the rail network in Delaware.

Two scenarios that could benefit Delaware and local communities would be to extend the NS' Triple Crown Service (TCS) from Harrisburg, Pennsylvania to Newark, and to introduce TCS on the NEC, with terminal service at Newark. Because both Daimler-Chrysler and General Motors assembly plants already use the Harrisburg TCS terminal, the service extension may be viable, if sufficient terminal space can be

made available at Newark, and a Newark “block” of containers can be efficiently assembled within the TCS terminals network. One means by which terminal space may be made available at Newark is to restore Edgemoor Yard as the regional industrial support facility in conjunction with restoration of the Christina River swing bridge.

Improving the NEC’s capacity for freight service is essential for the expansion of premium quality intermodal rail service for Delaware industry. Incorporation of Freight Rail Plan recommendations for capacity improvements is a necessary first step.

2. **Problems with rail service reliability as a result of the CSXT/NS acquisition of Conrail, have caused a shift of freight transport to trucks, resulting in increased truck traffic and adversely affecting communities.** Restoration of service reliability levels that existed before the Conrail acquisition is a continuing and largely achieved goal of NS and CSXT. However, it may take considerably longer for the railroads to recover lost business that shifted to trucks. Increasing rail’s market share, particularly with the Port of Wilmington and the automotive industry, will require capacity improvements, such as those defined in the next chapter of this report.
3. **Delaware has no trailer on flatcar/container on flatcar (TOFC/COFC) terminal, which hinders the most effective use of rail and truck modes and encourages long-haul truck traffic.** Delaware shippers using intermodal trailers or containers are presently served from intermodal terminals in Baltimore (NS or CSXT), Philadelphia (NS or CSXT), and Harrisburg (NS). NEC freight operating constraints and the proximity of these terminals to Delaware weigh against locating an intermodal terminal in Delaware for the foreseeable future. Port of Wilmington officials do not envision a need for double-stack service at the port for container customers (mostly banana importers). Such a terminal conceivably could be owned and operated by a third party.

In the near term, the NS Triple Crown RoadRailer service, which is not encumbered with weight or clearance restrictions, may have the traffic volumes and market potential to justify a terminal in Delaware. Newark would be a prime location to consider for such a facility. Improvement of NEC freight capacity is essential for the expansion of premium-quality intermodal rail service for Delaware.

4. **The Port of Wilmington is served by only one railroad company, which could limit its access to potential markets.** At present, only NS serves the port, although an interchange between CSXT and NS is available at West Yard in Wilmington. This interchange has a clearance restriction at the NEC underpass, precluding the interchange of tri-level rail cars. Nevertheless, the existence of a physically unrestricted interchange does not guarantee a commercially unrestricted interchange between carriers. The economic effect on port customers is that transportation expenses are higher, because a switching charge per car by NS is incorporated into the total rail charges. That would not be the case if CSXT served the Port directly.

Port customers are not denied access to potential markets by the lack of direct rail service by more than one carrier; however, the cost of transportation service to those markets is disproportionately higher because of switching charges.

Chapter 8 - RECOMMENDED PLAN OF ACTION

This chapter begins with a review of the goals and strategies that should guide freight planning and investment in Delaware over the next 25 years. It describes how freight goals and strategies are linked directly to overall statewide transportation and economic goals and strategies. This linkage is to ensure consistency of freight plans and improvements with other infrastructure plans and investments. The next section provides a long-term vision of what Delaware's freight and goods movement system should look like in 2025 and how it should function. The final sections describe proposed freight improvements and investments that will be needed to achieve the vision.

Goals and Strategies

DelDOT's *Statewide Long-Range Transportation Plan* set forth three basic goals relating to transportation system safety, efficiency, and support of the state's economic and environmental well being. These same goals can be adapted to guide freight planning and investment:

- Provide a safe *freight* transportation system that sustains or improves 2000 levels of freight access and mobility;
- Support the state's economic well-being, while remaining sensitive to environmental needs and concerns; and
- Achieve efficiency in operations and investments on the *freight* transportation system.

Because DelDOT directly controls only one portion of the freight transportation system in the state (albeit a huge one), extensive cooperation and forging of partnerships with private sector freight carriers, shippers, and industry, as well as local governments, will be needed in working toward these goals. DelDOT policies and investments can help to leverage private investments and working relationships, thereby magnifying the positive contributions of state action.

The most important part of the *Statewide Long-Range Transportation Plan* was a set of seven strategies to keep Delaware on a path toward its goals over the next 25 years. These strategies concerned the total transportation system, and are further refined in this chapter of the Technical Report in terms of their freight implications. Table 8.1 indicates the correlation between general transportation and freight strategies. A further description of the freight strategies is summarized below and detailed in the following sections.

Table 8.1
Relation of Strategies for Freight and Goods Movement in Delaware to
Transportation Strategies from the Statewide Long-Range Transportation Plan

Transportation Plan Strategies	Freight and Goods Movement Strategies
1. Direct transportation investments to support the growth management goals of the counties and best use transportation services and facilities.	<ul style="list-style-type: none"> • Improve freight and goods movement facilities and modal options to support state and local economic growth policies – focusing growth on freight centers to control sprawling development.
2. Better coordinate transportation and land use.	<ul style="list-style-type: none"> • Include freight and goods movement planning as part of transportation impact studies and long-range transportation plans by MPOs and local communities.
3. Expand the number of travel choices available.	<ul style="list-style-type: none"> • Provide modal options and stimulate modal competition for freight and goods movement, especially in major freight corridors. • Develop safe, efficient, and convenient intermodal connections between freight modes to promote seamless goods movement.
4. Capitalize on new techniques to increase the efficiency of transportation services and facilities.	<ul style="list-style-type: none"> • Apply advanced technologies in the planning and design of freight transportation facilities and services. • Coordinate freight and goods movement planning with DelDOT’s Intelligent Transportation Systems (ITS) program.
5. Emphasize preservation of existing transportation facilities as a top priority.	<ul style="list-style-type: none"> • Where warranted by existing economic development and system usage or by projected development opportunities, upgrade and maintain the existing freight infrastructure to a state of good repair.
6. Manage existing transportation services and facilities to get the most efficient and safest use from them.	<ul style="list-style-type: none"> • Plan and implement projects to preserve, enhance, promote, and make the most efficient use of existing facilities that support goods movement, such as major truck routes, the Port of Wilmington, rail infrastructure, and airports. • Coordinate freight and goods movement planning with DelDOT’s transportation safety programs. • Seek to reestablish local rail freight service in selected areas and strengthen the role of short-line operators. • Cooperate with adjacent states in freight and goods movement planning for major corridors (including I-95 and the NEC), rail freight lines, and commercial vehicle operations. • Use strategies and techniques, such as tolling, access management, and truck route designation, to direct commercial vehicles to interstates and other major highways.
7. Appropriately expand transportation facilities and services within a multimodal framework that supports economic development and the redevelopment of existing communities and respects environmental and agricultural needs.	<ul style="list-style-type: none"> • Emphasize freight and goods movement options that support growth and redevelopment in existing communities and designated growth areas. • Support compatible economic development along existing rail lines through strategic investments in sidings, transfer facilities, and other improvements.

Improve freight and goods movement facilities and modal options to support state and local economic growth policies of focusing growth on freight centers.

Delaware's economic future, as supported by state plans and growth policies, is trending toward more growth in services, finance, wholesale and retail trade, distribution, pharmaceuticals, and high technology businesses.

The freight implications of growth in these sectors will be an emphasis upon flexible, efficient, and timely pick-up and delivery of non-bulk, high-value commodities. This means more business for air freight and trucking, and a requirement for railroads to improve the speed and reliability of their service if they are to compete with trucks for even a share of the express package and JIT freight market. Rail system bottlenecks, such as constrained freight capacity on the NEC and the CSXT interchange at West Yard, compromise rail's ability to compete in this market and limit the quality of service it can provide to traditional rail markets such as bulk shippers.

Include freight and goods movement planning as part of transportation impact studies and long-range transportation plans by MPOs and local communities.

While accommodating the through movement of freight is an important element in long-range transportation planning, facilitating local freight movement and distribution may be a more important role for MPOs and local communities to play in their planning processes. Much of the delay encountered by trucking and airfreight firms is within 2 to 3 miles of freight trip origins and destinations. Transportation impact studies can help to define effective approach and departure routes that avoid sensitive areas and ensure that appropriate roadway design factors are applied to produce safe and efficient truck movements.

Provide modal options and stimulate modal competition for freight and goods movement, especially in major freight corridors.

Railroads can and must be strengthened in Delaware to provide a viable modal option to the ever-increasing truck traffic, particularly in corridors and areas where high truck volumes may already be posing both capacity and community impact problems, as in the Newark and Hockessin areas. However, this will require both the elimination of key rail bottlenecks and physical/operating constraints within Delaware and improved rail service reliability relative to broader rail system conditions outside the state. The development of effective, strategically located intermodal terminals in Delaware could also be a key factor in improving rail's competitive posture.

Facilitate safe, efficient, and convenient intermodal connections between freight modes to promote seamless goods movement.

Lack of effective intermodal facilities in Delaware is a deficiency in the state's freight system that could loom large in the future of the Port of Wilmington and the railroads. The port depends on an effective intermodal interchange between waterborne and

landside (rail and truck) freight modes. Projects in the port's master plan will improve on-site intermodal facilities, but off-site improvements to rail and truck access will be needed as well. At present, not all freight modes are being used to their best advantage, especially rail. Dover Air Force Base may represent a future opportunity to bring direct air freight service to downstate customers, possibly as part of a domestic and international air freight distribution center.

Apply advanced technologies in the planning and design of freight transportation facilities and services.

The application of intermodal technologies, such as RoadRailer and Iron Highway/*Expressway* service, can improve the efficiency and performance of long-haul rail and related truck freight service. ITS improvements to facilitate traffic flow and reduce highway congestion represent another area where new technology can enhance freight service.

Coordinate freight and goods movement planning with DelDOT's ITS program.

The ITS program will provide better real-time and projected information on traffic conditions to freight carriers and shippers that will help to improve freight system operations and reliability. Coordinated traffic signal systems, with the ability to quickly change signal timing patterns in response to, or in anticipation of, changing traffic conditions, will greatly facilitate truck freight movement in areas prone to congestion. Weigh-in-motion and electronic credentialing and record checking will also reduce delay for trucks by eliminating needless enforcement stops.

Where warranted by existing economic development and system usage or by projected development opportunities, upgrade and maintain the existing freight infrastructure to a state of good repair.

Preservation of existing transportation facilities is a top priority in the *Statewide Long-Range Transportation Plan*. Transportation rights-of-way are valuable resources, because existing land development and environmental concerns make it extremely difficult to create new rights-of-way. Existing rights-of-way should be preserved, even though their future transportation use may change. DelDOT has a long-standing commitment to the preservation of existing rail lines, which has extended to the purchase and maintenance of two lines. These freight facilities must be maintained to industry standards if they are to be useful in attracting new economic development.

Plan and implement projects to preserve, enhance, promote, and make the most efficient use of existing facilities that support goods movement, such as major truck routes, the Port of Wilmington, rail infrastructure, and airports.

Making the most effective use of existing transportation infrastructure is a cornerstone of the *Statewide Long-Range Transportation Plan*. This strategy recognizes the high cost and potential disruptive community impact of creating new rights-of-way and

infrastructure and focuses on better management of existing freight facilities. Fortunately, Delaware doesn't need to develop a new port; it simply needs to optimize the investment in the existing port through expansion and enhancements. Similarly, proposed improvements to major truck routes and the rail system can be made primarily within existing rights-of-way.

Coordinate freight and goods movement planning with DelDOT's transportation safety programs.

Points of interface between safety and freight programs include the permitting and routing of hazardous materials and wastes, rail-highway grade crossing control, monitoring of safety conditions and practices for railroads and airports, regulation and enforcement of oversize and overweight vehicle transport, and other highway safety programs affecting commercial carrier operations. Freight infrastructure improvement proposals should be assessed for their safety implications for the general public and for groups living or working near or directly involved in the freight activity.

Seek to reestablish, improve, and expand local rail freight service in selected areas and strengthen the role of short-line operators.

This strategy is consistent with other strategies to make maximum effective use of existing freight facilities, provide modal options, and support economic growth policies. Coordination with rail preservation efforts by the State of Maryland will be important, because three short-line routes extend into Maryland from the Delmarva Secondary and draw virtually all of their traffic from Maryland businesses. DelDOT must work proactively with DEDO, NS, the short-line systems, and local governments in marketing rail service to potential new customers. Industries that would generate freight for back-haul out of Delaware would be especially useful in strengthening rail service.

Cooperate with adjacent states in freight and goods movement planning for major corridors, rail freight lines, and commercial vehicle operations.

DelDOT should continue working with the I-95 Corridor Coalition, Amtrak, NS, CSXT, and adjacent states on promoting through-freight operations and ensuring continuity in regional freight routes and service. There is a need for long-range contingency planning for the rail system for the entire Delmarva Peninsula to consider the effects of the loss of key rail customers upon the viability of rail service in the region.

Use strategies and techniques, such as tolling, access management, and truck route designation, to direct commercial vehicles to interstates and other major highways.

All three states abutting Delaware have some form of statewide truck route designation that has been mapped to inform commercial carriers about route characteristics and operating and physical constraints. Delaware should develop a similar approach to providing information to truckers about favorable truck routes and restricted sections and should ensure that its major truck corridors are consistent and provide continuity with

those in adjacent states. Toll policies on SR 1 and I-95 should be continually reviewed to ensure equity with toll facilities in adjacent states and to be sure the toll facilities are accomplishing the objective of attracting and serving truck traffic.

Emphasize freight and goods movement options that support growth and redevelopment in existing communities and designated growth areas.

Proposed port and rail system improvements in New Castle County will support growth and redevelopment in established growth areas north of the C & D Canal, as well as enhance downstate rail freight service. Virtually all proposed improvements to the freight system fall within these “multimodal” or “management” transportation investment areas.

Support compatible economic development along existing rail lines through strategic investments in sidings, transfer facilities, and other improvements.

Relatively low-cost improvements can enhance the attractiveness of sites to new development along rail lines and strengthen the position of existing customers. For example, DelDOT may be able to assist the poultry industry in the possible development of extended sidings at feed mills to accommodate longer grain trains. Working with DEDO, the railroads, and local governments, DelDOT could make other freight-related improvements to assist new industries in capitalizing on rail corridor sites.

Freight Vision Plan

What should Delaware’s freight system look like in 2025 and how should it function in order to best satisfy the goals set forth in the preceding section? The following statements describe a freight vision for Delaware:

- A seamless freight system serves the state in which each mode performs the service function for which it is best suited. New terminals and the initiation of new operating policies and agreements among freight carriers, their customers, DelDOT, and other relevant public entities, enabling the intermodal flow of goods, utilizing the inherent advantages of each mode.
- Delaware’s rail infrastructure has been revitalized through (a) provision of a new track on the NEC that is devoted primarily to freight, (b) restoration of the Christina River rail bridge, (c) return of through-freight service to the Shellpot Secondary, (d) upgrading of existing rail service throughout the state in terms of quality and reliability, and (e) intermodal terminal development.
- The Port of Wilmington has excellent water, highway, and rail access through (a) rail system improvements that allow tri-level and double-stack access, (b) major road and land use improvements in the immediate vicinity of the port that facilitate truck movements between the port and I-495 and provide a comprehensive truck service facility, and (c) on-site port improvements that provide deeper berths on the Delaware River, port expansion space, and a more efficient internal circulation system.

- Trucks move efficiently over a statewide system of major truck corridors with appropriate connections to principal freight generators. The trucking industry is informed as to the characteristics of the state's highway system and the ability of each part of the system to accommodate trucks of different sizes and weights. Real-time traffic data is available to truckers in their vehicles, as well as assistance in identifying alternative routes to avoid congestion.
- Through the design of new highway facilities and the upgrading of design characteristics of older, problem locations, trucks are moving more smoothly and safely through intersections and interchanges on Delaware's highways with less damage to trucks and to highway signs, curbs, traffic islands, and pavements.
- Motor carriers take advantage of streamlined electronic registration and credentialing of trucks and make fewer stops for roadside inspections because of interstate and interagency sharing of records.
- A coordinated system using weigh-in-motion stations and portable scales are employed to enhance truck weight and safety enforcement.
- An air freight distribution center at Dover Air Force Base has stimulated the location of several new industries in central Delaware that rely on JIT deliveries and extensive use of domestic and international air freight service.
- A proactive joint transportation and economic development initiative has brought new industry and business to downstate railroad corridors, strengthening the position of short-line operators and creating new jobs and tax revenues.

This vision is clearly within reach over the next 25 years. The required capital investments are not out of reason and the implementation requirements are not insurmountable. The following sections describe a program of freight-related actions and initiatives to achieve this vision.

Proposed Motor-Carrier Freight Improvements

Classify roads according to their ability to safely accommodate vehicles of various sizes and weights, sign and enforce restrictions on roads with severe safety and operating constraints, and map the system for broad distribution to the public and trucking industry. There is a need in Delaware to define an expanded system of roadways that will be improved, where necessary, and maintained to safely accommodate commercial vehicles of various sizes and weights. The objective is to smooth the progress of freight and goods movement and to stimulate commerce, while at the same time ensuring that public safety and the quality of life of adjacent communities are protected. The principal steps in implementing this recommendation are:

1. Inventory the existing highway system and identify physical factors and conditions that may constrain the safe operation of commercial vehicles. Of particular concern are lane widths, pavement and bridge load restrictions, vertical and horizontal

clearance constraints, vertical and horizontal curvature, and shoulder availability and width.

2. Identify existing major truck corridors throughout the state. This will require an extensive program of vehicle classification counts on all routes that are known or thought to have significant truck volumes. This should include local connectors to major generators of truck traffic, such as terminals and major industries.
3. Based upon the results of the preceding tasks, classify all state roadways as to their *existing* ability to accommodate safely 102-inch twins and 102-inch 48- and 53-foot semitrailers and trailers. Also, identify those sections that could have limited approval for vehicles that are 102 inches in width, but for which length restrictions may be appropriate. Desirably, 102-inch twins and 102-inch 48- and 53-foot combinations should not be allowed on roadways having travel lanes that are less than 10 feet wide. Roadway sections and bridge locations with restrictions resulting from load limits, clearance constraints, or unique environmental or scenic concerns should be identified and mapped in concert with the roadway classifications described above.
4. The mapped existing conditions and classifications should be compared to the network of major truck corridors defined in task 2 to identify roadway sections and structures in major truck corridors that cannot accommodate STAA vehicles. These sections are candidates for capital improvements that would eliminate the operating constraints and allow the safe operation of large trucks and combinations throughout the system of major truck corridors.
5. Route sections on which trucks of a certain size or combinations should not be allowed to operate should be posted in the field and the restrictions enforced by state police and local law enforcement personnel.
6. Maps of the classified route system should be mass-produced for wide distribution to the trucking industry and other interested parties. The maps could include other information on state regulations affecting truck operations in Delaware, as well as information on the location of public truck rest areas and private truck stops.

Identify communities where bypasses may be warranted because of through truck movements and initiate project planning studies. To improve freight movement in designated major truck corridors and to reduce adverse community impacts, bypasses may be warranted for some communities. By focusing on routes that are part of the system of major truck corridors, improvement priorities can target projects that will produce the greatest benefit in easing truck movements and relieving community pressures and impacts. Factors that should affect improvement priorities include the volume of through trucks that would be diverted to a bypass and the amount of relief (e.g., improved level of service, reduced noise levels, etc.) that would accrue to the old route as a result of building a bypass.

As noted in Chapter 3, the problem of truck traffic in upstate communities, such as Newark and Hockessin, may not be amenable to a bypass solution, because extensive land development and environmental concerns will make it difficult to find acceptable new route alignments. Solutions that rely on new highway construction are also

constrained by the fact that the truck traffic in question (trucks moving between Delaware and Pennsylvania) is dispersed among three routes in Delaware – SRs 7, 41, and 896. Two of these routes (SRs 7 and 41) merge into one route (PA 41) just across the state line in Pennsylvania to form the most significant truck corridor, where commercial vehicles account for up to 30 percent of the corridor volume and heavy trucks as much as 13 to 16 percent of total traffic.

PennDOT is currently studying alternative roadway improvements for the 10.3-mile section of PA 41 from the Delaware line to PA 796. It seems very likely that PennDOT will proceed with some improvement to PA 41, and this will increase the traffic pressure to make improvements on SRs 7 and 41 in Delaware. The most likely scenario would be limited improvements along the existing alignments of these routes, emphasizing safety enhancements and modest capacity expansion. The results of stakeholder interviews with Daimler-Chrysler and other industries in Delaware suggest that the rail and intermodal improvements described elsewhere in this report could make it possible to divert some truck traffic from these routes to rail. Daimler-Chrysler alone generates on average 65 Triple Crown tractor-trailers per day between its facilities in the Newark area and the Triple Crown intermodal yard in Harrisburg. This is a total of 130 truck trips/day that could be diverted from SRs 7 and 41 to rail, if Triple Crown rail service could be extended to Newark as proposed in the rail improvement recommendations. This is just the trips for one industry that are already on rail and that now shift to truck because of the lack of effective rail access to Delaware and a local intermodal terminal.

It is proposed that DelDOT pursue the rail improvement proposals that will make it possible for more truck traffic to be diverted to rail, while at the same time initiating studies of limited safety and capacity improvements to SRs 7, 41, and 896 in the Newark-Hockessin area.

Develop a plan to improve truck access and operations in the vicinity of the Port of Wilmington. The Port of Wilmington is located within a half-mile of I-495 via an interchange with Terminal Avenue. This proximity to the interstate system provides the port with excellent regional and interregional access to a large market area. However, local roadway and interchange conditions tend to degrade the efficiency and effectiveness of truck service to the port. Moreover, state and local governments are failing to capitalize upon the economic development opportunities associated with this unique intermodal location.

The Port Master Plan calls for new roadways within the Port property to better accommodate access to ship berths and storage areas, particularly for the auto import/export trade. However, that plan stops at the port's property line and does not account for the possible need for broader, related roadway improvements in the surrounding area, such as on Christiana Avenue, Pigeon Point Road, and possible new connections to the port. A plan to improve truck access and operations around the port should assess the need and develop specific proposals for new roadways and ramps.

Problems with the design of certain ramps at the Terminal Avenue/I-495 interchange have created difficult operating conditions for trucks. Informal, roadside truck parking and a lack of access management along Terminal Avenue creates hazardous conditions associated with vehicles pulling on and off the roadway. These movements also break up the pavement and create ruts along the roadside. There is a need to analyze these problems and make improvements to the interchange and Terminal Avenue.

There is also a need for a full-service truck stop and service facility in the vicinity of the Port, given the hundreds of daily truck trips to the port and nearby industries. Such facilities could meet the need for an additional truck rest area in northern Delaware and provide needed off-street short-term and overnight truck parking.

It is proposed that a comprehensive transportation and land use study be conducted for the area surrounding the port to identify existing and projected future transportation improvement needs, including both roadway and rail-intermodal improvements. Additionally, it would identify desirable land development and redevelopment proposals to make the most effective use of the valuable land around the port and to capitalize on the unique intermodal accessibility of this location.

Review roadway and intersection design criteria and standards with representatives of the trucking industry to consider modifications to enhance truck operations, especially in major truck corridors. The Delaware Motor Truck Association (DMTA) and trucking companies have identified numerous locations throughout the state where trucks have difficulty operating, because of inadequate turning radii, lane widths, ramp configuration and grades, signs, shoulders, pavement, and other factors. More than 70 percent of the shippers and carriers using trucks in DelDOT's 1998 *Customer Satisfaction Surveys* said that interchanges with ramps that trucks can negotiate, wide intersections with turning lanes, and well-planned sequencing and timing of traffic lights were "extremely important".⁴⁹ This response was consistent with the results of the 1997 surveys.

It is proposed that DelDOT's design engineers review roadway and bridge design criteria and standards with representatives of the trucking industry to obtain their insights on the issues and problems faced by the industry in using the state's highways. These insights may foster modifications to design criteria and standards, especially for application to projects in major truck corridors.

Traffic forecasts that are prepared to guide the design of roadway improvements often do not reflect or highlight potential heavy truck usage of such facilities, and thus, the designs do not include special consideration of their unique requirements. Therefore, it is proposed that any roadway or bridge improvement project on a route that is part of the system of major truck corridors should include a specific estimate of truck traffic and identify truck operational issues for input to project design.

⁴⁹ 1998 *DelDOT Customer Satisfaction Surveys*. Prepared for DelDOT by Frederic R. Harris, Inc.

Expand the statewide deployment of joint weigh-in-motion (WIM) and traffic counting stations and ensure the provision of safe roadside enforcement areas for each facility. Delaware needs to expand its monitoring and enforcement of commercial vehicle weight restrictions and to initiate a continuing, comprehensive traffic counting program for commercial vehicles throughout the state. These two needs can be satisfied through a joint program to develop some 50 to 60 WIM sites in major truck corridors across the state. The system of major truck corridors should be reviewed in establishing WIM/traffic counter sites to ensure reasonable coverage of major routes and critical areas, as well as broad geographic coverage.

Expand ITMS traveler-information services to improve the availability of timely data on traffic conditions to truckers. Real-time information on traffic and roadway conditions is now available to truckers (and other motorists) primarily through variable message signs (VMS) on the roadways and the Travelers' Advisory Radio System (TARS). Several other sources are available through the Internet, such as PennDOT's *I-95 Revive* service, but these are generally not accessible to truckers on the road.

Telematics, which are in-vehicle wireless systems and services using advanced location tracking and communications technologies, can provide motorists with the ability to communicate in the event of an emergency, timely prompts of road hazards and traffic conditions, and accurate route guidance in unfamiliar territory.⁵⁰ The private sector is likely to offer both in-vehicle hardware and information services that truckers and others can tap into to expedite travel through congestion caused by highway incidents or chronic highway system overload.

With the growing emphasis on JIT deliveries, timeliness and reliability in freight operations will become increasingly important. DelDOT should look for ways it can help to improve freight schedule reliability by expanding the provision of traveler information through its ITMS and in cooperation with other groups, such as the I-95 Corridor Coalition. Cooperation with its neighbors in the sharing of traveler information is particularly important for Delaware, because so many of its truck freight movements have origins or destinations outside the state, and these trips can become embroiled in traffic tie-ups in adjacent states.

During the stakeholder interviews, a representative of a major industry that is also a significant generator of truck trips expressed a desire for more real-time information on road maintenance and repair work schedules. This company receives extensive deliveries from local suppliers on a JIT basis, and these deliveries are often disrupted by local roadwork. DelDOT currently provides detailed information on planned and ongoing road maintenance and construction projects through its website and by radio via WTMC-AM. It may be useful for DelDOT to send periodic notices to the logistics or transportation directors of major companies with significant truck activity to tell them where they can get reliable and current information on road construction and maintenance.

⁵⁰ C. Kenneth Orski. "The Telematics Boom – Fact or Fiction?" *Traffic Technology International*. August-September 2000.

Develop truck rest areas to address problems of driver fatigue. It is proposed that at least two new truck rest areas be developed in Delaware: one in the southern half of the state on either US 13 or US 113, and the other in the northern half of the state, possibly on I-495 near the Port of Wilmington. These facilities would provide driver amenities, such as rest rooms and vending machines, and safe short-term and overnight parking for driver rest. Alternatively, the potential to develop a full service facility, including fuel, service bays, motel, showers, etc., on a public/private or franchise basis should be investigated. A recent forum on truck rest areas suggests a consistent spacing of 100 kilometers, or approximately one hour apart, for such facilities in major highway corridors.⁵¹ Provision of rest areas in the northern and southern parts of the state would achieve roughly a one-hour spacing of such facilities in Delaware. The Federal Highway Administration has developed planning and design guidelines for estimating rest area truck parking requirements that will be useful in locating and planning these proposed facilities.⁵² Co-location with commuter Park & Ride facilities may also be possible at state-owned sites.

Implement electronic registration and credentialing of commercial vehicles and sharing of credentialing information with other states and Delaware enforcement personnel. DelDOT should implement the proposals in its ITS/CVO Business Plan to streamline registration and licensing procedures and enable the sharing of commercial carrier records with other states and enforcement agencies. An electronic credentialing system will allow motor carriers to submit registration requests and associated data electronically through the Internet or BBS.

The ITS/CVO Business Plan proposals also include the development of data systems that will provide field enforcement personnel with real-time information on a vehicle's registration, tax, and safety record. This information will be updated to reflect the results of field inspections or stops and shared with enforcement personnel in other states. This will expedite field inspections and allow law enforcement to focus on trucks and drivers with poor records, improving the effectiveness of the limited number of police dedicated to truck enforcement.

Proposed Rail and Intermodal Freight Improvements

Rail and intermodal freight improvements are discussed together because rail service is involved in all intermodal improvement proposals. NEC freight access improvements are covered first because they are the key to any significant improvement to rail and intermodal service in Delaware.

⁵¹ *Rest Area Forum: Summary of Proceedings*. Federal Highway Administration. June 1999.

⁵² *Commercial Driver Rest Area Requirements: Making Space for Safety*. Prepared for the Federal Highway Administration by the Trucking Research Institute, Apogee Research, Inc., and Wilbur Smith Associates. May 1966.

Develop a new track on the NEC between Newark, Delaware, and Perryville, Maryland, to be used primarily for freight. An engineering study should be conducted by DelDOT to assess the feasibility of a new, 21-mile track with 20-foot 6-inch clearances within the existing right-of-way of the NEC between Newark (Iron Interlocking) and Perryville. This track would be used primarily for freight service. The improvement project could include restoration of the railroad underpass beneath the NEC at Perryville and a connection to the Port Road Branch at Minnick, 2 miles west of Perryville, if deemed environmentally feasible. The study would also examine the feasibility of connecting the new track to the existing Track A at Iron Interlocking, as well as a short extension of the parallel tail track and its connection to Track A in order to increase operating flexibility near the Newark Yard. The new track would provide continuous hours of access between the yards at Harrisburg, Pennsylvania and Delaware origins and destinations.

The study would also document rail operating efficiencies that could be achieved, such as improved freight car and train crew utilization. In addition, the study would analyze economic and environmental impact issues and the undertaking of rail infrastructure improvements outside Delaware, including precedents for such. DEDO, Amtrak, and the State of Maryland should be active participants in the study

The government of Cecil County, Maryland has expressed interest in extending commuter rail service from Newark into the county, perhaps to Perryville, using the same NEC right-of-way. The feasibility study could include consideration of shared freight and commuter rail use of the new track. The study could also include the 6-mile extension of Track A from Ruthby Interlocking, now under construction, to Ragan Interlocking for connection to the existing New Castle Secondary. This track could be used both by freight and commuter trains, as well as add capacity to the NEC.

Restore the Christina River movable rail bridge and Shellpot Secondary operations, including direct, head-on access to the Port of Wilmington. DelDOT is providing financial, technical, and political assistance to NS in the early restoration of the Shellpot Secondary movable bridge and approach track structure at the Christina River, as well as the restoration of Edgemoor Yard to eliminate freight movements on the NEC through the Wilmington passenger station. Restoration of the Shellpot Secondary would improve local service to customers in Delaware, as well as allow the initiation of general merchandise, through-train service on the NEC, with service at Edgemoor Yard.

Restoration of the Shellpot route is a necessary ingredient in the provision of quality rail freight service to Delaware and the Delmarva Peninsula, as well as in promoting increased rail traffic. Restoration of the Shellpot route favorably alters Delaware's present circumstance of being a terminal at the end of a 90-mile branch from Harrisburg. Additionally, it eliminates the need for the existing freight traffic on the viaduct through the Wilmington passenger station. Elimination of heavy freight cars through the station will reduce stress on the station structure below, contributing to lower maintenance costs for the station and viaduct.

Develop a freight-only track on the NEC between Edge Moor, Delaware, and Marcus Hook, Pennsylvania, connecting to the freight-only Chester Secondary and the Conrail Philadelphia/South Jersey Shared Asset Area. DelDOT should study the feasibility and capital cost of a freight-only, high-clearance rail route between Philadelphia and the Edgemoor Yard. This track would be developed within the right-of-way of the NEC between the Bell and Hook Interlockings, a distance of 5 miles. A connection would be built to the Chester Secondary, which is within the Philadelphia Shared Asset Area. This connection has the potential to improve the quality of rail freight service between Delaware and points north.

Expand the operational function and capacity of the Edgemoor Yard to accommodate general merchandise, through-train service on the NEC. In conjunction with restoration of the Christina River movable bridge, the Edgemoor Yard would regain a major role as an origin for local train service in New Castle County, because through-freight trains could set-off and pick-up traffic at the yard. The Edgemoor Yard would perform some of the functions now performed at Newark, such as serving Reybold Industrial track customers at Delaware City. The proposed change in function at Edgemoor Yard would require restoration of some track capacity to accommodate increased switching and through-train activity. Present use of the yard for rail access by Dupont's Edge Moor titanium dioxide plant would have to be accommodated in any revised yard configuration and functions. The reduced level of activity at the Newark Yard could provide capacity for other functions, such as a Triple Crown Service RoadRailer facility for Daimler-Chrysler and possibly GM.

Develop an intermodal rail/container terminal in the vicinity of Newark, Delaware, utilizing RoadRailer technology. If capacity can be made available at the Newark Yard, a Triple Crown RoadRailer intermodal terminal could be established there, eliminating the need for drayage of Delaware freight from the NS Rutherford Terminal in Harrisburg. The existing volume of Triple Crown Service trailers to Daimler-Chrysler appear to justify such a train, assuming that it can be efficiently assembled for forwarding to Newark on a timely, consistent schedule.

Improve the rail interchange in Wilmington to allow CSXT better access to the Port of Wilmington or encourage NS and CSXT to negotiate more efficient handling of interchange traffic. The interchange at West Yard in Wilmington between NS and CSXT has a restricted vertical clearance that does not accommodate covered tri-levels. It is not certain that automotive traffic between CSXT/West Yard and the port would use this route, even if an adequate clearance were available. Commercial, rather than operating reasons, would likely prevail, because neither NS nor CSXT would intentionally short-haul itself.

One approach is to perform a traffic analysis of the feasibility of NS and CSXT interchanging Delaware traffic at other locations, such as Bay View Yard in Baltimore and/or Philadelphia, to determine if a local interchange would be more efficient and beneficial for both the railroads and Delaware. A formula, similar to a haulage

agreement, may be feasible. Port of Wilmington officials may find this to be a satisfactory way to obtain port access by both railroads.

Develop a downstate intermodal terminal. Implementing the preceding recommended rail improvements should achieve the quality of downstate rail access needed to provide reliable intermodal service. If commercial prospects also indicate promise, a downstate intermodal terminal, scaled to the traffic level, could divert some truck traffic from downstate highways, especially US 13, and would add traffic to the Delmarva rail network.

Initially, intermodal volumes at this proposed terminal may not justify a large capital investment to serve “anchor” shippers in the Dover/Delmarva area. However, intermodal terminals can be developed at relatively low capital cost by using RoadRailer and/or Iron Highway and *Expressway* technologies. These intermodal technologies do not require expensive lift equipment or extensive locomotive horsepower per revenue ton because they have a low tare weight. Triple Crown RoadRailer service to a proposed Wyoming terminal could be an extension of Triple Crown service to Newark. Iron Highway technology is not presently used by NS (or CSXT); thus, a niche market network for Iron Highway would have to be developed. The nature of this network would depend upon such factors as whether Iron Highway service were targeted at non-reinforced trailer operators, such as common carriers and private trucking operators.

Improve the rail interchange between the NS and MDDE rail lines at Frankford, Delaware. The Frankford interchange between the NS and the MDDE should be relocated to a point north of the existing inefficient interchange. A new interchange would also assist industries that may employ unit grain trains, as a result of the institution of unit-grain-train contract rates by NS.

Interchange switching requires many back-and-forth train movements across the streets in Frankford, because cars are being delivered to, or received from, the NS and MDDE. An NS train coming into Frankford from the north has two basic functions in addition to serving the Mountaire Farms feed mill: (1) leave cars for the MDDE and (2) pick up cars left previously by the MDDE for NS. Because of limited tracks in Frankford, picking up and leaving cars requires many back-and-forth movements, as groups of cars are uncoupled, placed on one track, then another group of cars are coupled and moved to another track.

Inefficient switching and interruption to highway traffic in Frankford could be eliminated by the construction of a new interchange track facility north of town. For purposes of this report, the need to accommodate a 50-car unit train has been assumed. The track facility should be the equivalent of about a mile in length, allowing about 3,000 feet for a unit train and about 2,000 feet for about 35 other cars. This project would depend on the retention of an interchange in the Frankford area.

Prepare a Delmarva rail service contingency plan. In association with state rail agencies in Maryland and Virginia, DelDOT should take the lead in preparing a

contingency plan for Delmarva rail service, premised upon the possible loss of unit coal train traffic if the Indian River generating station were to cease operation, or convert to an alternative fuel. Loss of this traffic, with or without the loss of other significant bulk volumes on the Delmarva, would alter the strategic value to NS of lines south of the C&D Canal. The contingency plan should explore the creation of a multi-state, regional authority to acquire these assets and lease them to a regional rail carrier in the event of a significant decline in the interest and commitment of NS to this service. The regional carrier would provide an integrated local service on the Delmarva, including local rail movements of corn, soybeans, and other commodities. A multi-state regional authority could also discuss other rail service issues of mutual interest through regular meetings with NS.

Work with the poultry industry to achieve efficiencies associated with 75-car unit grain trains at feed mills, including rail car siding length requirements. The poultry industry is currently considering the use of 75-car unit grain trains instead of the existing 50-car trains. If the economies and efficiencies of the longer trains are sufficiently attractive to the poultry industry to justify its investment in either expanding existing facilities or developing new ones, state and local agencies may be able to assist in implementation. This assistance could take several forms, including working with the railroad to resolve possible land use impacts and grade crossing questions.

Proposed Waterborne Freight Improvements

The discussion of proposed waterborne freight improvements focuses primarily upon on-site improvements to the Port of Wilmington. Preceding sections on proposed rail, intermodal, and motor carrier freight improvements include projects to improve landside port access and land use and circulation conditions in the area surrounding the port. Proposed improvements presented in this section are drawn from the port's master plan report, and the reader is referred to that document for a more detailed description of and rationale for them.⁵³ The long-term vision for the port is that all berths be located on the Delaware River in order to assure the port's efficiency in handling ocean-going vessels. Certain master plan proposals that have since been deferred are noted in the following discussion.

Proposed Port Improvements

The master plan identified 24 improvement projects, having an estimated cost of \$235 million and implementation staged through 2018. Two projects in the master plan have since been deferred: (1) filling of the Lobdell Canal and (2) acquisition of the Potts property and its development for open storage of breakbulk cargoes and warehousing truck entry and staging.

⁵³ *Port of Wilmington Strategic Master Plan*. Prepared for the Diamond State Port Authority by Vickerman Zachary Miller. June 1999.

A new gate was recently constructed to handle the average of 800 trucks per day, with 1,100 at peak, including petroleum tank trucks. The remaining port improvement proposals are described below.

The following improvements are proposed regarding property acquisition or enhancement:

- Stabilize and surcharge the dredge disposal area provided to the port by the Corps of Engineers.
- Fill the northeast shoreline at the confluence of the Christina and Delaware rivers for the development of new container and auto berths and storage areas.
- Investigate a potential land swap or other use agreement with the Corps of Engineers for the land parcel directly south of the reconfigured Volkswagen facility, or alternatively, investigate the cost of acquiring the Pigeon Point Landfill to obtain 30 acres of storage.

The port is constrained in its operations by the necessity for vessels to maneuver in and out of the Christina River and by the rapid silting of the river channel and berths. New berths are proposed for development on the Delaware River will not silt up as rapidly as the existing berths and will be easy to access from the Delaware River channel. The following specific improvements are proposed for ship berthing:

- Reconstruct Berth 4, primarily for refrigerated breakbulk cargo and secondarily for drybulk cargo.
- Remove the existing floating berth and construct new mooring structures to handle Citrusuco, Inc., berthing needs for citrus products.
- Develop additional berths to the south along the Delaware River frontage.⁵⁴
- Change the types of cargoes handled at some existing Christina River berths to reflect shifts to the new berths on the Delaware River. Most significantly, two container terminals are proposed: one using the new Delaware River berths and the other using Berths 1 and 2 on the Christina River.

The following improvements for warehousing, storage, and other cargo facilities are proposed:

- Expand Volkswagen's facility to include all of the area south of Gist Road not occupied by dry cargo warehousing or open cargo storage. As noted earlier in proposed property changes, additional auto storage area is proposed by acquiring use of the parcel south of Volkswagen or by use of the Pigeon Point Landfill.

⁵⁴ By roughly 2018, the major dredge disposal area south of the port along the Delaware River should be filled. Port officials should monitor this situation, and at an appropriate time, enter negotiations with the Corps of Engineers for acquisition of this area for future port expansion.

- Develop two new warehouses for refrigerated cargo in the vicinity of Berths 7 and 3 and 4.
- Develop a new fumigation warehouse adjacent to Berth 4 to replace the existing facility in Warehouse D and to accommodate growth.
- Implement and enforce improved bulk handling guidelines to prevent dusting and cargo spillage in the vicinity of the dry bulk facilities at Berth 2 and 3.
- Rehabilitate Warehouse B and make other minor modifications and expansions to on-site buildings and storage areas.

Several circulation improvements were proposed in the master plan, allowing for the segregation of cargo types and the use of additional access points other than the main gate. The following improvements for circulation at the port are proposed:

- Shift all petroleum tank trucks from the Main Gate to the new South Gate on Pigeon Point Road.
- All other trucks carrying containers, dry bulk, Lafarge materials, refrigerated, and open-storage breakbulk will continue to enter and exit via the Main Gate, although dry bulk trucks will have the option to exit via the new South Gate. A traffic control signal light at Pigeon Point Road is warranted.

If the Potts property is acquired in the future, a new North Gate connecting to Christiana Avenue could be developed on that property to provide further relief to the Main Gate.

While the Diamond State Port Corporation is responsible for and is receives state funding to develop infrastructure and operations within the port, various land use, environmental, and transportation agencies have jurisdiction of the areas outside the port.

DelDOT can work with the port to ensure that traffic circulation in the areas adjacent to the port and access to and from the port is maintained at an optimum level. DelDOT has expanded Terminal Avenue to four lanes and installed a signal light at the intersection of Terminal and Pigeon Point Road to facilitate truck movements to and from nearby I-495. DelDOT may also assist in developing truck support/rest areas that serve the port area as well as coordinating improvements in rail service to the port.

Barge Shipping/Feeder Port

Delaware has another potential waterborne freight asset that could prove useful in the future. That asset is the state's strategic location in the center of the Eastern Seaboard and the unique water commerce resources of the Delaware River and Bay and the C & D Canal. These attributes position Delaware as a possible future center of coastal shipping, using barges or self-propelled vessels. As congestion grows on coastal highway corridors such as I-95 and landside access becomes less available at large, deep-water ports like New York/New Jersey, coastal shipping could become an alternative mode for distributing freight from major ports and accommodating interstate movements for bulk

commodities. The major deterrent to coastal shipping is the cost of the intermodal shifts required at each end of the trip.

The Port of Wilmington is still considered a potential feeder port for PONY/NJ as part of their recently proposed Port Inland Distribution Network (PIDN) plan. DelDOT and the Diamond State Port Authority should continue to monitor markets and look for opportunities to stimulate or assist in developing coastal shipping.

Other Actions and Improvements

Delaware has another potential waterborne freight asset that could prove useful in the future. That asset is the state's strategic location in the center of the Eastern Seaboard and the unique water commerce resources of the Delaware River and Bay and the C & D Canal. These attributes position Delaware as a possible future center of coastal shipping, using barges or self-propelled vessels. As congestion grows on coastal highway corridors, such as I-95, and unless railroads can eliminate freight bottlenecks, coastal shipping could become an alternative mode for distributing freight from major ports, such as the Delaware River ports, and accommodating interstate movements for bulk commodities.⁵⁵

The major deterrent to coastal shipping is the cost of the intermodal shifts required at each end of the trip.

DelDOT and the Diamond State Port Authority should continue to monitor markets and look for opportunities to stimulate or assist in developing coastal shipping.

Proposed Air Freight Improvements

As noted earlier, the key question for the future of air freight in Delaware is whether the local market for this service will grow to the point of making it desirable and profitable for air freight carriers (Fed Ex, Airborne, UPS, and others) to fly directly into Delaware airports. Highway congestion could ultimately affect this decision, if it reaches levels that severely constrain the timeliness and reliability of ground pick-up and delivery in Delaware for freight being flown in and out of Philadelphia.

For the foreseeable future, Delaware's best posture is to keep its future options open. This means preserving the capability of NCCA and the civil aviation side of Dover Air Force Base to accommodate cargo aircraft and landside air freight operations. It seems likely that non-scheduled air freight service may grow at NCCA, as more industries in that area require JIT deliveries of non-bulk, key components and materials.

Dover Air Force Base may present a unique, long-term opportunity for the creation of a domestic and international air freight distribution center. Its runways can accommodate the largest cargo aircraft in the world. It is not congested by air passenger traffic. It has

⁵⁵ Krick, Kevin W. "A Bright Future for Coastwise Shipping". *The Beacon*. Maritime Exchange for the Delaware River and Bay. Sept/Oct 2000.

excellent regional and inter-regional highway access via SR 1 and its connections to the interstate highway system. Opportunities are available to develop commercial and industrial sites adjacent to the airport to accommodate related businesses that would support and/or require air freight service. The uncertainty surrounding joint use of an active military facility seems to have stymied any discussion of this idea for the near future, but as capacity is needed, the idea may become more viable.

Plan Implementation Priorities

In reviewing the preceding discussion of freight issues and proposed improvements, several improvement proposals clearly emerge as the keys to developing a better freight and goods movement system for Delaware. They comprise an interrelated group of improvements, aimed at eliminating bottlenecks in the rail system that now constrain rail access to Delaware and at creating intermodal terminals to optimize the best attributes of all freight modes. These improvements also offer the best hope of easing truck traffic impacts in the northern part of the state by facilitating direct intermodal rail service to Delaware that could divert certain freight movements from trucks to rail. Rail access to the Port of Wilmington will be greatly enhanced. The benefits of these rail improvements will extend to all parts of the state and the entire Delmarva Peninsula through the improved national and regional rail access they will bring to the Delmarva Secondary. Finally and most importantly, they are consistent with the freight plan strategies outlined at the beginning of this chapter and will make the greatest contribution toward the three basic goals relating to transportation system safety, efficiency, and support of the state's economic and environmental well being.

The following discussions identify the highest priority improvements for each freight mode and provide order-of-magnitude costs for most proposals. The highest overall priority should go to the package of rail and intermodal improvements that are described below.

High-Priority Rail and Intermodal Freight Improvements

While the NEC freight access improvement recommendations have been discussed individually herein, fully integrating these improvements could create a synergistic effect on the quality and competitiveness of rail service in Delaware. This section identifies some of these synergies and estimates the order of magnitude of investment required to position rail service so as to maximize its utility to the Delaware transportation system and the state's economy.

The development of a new track between Perryville and Newark, dedicated primarily to freight, would significantly reduce the number of track-miles requiring raised catenary. Completing the Christina River movable bridge rehabilitation and Edgemoor Yard capacity expansion could create capacity at Newark Yard to accommodate a Triple Crown Service RoadRailer intermodal terminal. This would reduce truck traffic and possibly increase rail's market share of the two automotive assembly plants in the area.

Reliability of Triple Crown Service to Newark is directly tied to improved access on the NEC, including the proposed new track between Perryville and Newark. The current rehabilitation of the Christina River Bridge/Shellpot Secondary route is a critical element for the eventual restoration of general merchandise through-train service on the NEC between points south/west and Oak Island Yard, the principal carload freight yard in the Conrail Shared Asset Operation in northern New Jersey. Table 8.2 (next page) summarizes general order of magnitude costs of the individual improvements.

There is considerable symbiosis between the individual rail freight improvements and service availability, as well as quality of that service. Improved dependability and frequency of rail service has the potential to restrain the scale of capital investments in highway infrastructure that would otherwise be necessary.

High-Priority Motor Carrier Freight Improvements

Three proposed actions to improve motor carrier operations in the state stand out as requiring high priority. They are:

- Classify roads according to their ability to accommodate vehicles of various size and weight safely and identify a system of major truck corridors throughout the state. There are at least two important needs for this action. First, DelDOT can facilitate motor carrier operations by providing information on highway system characteristics, constraints, and regulations through the preparation and broad distribution of a map and trucker’s guide, similar to the one produced by PennDOT for Pennsylvania.

**Table 8.2
Summary of High Priority Rail Infrastructure Improvements**

Improvement	Order of Magnitude Cost	Benefits and Beneficiaries
Restoration of Christina River Bridge and related trackage (currently underway)	\$20 million	<ul style="list-style-type: none"> • Benefits NS and Amtrak by improving freight service and reducing Amtrak maintenance costs. • Delaware shippers receive improved service. • Permits Delaware industries to benefit from added freight service on NEC. • Improves rail freight service network to Delaware.
Construct NEC track, dedicated primarily to freight, between Perryville and Newark (21 miles)	\$60-75 million	<ul style="list-style-type: none"> • Provides NS with unrestricted hours of east/west access to Delaware. • Delmarva industries gain improved access. • Provides improved vertical

Improvement	Order of Magnitude Cost	Benefits and Beneficiaries
		clearances.
Total	\$80-95 million	

Second, by identifying major truck corridors, DeIDOT will have a better basis for considering motor carrier needs in defining and prioritizing highway and bridge maintenance and capital investments. This information will also be useful to the two MPOs and Sussex County in their regional transportation and land use planning processes.

- Development of a plan to improve truck access and operations in the vicinity of the Port of Wilmington. The port is one of the largest generators of truck trips in the state, and the provision of safe and efficient truck access to it is essential to both motor carrier and waterborne freight system effectiveness. Development of a coordinated transportation and land use plan for the area around the port is also essential to realizing the full economic development potential of this unique area. Further, such a plan will facilitate the possible development of a full-service truck stop and rest area near the port and in the I-495 corridor. The estimated cost of the proposed planning study is \$150,000. Subsequent capital investment requirements must be established by the study.
- Initiate planning studies and pursue safety and limited capacity improvements to SRs 7 and 41 in the Newark-Hockessin area to reduce the adverse effects of truck traffic on adjacent communities and enhance the safety of truck and general traffic operations. Conflicts between truck traffic and local traffic and land use in this area are probably the most severe in Delaware, and they will definitely get worse unless some action is taken. A coordinated package of transportation improvement strategies will be needed to solve the truck and overall transportation problems in this critical area. The rail improvements described earlier are part of this package through the potential they hold for diverting some truck traffic to rail. Other parts of the package are likely to include localized land use planning, access management, traffic engineering improvements, and limited capital improvements along these routes. DeIDOT, WILMAPCO, and the affected local communities should embark on a coordinated study of the two routes to develop a comprehensive improvement plan and program. Coordination with the ongoing corridor study in Pennsylvania will be essential to avoid having disparate plans for the two state portions of the corridor. The estimated cost of the planning effort through the environmental impact statement phase could reach \$500,000 to \$800,000.

Most of the other proposed motor carrier freight improvements are institutional in nature, such as expanding the timely provision of ITMS traveler information to truckers, implementing electronic credentialing of commercial vehicles and sharing of this information with other states, and reviewing/modifying design criteria and standards for roadway and bridge design to promote safe truck operations. These important initiatives should be implemented as expeditiously as possible.

High-Priority Waterborne Freight Improvements

The Port of Wilmington's master plan defines a detailed, month-by-month schedule for implementation of capital improvements reflected in the plan. The reader is directed to that document for this detailed information. The critical path actions are the filling of the northeast corner of the Port property and the construction of new automobile and container berths along the Delaware River. Development of auto and truck access roads to the new berths will be done as the land filling process permits to provide access to the eventual berth construction sites. Shifts in the functions of existing berths, the rehabilitation and expansion of warehouse facilities, and shifts and expansions in storage areas will be orchestrated around the landfill and new berth construction over the next 18 years.

High-Priority Air Freight Improvements

There are no high-priority air freight improvements in the statewide Freight and Goods Movement Plan. For the next few years, most of Delaware's air freight service will continue to operate out of Philadelphia International Airport, and the most that DelDOT can do to enhance air freight service efficiency is to minimize congestion on roadways that are heavily used by air freight trucks.

Summary

Preliminary projections by the Federal Highway Administration's Office of Freight Management, contained in an ongoing study being directed by the Battelle Memorial Institute, indicate a 2.9% annual rate of growth nationally for rail and truck tonnage, resulting in a cumulative increase in tonnage of 87% by 2020⁵⁶. The Northeast is expected to have a similar tonnage growth rate. While these projections are termed "unconstrained demand" subject to adjustments, it is clear that infrastructure construction will not grow anywhere near the growth in demand. Therefore, limited capital funding must be directed at key bottlenecks, improving the productivity of the existing transportation network, and leveraging the available investment capital in conjunction with private investment, such as at intermodal terminals and intermodal linkages.

⁵⁶ *Freight Forecast* presentation at Transearch Seminar, October 16, 2001, by DRI-WEFA Inc. in association with Battelle Memorial Institute on behalf of FHWA.

APPENDIX

DELAWARE STATEWIDE FREIGHT AND GOODS MOVEMENT PLAN STAKEHOLDER INTERVIEWS

This is a compilation of interviews conducted by Parsons Transportation Group, Inc. The following list indicates the lead contact for each organization, although, in some cases, additional individuals of that organization may have participated.

1. Michael Kirkpatrick DelDOT Freight Plan
2. Juanita Wiezoreck Dover/Kent County MPO
3. Robert Deitrich Delaware Motor Transport Association
4. Tom George Rollins Leasing Corporation
5. Michael Simmons DelDOT Road Design
6. Tom Brockenbrough DelDOT Traffic Impact Studies
7. Margaret Priest DaimlerChrysler Corporation
8. Charles Baker Wilmington Area Planning Council
9. Rob Skomorucha Delaware Economic Development Office
10. Vince Rucinski DelDOT GIS/Computer Support
11. Jeff Reed Delmarva Trucking Company
12. Dennis O'Shea DelDOT Bridge Design
13. Dave Samick Kraft Foods, Inc.
14. Cindy King Motor Fuel Tax Administration
15. Don Short Dept. of Natural & Environ. Res. Conserv.
16. Adam McBride Diamond State Port Corporation
17. Dave Valentovich Volkswagen
18. Richard Horstmann Delaware River and Bay Authority
19. Joe Paterno Dover Air Force Base
20. Joe Parent General Motors/Saturn
21. Raymond Anderson Dawn Arrow Aviation
22. Willie G. Brown Delaware Solid Waste Authority
23. Tony DiGiacomo Cecil County (MD) Planning Commission
24. Mary L. Pileggi DuPont Logistics - Rail Procurement
25. Olav S. Urheim Delaware Terminal Company
26. Joseph Kline Kline Transportation Company
27. Don Carpenter Carpenter Transportation
28. Diane Arvey Motiva Enterprises LLC
29. Richard Williams Mountaire Farms, Inc.
30. Cliff Hicklin Allen Family Foods, Inc.
31. Joyce Kuhn Equilon Pipeline Company
32. George McWiggins OxyChem Corporation
33. Harvey Short W. T. Gore Company
34. Rod Smith AstraZeneca, Inc.
35. Robert Simon Amazon.Com, Inc.

36. Sharon Mock	Perdue Farms Inc.
37. Avery Dalton	Delaware Solid Waste Authority
38. Ron Cavey	Food Lion Stores
39. Charles White	Wal-Mart Stores
40. Kim Stanley	FedEx Freight
41. Bill Turner	United Parcel Service, Inc.

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GLOSSARY

Breakbulk – the unloading and distribution of a portion or all of the contents of a ship, rail car or truck.

Catenary - the overhead structure on an electrified railroad which holds a system of electrically-charged wires in position at a specified elevation above the rails.

Common carrier – an entity held out to the general public to transport property and/or passengers for compensation in intrastate, interstate or foreign commerce, with varying degrees of regulation, in accordance with the Interstate Commerce Act, as amended.

Conrail Shared Asset Areas – areas comprising Conrail facilities in southeastern Michigan, northern New Jersey, and Philadelphia/southern New Jersey that CSX and NS share and Conrail operates for the benefit of both CSX and NS, as part of their acquisition of Conrail.

CSXT – CSX Transportation Inc., the railroad unit of CSX Corporation.

Double-stack freight service – the transport of two intermodal containers one atop the other on one platform of an intermodal rail flatcar. A vertical clearance of 20’6” is normally required for two high cube containers.

Expressway service – a commercial product of Canadian Pacific Railway for the movement of common carrier and private trailers in a trailer-on-flat-car (TOFC) utilizing a roll-on/roll-off technology (circus-style loading/unloading), rather than lift equipment requiring reinforced trailers.

Hazardous materials – substances or materials that the U.S. Secretary of Transportation has determined are capable of posing an unreasonable risk to human health, safety, and property when transported in commerce, as designated under 49 Code of Federal Regulations Parts 172 and 173.

Interchange – the physical point and contractual agreement by which two or more railroads connect for the purpose of exchanging freight traffic.

Interlocking – an arrangement of switch, lock, and signal devices located where railroad tracks cross, join, or separate. The devices are interconnected so that their movements must succeed each other in a predetermined order, thereby preventing opposing or conflicting movements.

Intermodal facility – a paved or unpaved site consisting of tracks, lifting equipment, and a control point for the receiving and dispatching of trailers and containers between rail and highway, or between rail and marine modes of transportation.

Iron Highway – a manufacturer’s patented technology utilizing a single 1,200-foot-long, trailer-carrying platform with two built-in ramps for loading--for example, twenty 53-foot trailers in about 45 minutes. The platform elements can be expanded for additional loading ramps.

Just-in-time (JIT) – an element of a manufacturing or production process in which the inventory and materials handling of components is minimized by means of relying on the carefully scheduled arrival of components from suppliers.

Lighter – a flat-bottomed boat designed for cross-harbor or inland waterway freight transfer.

LTL (Less-than-Truckload) – shipments weighing less than the truckload minimum which normally require truck terminal trans-loading prior to and following the line haul segment.

Northeast Corridor (NEC) – electrified railroad line between Washington, D.C. and Boston, MA, on which Amtrak and others operate. Amtrak controls and maintains the route, except for the segment between New Rochelle, NY, and New Haven, CT.

RoadRailer – a manufacturer’s patented technology for dual mode rail-highway trailers that can be coupled for rail movement without utilizing a standard railcar technology, but rather are coupled together with two-axle rail wheel sets. See Triple Crown Service.

Roll-on/roll-off (ro/ro) – a feature designed in a specially constructed vessel that allows cargo to be loaded and unloaded through doors in the vessel’s hull. This feature allows cargo to be rolled in and out of the vessel.

Through train – a train operating between principal terminals or yards, usually with few stops to set off, pick up, or switch freight cars.

Ton-mile – a measure of output for freight transportation, reflecting the weight of a shipment and the distance it is hauled.

Tri-level rail car – a three level freight car used for transporting motor vehicles, normally between 12 and 15 vehicles per rail car.

Triple Crown Service – an expedited intermodal service offered by Norfolk Southern, using RoadRailer equipment.

Truckload (TL) – the quantity of freight necessary to qualify for a TL rate, normally in excess of 10,000 pounds. Truckload operations normally permit the bypassing of intermediate terminals.

Unit train – movement of large tonnages of single bulk commodities or containers/ trailers between origin and destination, bypassing intermediate switching yards.

Yard (freight) – trackage within a specified area used for storing cars, or for making up trains.