NEW YORK METROPOLITAN TRANSPORTATION COUNCIL

TRUCK TERMINALS AND WAREHOUSES SURVEY RESULTS

In The New York Metropolitan Region

February 2001

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4. Introduction

1.1 Description Of Survey Extent And Survey Methodology

New York Metropolitan Transportation Council (NYMTC) is the federally designated Metropolitan Planning Organization (MPO) for the New York State portion of the metropolitan region. The agency provides a forum to address transportation-related issues from a regional perspective, collect pertinent data, and conduct transportation related studies, with the goal of improving the movement of people and goods. The 1996 Federal Certification Review called for NYMTC to take a leading role in freight transportation planning in the region. The purpose of this survey is to provide an inventory of the existing trucking and storage facilities in NYMTC area, and to identify the highway and other access bottlenecks to truck movements, adequate storage place, and commodity flows. This survey is continuation of the truck terminals and warehouses survey, conducted by NYMTC Staff and its member agencies staff in 1995, which resulted in the publication of the NYMTC report: *Truck Terminal and Warehouse Survey Results,* issued in 1996[1]. The comparison of changes within the last 5 years as well as findings are discussed on the following pages. The survey was conducted in 1999 by NYMTC staff and agency staff from New York City and Nassau, Putnam, Suffolk, Rockland, and Westchester counties. See **Fig.1 & 1-A** for typical warehouse interior. The result of this survey help to identify the key issues affecting the future of freight transportation in the region and provided a base for planning future facilities.

Below is a summary of the response rate by NYMTC subregion.

County	Returned questionnaires	Questionnaires sent out	Response rate (percent)
New York City (five boroughs)	42	207	20
Nassau County	20	188	11
Putnam County	40	95	42
Rockland County	15	120	13
Suffolk County	17	90	19
Westchester County	30	300	10
Total	164	1000	16%

This report does not include facilities in northern New Jersey or southwestern Connecticut. The Port Authority of New York & New Jersey (PANY&NJ) performed a market assessment of existing and future public warehouse space requirements for cargoes handled through the Port of New and New Jersey"and issued the report in April 2000 called *Future Port Warehouse Requirement Study*[2]. New Jersey warehouse inventory report is currently being prepared by the North Jersey Transportation Planning Authority (NJTPA), and is expected to be completed in 2001. For information on this study, call John Hummer, NJTPA, tel: 973-639-8424. In the 1999 and 2000, Connecticut

Department of Transportation prepared report on the *Southwest Corridor Commodity Flow Study*, which has examined freight movements within southwestern Connecticut, focusing on Interstate 95 freight movement issues. For information on Connecticut truck terminal facilities, contact Gerald Jennings of the Connecticut Department of Transportation, tel: 860-594-2140.

Additionally, the Port Authority is currently conducting a truck cordon survey in the New York metropolitan region covering commodity flow and the origin and destination of cargo traveling through the various toll plazas in New Jersey and at the New York/Connecticut border. This study is expected to be completed in 2002. For further information, call Lou Venech of PANY&NJ, tel: 212-435-4422. Other recently conducted studies include Cross Harbor Freight Movement Major Investment Study (NYCEDC, 2000), Long Island Transportation Plan 2000 (NYSDOT, 1998), Bronx Arterial Needs Existing Conditions and Problem Identification Report (NYSDOT, 1999), Port Development and Investment Planning Study (PANY&NJ, 1998), and others.

To achieve a more seamless movement of commodities, NYMTC and other transportation stakeholders in the region work to identify short- and long-term solutions for transportation and storage facilities, eliminate bottlenecks, maintain highways and bridges in a state of good repair, reduce jurisdictional barriers, improve site access, use new technology such as Intelligent Transportation Systems, expand public-private partnerships, and support an intermodal transportation system. Some of proposed solutions are included in "Mobility for the Millenium[3] issued by NYMTC in 1999. The *Regional Freight Plan Project* [4], currently underway and managed by NYMTC staff, will also present several short- and long-term improvement proposals, which will enhance freight movement in the next decades. More information on the Regional Freight Plan project can be found at http://webservices.camsys.com/nymtcfreight .

1.2 Description of New York Metropolitan Area Truck Freight Issues

The New York metropolitan area, with nearly 20 million residents and the largest agglomeration of businesses and services nationwide, represents the largest consuming region in the country. The efficient distribution of goods is essential to the national and regional economies. In New York City, an estimated 8% of all jobs are generated from the transport and delivery of goods to businesses and local residents. According to New York State Department of Transportation statistics, 1 in 13 jobs in New York is supported by the trucking industry. In total, the freight distribution and import-export industries in the New York region account for $120 billion in economic activity[5]. In New York City, according to NYMTC's *Regional Transportation Plan*[6], over 700 million tons of freight arrive, leave or pass through the Council's 10-county region annually. Most of the commercial transportation is done by trucks. A majority of the trucks come from the west side of the Hudson River and cross the river via the George Washington Bridge, the Staten Island bridges, or via the Lincoln and Holland tunnels. Many of these crossings have restricted clearances, which excludes large trucks. In 1998, major vehicular daily crossing in the bi-state region was 2.75 million vehicles per day, including 338,000 commercial vehicles[7]. A 1998 Port Authority traffic counts revealed that nearly 70,000 trucks per day traverse the New York City's bridges and tunnels; 30,000 of which cross over the George Washington Bridge (GWB) and Verazzano Narrows Bridge (VNB)[8]. The daily truck trips over these bridges is expected to grow to

37,000 by the year 2020, unless a significant change in the current system is introduced. One possible development is a rail tunnel across the harbor, which could divert between 6 to 13% of truck trips between New Jersey and New York City[9]. The over-reliance on trucks for freight delivery has serious consequences: significant traffic congestion, infrastructure degradation, deterioration in regional air quality levels, and reduced market competitiveness. Still, in the foreseen future, trucks will continue to be the predominant mode of transport.

The trend towards mergers and alliances, similar to those in the rail and marine freight industry, is also affecting the trucking industry. Globalization trends lead to other developments, including the emergence of large multi-functional warehouses, located mostly on New Jersey side of the Hudson River. The main constraints to more efficient truck freight operations are infrastructure inadequacy: weight limits on bridges and underpasses, clearance restrictions, tight curves and turning radii and narrow travel lanes. Congestion on major regional highways, access to facilities, terminal gate congestion and limited parking possibility are additional constraints. Many other factors contribute to high costs, delay in delivery, insufficient signage, grade crossings with railroads, and inadequate accident/incident management. Today, the region's highways carry a large volume of traffic: above 2,500 average annual daily trips[10]. In 2020 the total volume of freight moved in the region is forecasted to reach 605 million tons per year, 27% more than under existing conditions[11]. Another problem which is unique to the New York metropolitan area is that most of the truck terminals, distribution centers and warehouses, are located on the west side of Hudson River, while most of delivery locations are on the east side of the river. The main reason is the land availability and better access to the rail system.

The region's economy has continued to undergo major changes. The restructured economy is focusing on national growth industries such as finance, business and medical services. These changes to the economy's structure has changed the type of freight transported in the region and the manner in which it is transported–the what and how of freight transportation. According to the latest Cambridge Systematics analysis prepared for NYMTC's *Regional Freight Plan Project*[12], in the New York metropolitan area the predominant commodities were food, petroleum, building material, chemicals, and waste. These products are also reflected in the type of storage facilities. New York State waste tonnage grow by about 25% between 1988 and 1997, to 28.9 million of tons, and this trend created need for efficient transport of waste within and out of the region. In November 2000, the New York City Council approved Solid Waste Management Plan, which calls for 100% export of the City's waste, mostly by rail or water[13].

Trucks provide a continuous segment of door-to-door service, where "just in time" delivery is the latest trend in business. Trucks in the NYMTC region are prohibited from using certain roads such as parkways. To access the central business district (CBD) area, vans continue to be the choice of many companies due to their smaller size. Vans can more easily penetrate congested routes, restricted curb areas, and parking space limitations in Manhattan. In New York City, for the most part, larger, heavy trucks are used to deliver goods to the vicinity of the CBD, while smaller delivery truck and vans are used to move cargoes to and from the CBD. Urban goods pickup and delivery (PUD) differs from intercity trucking in that most shipments are small, many weighing no more than 100 pounds. The typical PUD truck is less than 10,000 pounds gross vehicle weight (GVW),

and rarely fully loaded. The typical trip length is short, less than three miles between stops, and speeds are slow, especially in the congested areas of the CBD.

The metropolitan region needs to be able to move more than 4 billion tons of goods on the ground every year – the equivalent of more than 200 pounds of freight per person - plus another 20 million tons of solid waste per year. Around 20 million tons of this total are transported by rail, the rest moves by truck[14]. Further, only about 5 percent of all freight that originated or is passing through the region goes more than 500 miles: the typical lower limit for a rail haul to be economically advantageous. Freight flows wholly within the NYMTC region represent 15 percent of total freight flows, while through moves account for 11% of total flows. Freight trips with one end in the NYMTC region and the other end outside represent 74 percent of total flows[15]. Number of truck trips in the NYMTC region increased by 5.2% from 1998 to 1999 and reached 74.8 million truck trips in 1999. Close to 53,000 trucks cross the Hudson from New Jersey to New York each day by the George Washington Bridge, the Staten Island bridges, the Tappan Zee Bridge, and the Holland and Lincoln tunnels[16].

Parking for commercial vehicles (trucks and vans) in New York City is a major challenge. In addition to congestion, limited curb space and time restrictions for truck parking, loading and unloading of cargo or mail becomes a significant logistical issue. Major delivery companies complain about the significant amount of penalties they have to pay each year for their truck drivers' parking violations in the city. Further impeding the smooth flow of goods in and out of the City is the reportedly hostile attitude of the police and their lack of understanding of the constraints under which drivers and trucking companies operate.

Another trend making truck transportation in the metropolitan region difficult is the trend toward the use of longer and heavier trucks. Spurred largely by deregulation and transportation efficiencies supported by recent legislation proposals, carriers have started to use heavier vehicle weights and longer trailers[17]. As trailer lengths have moved beyond 53 feet, geometric deficiencies have increased especially while crossing the metropolitan region's bridges and tunnels with height and weight restrictions. With the increasing weights being allowed under permit, pavement and bridges will deteriorate faster and create additional impacts on the region's roadways. Also, delivery of goods using these vehicles require larger loading docks and more accessible roadways, a difficult goal to achieve in New York City (see **Fig. 2**).

Congested highways and streets, hard to maintain delivery schedules, damaged and aging infrastructure, labor problem, rising freight costs, and air pollution, are the most common problems the regional freight movement faces. Extensive use of new technology including *Intelligent Transportation System* (ITS), better managed delays due to accidents and highway construction, and better planning approaches to investment priorities would improve economic competitiveness and quality of life in downstate New York.

1.3 Overview of Trends In the Trucking and Warehousing Industry

Metropolitan areas in the United States are experiencing unprecedented challenges to mobility. In

the decade 1988-1998 metropolitan traffic has grown by 30 percent, resulting in chronic gridlock. According to U.S. DOT forecast[18], in the next 10 years the number of cars on the U.S. roads will increase by 50 percent. American spend 2 billion hours per year stuck in traffic, and annual cost of congestion has reached in 1998 over $48 billion in lost productivity.

Trucks play a major role in freight transportation both in the U.S. and especially in our region. In 1998, commercial trucks in U.S. represented 9.5% of all registered motor vehicles and transported $486 billion in gross freight revenues, representing 86% of the nation's freight bill[19]. In 1998, trucking's share of the primary shipment volume in U.S. was 7.7 billion tons or 63.3% of the total volume (bulk and general freight) transported by all modes (rail, intermodal, air, water, pipeline)[20]. In 1998, 1,037 billion ton-miles were logged by intercity trucks, representing 29% of the total domestic intercity ton-miles logged by all modes. In the New York metropolitan region, the dependency on trucks is even greater. Freight movement in the metropolitan area is dominated by truck transportation representing over 90% of all freight movement in the area--two times higher than the national percentage[21]. For the transport of goods originating in or destined for the NYMTC region counties (not including regional through movements), the truck modal share for commodity flows by weight accounts for 73%, while water transport accounts for 26% and the remaining 1% is split between air and rail mode[22].

While the trucking industry provides reliable, flexible, and economical service, the growth of trucking has contributed to concerns about safety, congestion, pollution, and highway deterioration. Additionally, increasingly costly fuel has also precipitated higher transportation costs.

An additional issue that is currently facing the trucking industry is the lack of qualified drivers. In 1999, *Journal of Commerce*[23] estimated that truck carriers in the United States need 30,000 new drivers a year for the next ten years in order to meet the current demand. In the New York metropolitan region, several surveyed businesses stated that a shortage of qualified drivers is impairing their ability to meet the needs of the shippers. Currently, some of the trucking firms have to turn down business because of the lack of drivers.

Warehousing is closely connected to truck transportation (see **Fig.3**). The availability of adequate warehousing and distribution facilities is an important element in defining the competitiveness of the region's manufacturing and transportation industry. Recently, the role of warehouses in the supply chain is changing rapidly. The traditional warehouse, meaning a temporary storage facility tending to specialize with regard to function and commodity, is rapidly being replaced by service and distribution centers, answering to the growing demand for value-added and custom services. These service and distribution centers often provide such services as: reconditioning and repacking, consolidation, weighing and sorting, stockpiling, product mixing, distribution and discharge, export and foreign trade zone *(FTZ)* handling, and logistics. These functions, as well as "just-in-time" distribution system, have changed the physical layout and operation of facilities. The new distribution centers, while responding to requirements to decrease cost and meet customer's demands, will have to adapt their layout and operations to the new functions (see **Fig.4**). This will not be easy in the congested metropolitan area. The survey concluded that the number of warehouses located in New York City has declined in recent years, due to a combination of factors, including

land cost, traffic congestion, poor access, tolls, and competition from New Jersey. Many warehouses have either gone out of business or relocated to other states.

2.0 Description Of Truck Terminals And Warehouse Centers In the New York Metropolitan Area

The location of truck terminals is largely dependent on the road system, particularly the expressway system. Access to major through-routes, to the central business district and customer market, and to the region as a whole are vital factors in locating a truck terminal. Real estate costs are also an important factor. In the New York metropolitan region, many truck terminals are located not within the city, but rather in northern New Jersey or in the New York suburbs, often in connection with local manufacturing or distribution facility. Terminal location and design has adapted to the changes in cargo movement technology, such as advances in vehicle design, the expansion of the interstate highway system, better efficiencies in loading and unloading system and the advent of freight containerization.

Truck terminals form an important link in the movement of cargo in the metropolitan area. While the nation-wide trend is towards increasing the size of terminals, most of the terminals in the metropolitan area are still of moderate size, with 75% having fewer than 20 truck bays. At present there are no estimates of the total number of truck terminals in the entire metropolitan region but a 1996 study by Wilbur Smith & Associates estimated that there are about 300 Class I (with revenue over $1 million per year) and Class II terminals in the five boroughs of New York City. There has been little change in the total number of truck terminals in recent years within the metropolitan area due to the trend toward larger terminal size and the movement of terminals to west of the Hudson River.

Compared to other parts of the three-state metropolitan region, especially to northern New Jersey, the warehousing industry in New York City is not flourishing, mainly because of the high cost of business, scarcity of available land, and increasing traffic congestion. According to the Port Authority's *Future Port Warehouse Requirements Study*[24], among the five boroughs of New York City, Manhattan maintained its lead position in warehousing, and showed continuing growth. In contrast, the role of Brooklyn, where the majority of warehouses handling oceanborne cargo is located, is declining, partially due to congestion on the highway network, older warehousing facilities, and an overall smaller share of port trade on the New York side.

According to data collected for this study, employment in the *Trucking and Warehousing Industries* (standard industrial classification SIC 4200) grew by 21.8% in the 10-county NYMTC region between 1986 to 1995. Significant gains in employment were seen in Manhattan, Queens and Suffolk County while Brooklyn and Westchester County experienced sizeable job losses during these ten years. Public warehousing is the major category described by establishments in most counties, accounting for 62 percent of surveyed establishments. Food and general commodities are the most common products handled by the surveyed firms.

The public warehousing industry (SIC 4220) plays an important role in the delivery of perishables,

particularly food products. In the New York region there is a lack of sufficient refrigerated space with modern equipment, necessary to support this industry. The region's warehouse operators are acting in a very competitive environment and are focusing on decreasing costs while increasing or maintaining competitive levels of customer service. Several warehouse operators maintain their own truck fleets to service the facility and attract customers under a total distribution package. Few operators, mainly those connected to a manufacturing facility, work double shifts today. Logistics play an increasingly important role in warehousing operations, however, in the New York area most facilities use it only in a limited role. Just-in-time or lean inventory systems requires distribution for same-day order packing and shipping, and many firms have reorganized their shop floor to accommodate fast deliveries, and storing products according to their priority. Lack of dock access space is also a serious hindrance to the development of this system.

2.1 Commodities

In 1997, the value of commodities transported within New York State was $675 million or approximately 12% of the national commodity flow value. By weight, this freight measured 403 million tons. Trucks carried 76% of the dollar value of goods shipped in the state, 90% of the tonnage of those shipments and 95% of the ton-miles traveled of those shipments, about 25% more than the U.S. average[25]. According to the NYMTC's Regional Freight Plan Project (Cambridge Systematics presentation, see **Fig.5 and Fig.6**), in the NYMTC metropolitan area, the predominant transported commodities are shown below.

TABLE 1
Top Commodities for the NYMTC Region, by Weight and Value [26]

Inbound by Value		Inbound by Weight		Outbound by Value		Outbound by Weight	
Commodity	Percent	Commodity	Percent	Commodity	Percent	Commodity	Percent
Food or kindred products	21%	Food or kindred products	17%	Secondary cargo or drayage	20%	Petroleum or coal products	30%
Machinery, excluding electrical	13%	Petroleum or coal products	14%	Instruments, photo or optical goods, watches	11%	Secondary cargo or drayage	24%
Electrical machinery or equipment	11%	Clay, concrete, glass, stone products	13%	Apparel, finished textile products	9%	Food or kindred products	8%
Transportation equipment	10%	Secondary cargo or drayage	13%	Electrical machinery or equipment	8%	Waste or scrap materials	8%
Secondary cargo or drayage	8%	Chemicals or allied products	9%	Transportation equipment	8%	Clay, concrete, glass, stone products	7%

Inbound by Value		Inbound by Weight		Outbound by Value		Outbound by Weight	
Commodity	Percent	Commodity	Percent	Commodity	Percent	Commodity	Percent
Chemicals or allied products	7%	Waste or scrap materials	5%	Chemicals or allied products	6%	Chemicals or allied products	6%
Instruments, photo or optical goods, watches	5%	Lumber or wood products	5%	Food or kindred products	6%	Pulp, paper or allied products	3%
Other	25%	Other	24%	Other	32%	Other	14%

New York City is mostly an importer of commodities, it absorbs 60% of goods into the region, and exports 40% outbound from the region[27]. Top regional through commodities are by weight: secondary cargos and drayage (22%), chemicals or allied products (17%), paper, pulp or allied products (9%), food or kindred products (9%), and metal products. Regional through commodities by value are: machinery and electrical machinery, chemicals, secondary cargo and drayage, rubber and plastics products, metal products, and instruments (per *NYMYC Regional Freight Plan*).

The 1999 NYMTC survey of region's warehouse (see *Appendix B*) presents the following main stored commodities:

TABLE 2
Main Commodities Stored in the Region's Warehouses **(from survey)**

Bronx	Brooklyn	Manhattan	Queens	Richmond	Nassau	Putnam	Rockland	Suffolk	Westchest.
Furniture	Food	Food	Food	Electrical equipment	Household items	Food	Food	Beverage	Fuel oil
Medical waste	Machinery	Machinery	Beverages	Paper product	Appliance & General merchand.	Fuel & motor oil	Fuel oil	Food	Food & beverage
Food	Electrical machinery	Small packages	Machinery		Health & beauty aids	Machinery	Auto parts	Apparel	Furniture
Fuel oil	Small packages	Household items	Electrical equipment		Pharmaceutical products	Electrical machinery	Pharmaceutical products	Pharmaceutical products	Construction material
Paper product	Household items	Office Equipment	Office equipment		Paper product	Furniture	Furniture	Household items	Household items
Household items	Beverage	Paper products	Mail		Auto parts	Paper products	Apparel	Health & beauty aids	Paper products

2.2 Current And Future Environment For Trucking And Warehousing

The demand for freight transportation is high, and in 1994 it accounted for 6.3 percent of Gross

Domestic Product, not including revenues spent on inventory, warehousing and logistics services[28]. According to American Trucking Association analysis[29], in the next decade the volume of freight transported in the U.S. is expected to grow more slowly than in the last five years, and average annual U.S. economic growth will remain in the 2% to 2.5% range. Trucks will continue to dominate the freight transportation market and will continue to claim the largest share of primary shipment revenues (80.3% in 2007). However, increasing congestion and worsening roads add to the cost of driving in New York region. It has been estimated that 28% of New York urban highways are congested, which reduces economic productivity, worsens air quality and adds to motorists' fuel costs. Vehicle travel in NYC increased by 23% from 1987 to 1997 and is expected to jump another 35% by the year 2015, while population growth in the same period increased only by 2%. Congestion costs in the state can be expected to increase along with the increase in vehicle travel. The additional vehicle operating costs *(VOC)* are due to substandard roads. Overall vehicle miles of travel *(VMT)* in the state is expected to increase to 163 billion annually by 2015, 35% higher than today. The state ranks 8th in the nation in the number of licensed drivers per lane mile (240 drivers, while the nation's average is 153), and 10th in vehicle mile traveled per lane mile, with 1.9 million VMT annually. New York has the highest percentage of bridges in the country in need of repair or improvement -- 59%. Almost 39% of NYS's major non-interstate roads have lane widths less than 12 feet, which is consider optimum for safety on major roads. Twenty-four percent of New York's major roads are in poor or mediocre condition, and roadway conditions are a factor in an estimated 30% of traffic fatalities. The FHWA has found that every $100 million spent on highway safety improvements will result in 145 fewer traffic fatalities over a 10-year period[30]. The improvement of New York region's transportation infrastructure is the major task facing transportation agencies and operators.

Various government agencies are planning several actions to improve trucking and warehousing activities[31]. Some of them are already in progress:

- Increase Non-Peak Hours delivery and service, through toll incentives and cooperation between the private sector and government agencies.
- Improve the region's infrastructure by removing clearance and weight restrictions, widening and repairing streets and improving access to facilities, and providing designated freight lanes on some highways.
- E-Z Pass enhancements and wider E-Z Pass toll lanes for commercial vehicles.
- Improve parking system in the New York City, including In-Vehicle-Parking-Devices (IVPD) for trucks
- Coordinate Transportation System Management (TSM) which can maximize capacity of present transportation system.
- Discuss with the City's agencies to improve delivery and truck security, by improving police work, and remove its prejudice against truck drivers.
- Help to modernize and expand existing facilities by financing and advices through the professional groups and organizations.

The other action taken by the New York government agencies to improve commodity flow is to revitalize regional freight rail with the goal of removing some of the trucks from the roads. The

steps taken include recent privatization of LIRR freight operation, competitive Class I rail access to east of Hudson region, revitalization of Oak Point Link and Harlem River Yard intermodal terminals and building a new intermodal terminal on Long Island (Pilgrim State), and restoration of Staten Island Railway and Arlington Yard.

In the next decade, the domestic transportation industry will continue to be affected by tightening costs, substantial changes in logistics and information technology, and the U.S.' position in world trade as exporter of high-value goods and importer of consumer products. Freight logistics and information technology will remain an increasingly important tool in managing freight flows. Logistics seeks to eliminate unnecessary inventory from the production and warehousing. One option is "crossdocking", defined as the movement of full pallets of merchandise from a receiving dock to an outbound load, but applying also to interfaces between manufacturer and retailer, or crossdocking between two trading partners anywhere in the supply chain[32]. Technology includes also often sophisticated information systems to manage a low-inventory operation, and the automated picking system (see **Fig.7**), including automatic storage and retrieval systems, carousels, mobile carts, and other modern equipment[33]. The role of warehouses in the supply chain is changing, and in the next decade will include more value-added customizing services. Current trend is to reduce the number of warehouses in the system. One of the greatest achievement for logistics during the last 20 years has been acceleration in inventory velocity. Information and communication system advances have allowed companies to substitute information for inventory. Third party logistics (3PL) services are in demand (see **Fig. 8 & 9**). And the emergence of faster, more reliable transportation services has allowed companies to deliver goods in much shorter time. Also, inclusion of new technologies, such as ITS (including EZ-Pass system) helps to fight traffic congestion. However, unless large investments are introduced, the region will in the future continue its dependency of the trucks.

3.0 Comparison with Previous Survey Results, Focusing on Critical Issues

The comparison of current and former surveys shows the similarity of the main issues facing the trucking freight industry over the last five year period. The response rate is low, due to private industry's desire for confidentiality and its lack in confidence in the role of government. Congestion is still the primary issue stated as impacting the efficient movement of freight, especially within New York City. The rate of complaints about congestion remained steady from 1995 to 1999; however, in New York City the percentage of survey participants mentioning this issue as a main concern rose from 92% to 95%. Complaints on problem related to access to facilities in New York City also increased in the time between the two surveys, from 61% to 73%, and in the region from 38% to 54%, due mostly to worsening infrastructure conditions. For comparison of the 1995 and 1999 survey see *Table 3* on pg. 12.

TABLE 3
Comparison of 1995 and 1999 Surveys Results

County (Note: NYC includes five counties)	Total Number of Responses		Total Response Rate (%)		Facility Type						Transportation Related Problem							
					Truck Terminal		Warehouse		Both		Congestion				Access Problem			
											Response Number		Response Rate (%)		Response Number		Response Rate (%)	
Year of Survey:	95	99	95	99	95	99	95	99	95	99	95	99	95	99	95	99	95	99
New York City	49	42	38	26	12	8	13	11	24	23	45	40	92	95	30	31	61	73
Nassau	22	20	12	11	2	0	15	15	5	5	18	17	82	85	5	4	23	20
Putnam	11	40	20	42	2	4	7	24	2	12	6	24	55	60	5	23	45	57
Rockland	22	15	18	13	4	2	4	11	14	2	10	6	45	40	5	6	23	40
Suffolk	27	17	36	19	8	4	11	5	8	8	17	16	63	94	4	6	15	35
Westchester	18	30	6	10	1	11	8	17	9	2	10	7	56	23	7	9	39	30
Total	149	164	22	16	29	29	58	83	62	52	106	110	71	68	56	79	38	54

3.1 Description Of Surveyed Facilities:

Responses from the 1999 questionnaire are categorized as follows: 18% of the responses were from truck terminal operators, 51% from warehouse operators, and 31% from operators of facilities with both functions.

Most of the surveyed facilities are middle-sized or smaller. About 45% of them are in Class I (revenues of $1 million or more annually) and the rest are in Class II (revenue below $1 million annually). Employment in the surveyed facilities in the 10-county region varies from 3 to 260 employees. The number of trucks operating from the facilities ranges from 3 to 130. Some facilities use outside trucking services to distribute their goods. The size of the facilities range from 5,000 to 380,000 square feet and lot size range from ½ acre to 10 acres. Some facilities operate from rented space and do not have any additional acreage available. The East River Facilities Study, conducted in 1988 by the PANY&NJ, found that Brooklyn warehouses ranged in size from 15,000 to 1.5 million square feet, with average size about 400,000 square feet. Currently, the average size of facility (in square feet) in every county of the NYMTC region, based on survey responses, was as below *(Table 4)*:

TABLE 4
The Average Size of Facilities (in square feet) In the NYMTC Region (from 1999 Survey)

New York City					Nassau	Putnam	Rockland	Suffolk	Westche-ster	Total Average
Bronx	Brooklyn	Manhattan	Queens	Staten Island						
55,300	96,200	49,000	96,700	120,000	76,600	30,200	109,800	102,300	49,000	76,200

Several specific transportation related problems were pointed out in the 1999 survey responses. They are summarized in the *Table 5* below:

TABLE 5
Transportation Related Problems (Number and Percent of Respondents)

Transportation Related Problems	COUNTIES											
	NYC (five boroughs)		Nassau		Putnam		Rockland		Suffolk		Westchester	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Road Congestion - Major (over 15 min.)	22	55%	10	50%	4	10%	4	27%	5	29%	2	7%
Road Congestion - Minor (5-15 min)	17	43%	6	30%	13	32%	2	13%	7	41%	8	27%
Construction on the roads	12	30%	3	15%	5	12%	2	13%	4	24%	2	7%
Uncoordinated/missing traffic lights and traffic signs	7	18%	3	15%	5	12%	1	7%	1	6%	1	3%
Delays due to accidents/incidents handling	5	12%	1	5%	3	8%	1	7%	1	6%	1	3%
Delay due to infrastructure (roads) geometry & road conditions	17	43%	2	10%	15	37%	2	13%	3	18%	9	30%
Parking problems	8	20%	1	5%	0	0	1	7%	1	6%	1	3%
Insufficient police supervision & law enforcing/Security problems	14	23%	2	10%	4	10%	3	20%	1	6%	2	7%
Tolls	2	5%	0	0	3	8%	2	13%	0	0	1	3%
Labor issue/Drivers shortage	1	2%	1	5%	2	5%	0	0	0	0	0	0
Legal problems	9	22%	2	10%	4	10%	2	13%	2	12%	1	3%
Access problem (incl. clearance)	17	43%	2	10%	13	33%	5	33%	4	24%	7	23%
Internal problem (building/dock/lot's inadequacy)	13	32%	2	10%	7	18%	4	27%	4	24%	3	10%

4.0 Description Of the Main Problems Indicated In the Survey

Most survey respondents indicated congestion, both on the access highways and on the local streets, as a major barrier to freight mobility and timely distribution of goods. Also, deteriorated road conditions, lack of parking space, construction performed during peak travel periods, poor synchronization of traffic lights, hostile police attitude against truckers and unresolved legal problems contribute to increased delivery difficulties. Several facilities included information about their access problems and the need to improve local infrastructure including enlargement and modernization of docks. As a means to address these issues, the survey respondents identified several bottlenecks and often provided suggestions regarding improvements. The number in parentheses in the text apply to the unique identification number of every surveyed facility, as listed in Appendix A and B. The main problems listed in questionnaires and improvement suggestions are as follows:

Congestion:

- Construction on highways create delays and congestion *(S-7, W-2)*. Construction on highways and on the city streets should be done more effectively and within a shorter timeframe *(NYC-19, NYC-24, N-1, N-10, N-11, N-13, P-34)*. Construction and repairs on the main thoroughfares is the problem and should be conducted at nights, never in the rush hours *(NYC-12, 13, 14, 22, 24, 28, 29, 38, 39, N-1, P-8, 14, 35)*.

- The major highways and those which are most congested highways (Brooklyn-Queens Expressway, Gowanus expressway, Long Island Expressway (LIE) should be widened wherever feasible *(NYC-4, 29, 35, P-1, P-33, 34, 35)*.

- Create express freight lanes on congested highways, especially on the LIE *(N-19)*.

Access/Infrastructure:

- Create effective truck routes directed from access points of the city to the main distribution points within the city *(NYC-32, 33)*. Passenger cars on truck routes should be not allowed at certain hours *(NYC-20)*. Truck routes should accommodate overweight loads *(NYC-32)*. There is a limited number of roads which trucks over 5 tons can use. Streets which are unable to accommodate large trucks should be excluded from the system by finding alternate routes *(NYC-6)*.

- More rail sidings should be investigated to eliminate part of trailer traffic. There is only one rail line entering the city. The rail line on the west side of Manhattan should be revitalized, to help in the delivery of goods. *(NYC-1)*

- Vehicular tunnels to Manhattan such as the Holland, Lincoln, Queens-Midtown and Brooklyn-Battery tunnels have clearance restrictions and can not accommodate larger trucks *(NYC-6, 7, 10, 15, 22, 24, 25, 42)*. As a result, all larger trucks entering Manhattan have to use the George Washington or the Verrazano-Narrows bridges. Build a new tunnel from New Jersey for freight only *(NYC-25)*. A new full height tunnel or bridge leading from New

Jersey to Manhattan and Long Island will improve traffic congestion on the crossing. Also, the access routes to the Queens-Midtown Tunnel need improvement *(NYC-26)*.

- Several city bridges have weight and clearance restrictions, hampering the movement of large trucks *(P-8, P-36)*. The Manhattan *(NYC-19)* and Williamsburg bridges *(NYC-10),* as well as Queens- Midtown Tunnel and Queensboro Bridge *(NYC-10, 26)* have height and weight restrictions.

- Several streets within the city and region are in a state of disrepair, creating an unsafe environment *(S-3)*. Some streets are too narrow *(N-12, P-1)*. Improve the City's infrastructure by improving existing street conditions and repairing potholes, cracks, and the street's surface *(NYC-8, 12, 15, 19, 30, 40, N-16, P-1, P-2, P-4, P-13)*. Improve the bottleneck at the Cross Island Parkway and Whitestone Bridge interchange *(NYC-39)*.

- Potholes and cracks in blacktop create an unsafe environment for trucks. Cobblestone street surfaces create wheel slippage in wet weather. *(NYC-8, 40)*. The geometry of some streets makes it difficult to move trucks around *(NYC-12, 17, 30)*. The geometry and interconnection of these streets should be improved, or alternative truck access needs to be found *(NYC-6, 9, 12, 39)*. Road conditions *(NYC-5, 19)* should be systematically reviewed and maintenance repairs carried out early. Some roads have no or insufficient flood drainage *(NYC-28)*.

- Streets under the elevated subway routes have insufficient vertical clearances for larger trucks. In the future rebuilding of the subway system, this problem should be addressed. In the meantime, alternative routes should be found to facilitate local delivery *(NYC-33, P-35, P-36)*. There is insufficient quantity of lanes on Rt. 22 in Brewster, Putnam County *(P-24)*.

- More parking space for delivery trucks is needed *(NYC-3, 16, 19, 22, 31, 32, 39, P-36, N-4, N-10)*. Provide more curbside parking space for delivery trucks and eliminate non-commercial street parking during business delivery times in commercial areas, such as at 46th to 49th Street and between Broadway & 8th Avenue *(NYC-7, 16)*. Review the city's parking policy of "no-standing" in commercial areas as at 42nd, 49th, 50th, and 57th streets, at certain hours *(NYC-7, 19)*. There is not enough curb space to accommodate commercial vehicles *(NYC-22)*. Parking regulations should accommodate needs for delivery, for example provide a "no-standing zone" in some hours at places of delivery. In some areas, local ordinances prohibit overnight parking of trucks, e.g in Orangeburg, Rockland County *(R-4)*.

- Legal regulations can help local businesses. In the area of Van Dyke Street (Brooklyn), where the double-parking is a common occurrence, businesses have asked for re-zoning of no-standing zones to create a larger receiving area which in turn keeps trucks from going the wrong way on local streets or using adjacent sidewalks *(NYC-7)*.

- Access road problem, due to road conditions *(P-10)*

Safety and Enforcement:

- Enforce existing laws for double-parking, keeping curb space clear *(NYC-27),* and for ambulance access *(NYC-31)*. Improve traffic police work, with more friendly attitude from police to truckers, and more cooperation from city officials especially on parking zone issues *(NYC-15, 33, P-12)*.

- The police should enforce traffic laws and regulations to help the delivery system run more smoothly. Cars blocking loading doors or double-parked should be fined *(NYC-7, 24, 31)*. The police do not understand the needs of commercial vehicle operators who are excessively ticketed while delivering goods. Police should prevent excessive speed on some roads *(R-7)*.

- Police should be more alert to security problems *(R-3)*. Security and the safety of drivers is a major concern. Trucking and warehouse companies complain about losses and stolen merchandise during delivery stops *(P-36)*. To prevent theft, many companies are forced to put an extra person in the vehicle *(NYC-22, 32)*. The drivers want to park close to their destination because of concerns over cargo security in their unattended trucks. In-vehicle security systems need improvement-- special locks and alarms require additional time from driver *(NYC-32, 36)*. Police should help community businesses by cruising and promptly issuing penalty fines for double parking *(Example: Van Brunt St. Brooklyn, NYC-8)*, for dirty streets, for debris blocking access *(NYC-32, 34, 37)*, and illegal small businesses and panhandlers operating on sidewalks *(NYC-37)*.

- There are excessive penalties for parking and the police have an antagonistic attitude towards truckers *(NYC-15, 20, N-10, P-34)*.

- Trucks are routinely stopped and inspected on the New York State Thruway and New Jersey Turnpike. One delivery company has proposed to issue a special sticker, valid for 4 to 6 months, issued at the location of first inspection to avoid delays due to similiar inspection in neighboring jurisdictions *(NYC-17)*.

Road Operation:

- Poor accidents and incidents handling results in serious delays in delivery *(NYC-12, 14, 16, 38, N-10, P-3, R-1)*.

- Traffic lights are not timed correctly *(NYC-29)*. Traffic lights and signs should be better synchronized *(S-5)* and re-timed in some places, to better direct the truck traffic *(NYC-15, 24, 28, 30, 38, 39, 40, N-12, 14, P-1, 6, 12, 35, R-8)*. Not enough signs directing trucks in the Bronx (Boston Road Area) *(NYC-6)*, wrong lights on intersection of I-878 and Peninsula Blvd. *(N-14)*. Install turning signal, westbound, at the intersection of Mill Rd and Hanse Ave, in Freeport, LI *(N-14)*.

- Develop a congestion pricing program as an incentive for off-peak travel & delivery *(NYC-*

13, 18, P-33)

Note: In October 2000, NJ Turnpike introduced a peak/off-peak toll structure. Tolls for E-Z pass users traveling at times other than 7 to 9 am and 4:30 to 6:30 pm will be 8% less than tolls charged during these hours. Also, in January 2001 the Port Authority (PANY&NJ) has accepted a plan to introduce variable tolls at the Hudson River crossings and Staten Island bridges under their jurisdiction. The new system will take effect on March 25, 2001.

Technology:

- To reduce delays due to accidents and incidents, the Intelligent Transportation System (ITS) program with immediate (emergency service) response system should be introduced and used within the city *(NYC-19, 26, 38, R-1)*. Also, information systems should be developed allow trucking companies to find alternate routes for their delivery in case of local congestion *(NYC-10, P-34, R-10)*. This will require cooperation of the private sector, especially trucking companies *(NYC-40)*.

- The EZ-Pass system should offer commercial vehicle discounts for off-peak use of bridge and tunnel crossings, as well as discounts for Alternate Fuel Vehicles (AFV) *(NYC-32)*.
  Note: New PANY&NJ variable toll plan, effective in March 2001, introduced in New York City in 2001, provides a discount for off-peak use of crossing facilities.

- Introduce "congestion priced" curb-side electronic parking meters (similar to EZ-Pass) that would encourage curb-side turn-over in Midtown and Lower Manhattan commercial zones. This program would discourage commercial vehicles from parking at the curb for long periods of time, reduce double-parking, the "cruising" of delivery vehicles, and reduce illegal activity, such as unloading at a bus stop. The Metro Chapter of the NYS Motor Truck Association (NYSMTA) has worked with the City in testing this proposal *(NYC-31)*.

- Designation of "green curbs" where Alternative Fuel Vehicles (AFV) would be allowed exclusive short-term curb-side parking access *(NYC-32)*. This would induce delivery trucks to switch from diesel to compressed natural gas (CNG). While this would not directly affect traffic flow, it would reduce emission levels associated with delivery trucks and reduce the operating costs of AFVs. This project has been discussed with NYCDOT, the Environmental Business Association of NY, Inc., and the Metropolitan Transit Authority (MTA) *(NYC-32)*.

- More logistics approach to business strategies *(NYC-30, R-5)*.

Internal Problems:

- Insufficient space for physical expansion *(NYC-22, R-1)*.

- Improve local infrastructure especially access streets wherever possible *(NYC-1, S-1)*.

- Build freight elevators to bring the goods to store basements or onto loading docks. Increase docking space, improve docks and dock access *(NYC-14, 24,31, P-2)* Insufficient loading dock space *(NYC-30)*.

- Physical infrastructure constraints such as inadequate docks, lack of drop-off areas and unloading zones restricted by narrow streets, have created difficulty in operating the facility and timely delivery of goods *(NYC-10, 30, S-7)*. In new buildings, adequate (truck docking) space should be provided; in existing facilities, the police should help to keep the street adjacent to the delivery area clear and not blocked by other vehicles *(NYC-21, 31)*. Deliveries will go more smoothly if smaller delivery vehicles are used *(NYC-6)*. Consolidate shipments and use more frequent, smaller deliveries. Delivery is faster if conducted during the non-rush hours (6PM to 6AM), if possible *(NYC-28)*.

- Move commodity flow to off-peak delivery *(NYC-6, P-35)*

- Labor problems and driver shortages can disrupt delivery schedules *(NYC-31, N-2, N-9, P-5, P-8)*.

Others:

- Tolls on bridges and tunnels entering the city are too high *(NYC-18, R-12)*. Eliminate or reduce high tolls on bridge and tunnel approaches to New York City *(P33, 34, 40)*. Toll collection at the Tappan Zee Bridge causes delays *(R-12)*. The toll pricing should accommodate truck movements and provide lower tolls for off-peak traffic *(NYC-8, 15, 18)*. *Note: New (2001) toll system on PANY&NJ-managed crossings provides lower tolls for off-peak traffic*.

- One delivery company has proposed to make a changes in legal regulations: to let minor summons to be resolved without representation of attorney. The company states that as a corporation they are required to be represented by counsel, which unnecessarily increases costs for even a minor summons due to the attorney fee. The company feels that corporations should represent themselves for minor summons *(NYC-16)*. In Newburgh, rerouting of oil trucks causes delay and bottleneck *(P-10)*.

- Too many shopping malls within a 2-mile radius create traffic jams in Inwood, in Long Island *(N-8, 9)*.

- Close the High Occupancy Vehicle (HOV) lanes on the Long Island Expressway: few cars use it, but it creates more congestion on remaining lanes *(N-18, 19, S-4)*.

5.0 Conclusions

Over the last 25 years, the economy of the New York region has shifted from the manufacturing-based to a service-based and hi-tech economy. Eighty-seven percent of the region's employment

is now in these industries. This shift has generated more demand for the flexible and reliable movement of smaller and high-valued, often time-sensitive goods, such as food, clothing, paper products and electronic equipment. To accommodate the "just-in-time" delivery of goods, businesses have reduced the amount of inventory held in warehouses and are using a more logistics approach to stockpiles of inventory. Because of the shortage of available land, most modern warehouses and distribution centers are now located in northern New Jersey, which have excellent connections to the interstate highway network and the North American rail network. Smaller warehouses and establishments related to more localized needs are still located in the New York region. The conclusion of this survey is that the amount of warehousing is decreasing in New York City compared to New Jersey and this trend is unlikely to reverse. However, certain niche markets for warehousing in the region are strong and should be encouraged. These include warehouses that are dedicated to specific commodities (such as certain food, beverage, apparel, furniture) and privately owned and operated warehouses.

In this metropolitan region, truck is the predominant freight mode. However, because of local problems such as highway congestion and aging or inadequate infrastructure, freight transportation has become increasingly costly and unreliable. The region's truck freight network, especially within New York City, cannot accommodate today's larger trucks such as the standard interstate trucks (102-inches wide by 6-feet 6-inches high) because of tight curves, limited clearance and weight restrictions. Therefore, most freight transported in New York City has to use smaller trucks, which increase delivery time and costs. While trucks are only 3 to 5 percent of peak-hour traffic on the most heavily used roads in the region, the traffic delays result in higher delivery costs. According to the *Regional Truck Freight Network Strategic Plan* by PANY&NJ, it now costs twice as much to move a freight container within the New York region as it does in other parts of United States[34].

The survey of truck terminals and warehouses in the NYMTC area resulted in identifying localized bottlenecks and other problems affecting the freight transportation and storage system. The most frequently mentioned problem of the freight industry is traffic congestion. In the 1999 survey, 67% of respondents stated that congestion is their main problem and 48% stated that access to their facility or other infrastructure inadequacy is a major obstacle to the efficient operation. These problems are most prominent in New York City where congestion was listed as a major problem by 95% of the respondents to the survey. Inadequate or obsolete infrastructure was listed by 73% of the survey respondents. The other problems facing industry are inadequate parking, road conditions, inefficient handling of road construction and accidents, uncoordinated traffic signs and lights, high tolls on bridges and tunnels to the City, lack of security, and poor police attitude toward truck drivers. The safety and enforcement problem was listed by 14% of the respondents (35% in the New York City), roadway operation by 10%, technology was mentioned by 9%, and internal problems by 13% of survey respondents.

In conclusion, NYMTC Central Staff isolated several issues of great concern to the trucking industry and has included recommendations to be analyzed by the appropriate public agencies with jurisdiction for the various facilities and systems. Some of the suggestions listed in this report may be progressed through the transportation planning process and included in the Regional Transportation Plan and the Transportation Improvement Program for the downstate New York of

the metropolitan region.

The list of major impediments to more efficient truck freight movement, as collected from the 1999 NYMTC questionnaires, are as listed below:

TABLE 6
Major Problems Listed by Respondents by County

Issue	NYC (5 boroughs)		County									
			Nassau		Putnam		Rockland		Suffolk		Westchester	
	Number of Answers	%	Number of Answers	%	Number of Answers	%	Number of Answers	%	Number of Answers	%	Number of Answers	%
Congestion	40	95	17	85	24	60	6	40	16	94	7	23
Access/ Infrastructure	31	73	4	20	23	57	6	40	6	35	9	30
Safety & Enforcement	14	32	2	10	3	8	3	20	0	0	1	3
Roadway Operation	4	10	3	15	5	13	1	7	2	12	1	3
Technology	7	18	1	5	2	5	3	20	0	0	1	3
Internal Problem	7	18	1	5	5	13	3	20	4	24	1	3
Other	8	20	6	30	6	15	2	13	2	12	2	7

For location of truck terminals and warehouses which answered NYMYC survey see **Fig. 10.**

Glossary of Terms and Abbreviations Related to the Truck Freight Industry

(Ref: "Distribution and Transportation" Handbook, by H.J. Brusel, 1971; http://www.bts.gov/tmip/papers/freight/quick/appa.htm)

Combination vehicle:	An equipment configuration that includes separate power unit (tractor) and at least one trailer.
Commercial trailer:	A trailer used to handle freight in the transportation of goods for others; excludes house trailers, light farm trailers and car trailers.
Dolly:	An auxiliary axle assembly having a fifth wheel used for purpose of converting a semitrailer to a full trailer.
Double:	A combination of two trailers pulled by a power unit. Usually refers to a power unit pulling two 28 ft. trailers.
Freight:	A commodity being transported.
Freight forwarder:	An individual or company that accepts LTL or less-than-carload (LCL) shipment from shippers and combines them into carload or truckload lots. Designated as a common carrier under the Interstate Commerce Act.
Gross Vehicle Weight (GVW):	The maximum allowable fully laden weight of the vehicle and its payload. The most common classification scheme used by manufacturers and by states for trucks and tractors.
LCV:	Longer Combination Vehicle
Less-Than-Truckload (LTL):	Motor carriers operating with loads, whose weight is less than 10,000 lbs and whose load allows other loads to be carried. This excludes package carriers, such as Federal Express, UPS, and US Postal Service.
Power Units:	The control and pulling vehicle for trailers or semi-trailers.
Straight truck:	A vehicle with the cargo body and tractor mounted on the same chassis.
Specialized carrier:	A trucking company franchised to transport articles that because of size, shape, weight, or other inherent characteristics, require special equipment for loading, unloading, and transporting.
Tractor Semitrailer:	A combination vehicle consisting of a power unit (tractor) and a semi-trailer.
Trailer:	A vehicle designed without motive power, to be drawn by another vehicle.
Truck:	A motor vehicle designed to carry an entire load. It may consist of a chassis and body; a chassis cab and body; or it may be of integral construction, so that the body and chassis form a single unit.
Truckload (TL):	Motor carriers operating with loads, whose weight is either in excess of 10,000 lbs or whose load allows no other load to be carried.
Twin trailer:	A short semi-trailer (under 29ft) designed to be operated as part of combination vehicle with a tandem trailer of similar length.

Warehouse — A building where wares or goods are stored, as before being distributed. The warehouse users have three alternates in warehousing service, differentiated primarily by degree of control: private, public, and contract warehouses.

- **Private Warehouse** — A warehouse operated by the owner of the goods stored therein. It can include small stockroom at a manufacturing plant or a huge order-picking facility of the catalog mail order house

- **Public warehouse** — A warehouse operated by a warehouseman engaged in the business of storing goods for hire. The word "public" refers to the fact that the warehouse provides a service to the public, and does not indicate public ownership. The public operator does not own the merchandise which he stores, and usually his company is independent from the firms which do own the inventory.

- **Contract warehouse** — It is a combination of public and private services. Unlike the public warehouse which exists under a month to month agreement, the contract warehouse usually has a long-term arrangement. This contract may be used to govern supplement warehousing services such as packaging, assembly, or other extraordinary activities. In such a cases, the contract provides an element of stability in procurement of specialized services.

Types of public warehouses:

Bulk warehouses:	Public warehouses providing tank storage of liquids and open or sheltered storage of dry products such as coal, sand, salt, stone and chemicals
Commodity warehouses:	Cotton, wool or tobacco warehouses, other agricultural product facilities, and grain elevators
Distribution center:	A public warehouse becomes a distribution center when it performs for any given client those physical distribution functions essential to the effective movement of that particular client's goods to his customers.
Field warehouse:	A public warehouse established on premises of a business concern to effectuate the acquiring of custodianship of commodities by the warehouseman. The primary purpose is to enable the warehouseman to issue warehouse receipts to be used as collateral security by the depositor.
Household goods warehouse:	A public warehouse that provides storage of household effects and other personal possessions. Normally operated by moving & storage companies.
Merchandise warehouse:	A public warehouse for the storage and distribution of products in great variety, that do not require refrigeration for their preservation. Some public merchandise warehouses offer air-conditioned and humidity-controlled facilities and may provide both refrigerated and merchandise warehousing services.
Refrigerated warehouse:	A public warehouse that provides storage, freezing, distribution and related services for perishable foods and certain other products requiring refrigerated protection. *Freezer space:* Refrigerated area with a controlled temperature of 0^{o} F or below. *Cooler space:* Refrigerated areas with controlled temperatures of from 25^{o}F to 60^{o}F *Atmospheric controlled space:* Refrigerated areas with specifically controlled temperatures of 25^{o}F to 60^{o}F and relative humidity of 50% to 70%

- *Bonded warehouses:*

State bonded warehouses:	Public warehouses must be licensed by the state before they can be legally in business. In some cases a bond is required. The amount of the bond may bear some relation to the size of the warehousing operation, and is used for the protection of the storer - in the event that the warehouseman defaults in meeting his liability under law as a warehouseman.
U.S. Custom bonded warehouse:	Until import duty on certain commodities manufactured in foreign countries are paid, the federal government retains control of the goods. According to law, imports awaiting collection of duty must be stored at the importer's expense, in the custody of warehouseman willing and able to furnish a bond that such commodities will not be released until the necessary duties are paid. The bond of Custom-bonded warehouse affords no bonded protection to the depositor of the goods.
U.S. Internal Revenue bonded:	In the case of Internal Revenue warehouses which have posted a bond that guarantees payment of internal revenue tax on goods produced in the U.S. The bond of an IRS bonded warehouse affords no bonded protection to the depositor of the goods.

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