

Changing Freight Transportation Requirements in the Baltimore Metro Region

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Changing Freight Transportation Requirements in the Baltimore Metro Region

**Prepared for the Baltimore Metropolitan Council
The Louis Berger Group, Inc.**

Executive Summary

As part of the freight planning process of the Baltimore Metropolitan Planning Organization, The Louis Berger team contacted 25 companies and one trade association with business activities in the Baltimore Metro Area in June, 2001 to assess their freight transportation requirements and how these needs are changing. The purpose is to see how the structure of the Baltimore economy is changing and how the transport needs of fast growing and emerging industries differ from traditional industries. Of those contacted, 14 provided insights into their freight transport operations, needs and constraints.

For this purpose, the study focused on firms in several industries, in both the traditional industrial base of Baltimore (excluding transportation services), as well as those in the technology-based and knowledge-intensive industries. The selected technology industries for this study were further categorized into high technology and those specifically in biotechnology fields. This study was carried out following the guidelines of the Louis Berger Group's study "Economic Trends and Multimodal Transportation Requirements: NCHRP Report 421" Transportation Research Board, National Research Council (National Academy Press, Washington, DC, 1999). The NCHRP research project developed an approach for considering transportation needs of businesses in the planning process. This Baltimore study is the first effort to apply one aspect of the NCHRP report's approach—obtaining input on freight requirements of the changing economy at the regional level.

Our findings are based on results from interviews with a relatively small number of firms in the Baltimore region. The study findings show that there are some serious freight transport constraints facing firms in Baltimore's traditional base and the biotechnology field. Firms in the high technology field have fewer freight transport issues. Although the study results cannot be considered representative of all industries and economic sectors, they provide an indication of the changing freight transportation requirements for different types of industries and firms in the Baltimore area.

Interviewed firms in Baltimore's traditional economic base rely on rail for many of their freight transport needs. While not all were willing to discuss their concerns regarding rail, rail service for these firms may not be improving, and indeed is



worsening in some cases. Concerns include freight rates rising to the point where rail will no longer be competitive with trucking, and an increase in rail transit times. The non-communicative firms likely prefer to resolve their problems in confidential negotiations with the rail service providers themselves. Moreover, some firms are skeptical regarding the ability of Government to improve rail service or transport problems in general.

Firms in traditional industries also suggested improving access to rail ramps to accelerate movement of multi-modal shipments. Among other potential improvements cited was the need for better infrastructure to improve road access to the port facilities.

Regarding the port, long delays moving containers through piers was cited as a major problem. Some of the comments emphasized the need to operate more efficient marine terminals at the port.

Regarding highways, these firms said they could increase their efficiency by being permitted to use 57' trailers. Another suggestion made is for public authorities to exercise better control over evening shutdowns of highway infrastructure being maintained. Road congestion, especially in the tunnels, increased transport costs for these firms. These time delays can also impose significant transport costs on firms in the high technology and biotechnology industries.

Firms in biotechnology rely on refrigerated trucking and specialized air transport services to move their product. They also rely heavily on overnight express services such as FedEx and other private overnight carriers. They are concerned about pending restrictions on moving hazardous and high-value perishable materials. For those that have grown into international markets, the limited specialized refrigerated international freight lift capability at BWI poses a serious constraint. Given Baltimore City's strategy to develop a biotechnology industry in the Baltimore metro area, the Consultant recommends that consideration be given to how best to address this limitation.

Firms interviewed in other high technology industries (other than biotechnology) also rely on private overnight carriers. They also rely on trucking to meet their freight transport needs. Policy concerns include the impact of a fuel surcharge on the costs of transport. For those with international operations, a change that could increase their competitiveness is to improve the turnaround time for freight inspections conducted by the U.S. Customs Service at the port.

Virtually no firm said that transport issues constrained their ability to attract and retain workers at all levels. For headquarters operations located in the suburban metro area, the commute was actually considered a plus. Most of those interviewed, however, were directors of freight transportation for their companies, so they may naturally put freight concerns to the forefront.



Recommendations

- Promote implementing the study's findings related to construction and maintenance, such as improving enforcement of the timing of publicly announced traffic interruptions for maintenance on given road links;
- Consider needed infrastructure improvements in the areas identified in this study so they can be pursued for implementation to promote lower cost multi-modal operations;
- Continue to promote policies to relieve highway congestion. In general, many public- and private-sector employers are encouraging increased use of telecommuting. From the Consultant's perspective, additional incentives to promote telecommuting will pay dividends in reduced congestion for Baltimore's firms that rely on timely delivery for their freight;
- Encourage the railroads to participate in efforts to increase the competitiveness of their services through meetings with their major customers in small private working groups. The outcome of these working groups would hopefully lead to the rail service providers being better able to match the service expectations of their clients;
- Undertake a study of the potential freight transport demand for temperature-controlled long-distance and international air freight that could be served by BWI;
- Work with the Baltimore City government, MDOT, Maryland Aviation Administration, and appropriate jurisdiction and regional authorities to improve BWI's ability to meet the demand for specialized air freight of the emerging regional biotechnology industry; and
- Undertake a study of the transport constraints facing the overnight parcel delivery services. Improving the operation of this segment of the freight transport supply industry is important to maintain the competitiveness of the high-technology and biotechnology industries, particularly as larger metropolitan areas face increasing congestion in their main corridors.



I. Introduction

This report documents the results of the study done for the Baltimore Metropolitan Council (BMC) by The Louis Berger Group on freight transportation issues facing Baltimore's businesses. The goal of the study is to identify key constraints in moving freight for businesses in the Baltimore metro area in both Baltimore's traditional economic base, and in the technology based and knowledge-intensive industries. The technology industries selected were categorized into general high technology fields, but special attention was given to biotechnology industries. This report is organized as follows. Following presentation of a summary of the scope of work, we present a brief overview of the Baltimore metro economy. Next, we describe how the Berger Team, working with the BMC, selected the sectors for interviews for the study. After selecting the general sectors, we describe how we selected the targeted firms to be interviewed. This is followed by a discussion of the survey questionnaire. The interview process is then described, including some of the lessons the team learned in securing information from the companies selected to be interviewed.

The report concludes with a presentation of the major findings of the study. These include some specific infrastructure and institutional constraints that are affecting the competitiveness of firms interviewed in the Baltimore area. We then present selected results reported by the firms we interviewed grouped by the three main groups of companies. The paper concludes with the consultants' recommendations to improve the competitiveness of the interviewed firms' operations in Baltimore, recommendations for two follow-on studies, and recommendations for the design of future studies of this nature.

Overview of the Study Methodology

This section presents an overview of the study methodology, as elaborated by the Consultant at the outset of the project. As the study progressed, certain refinements and modifications were made. These modifications are discussed in the sections on the interview process.

The objective of the study is to consider how the freight transportation requirements in the Baltimore region are changing as the regional economy continues to shift from the major traditional sectors, such as autos, steel, chemicals, etc., to technology and information-intensive industries. To obtain information on changing transportation requirements, interviews with selected industries were carried out.

To select industries to be interviewed, a brief overview of the Baltimore regional economy is first presented, listing the largest and fastest growing industries. From this overview, several important industries representing traditional, and



technology and information-intensive industries were selected to identify the transportation needs and constraints facing firms in various sectors.

The industries were chosen based on their importance to the Baltimore economy and because they have varied transportation needs representing changing transportation requirements in the regional economy. One group of industries was chosen from Baltimore's traditional economic base, and two others were chosen from the high technology and knowledge-intensive industries. Besides computer, communications and related high tech industries, several biotechnology firms were also selected as this is a priority area being pursued by local and state economic development agencies.

A questionnaire was developed to interview approximately 10 selected firms in the Baltimore region. These firms were interviewed regarding their changing transportation needs and specific issues. Based on the results of the interviews, freight transportation needs and constraints facing these firms were identified. Some general recommendations are then made regarding the need to improve Baltimore's transport system to promote business growth in the profiled sectors and industries.



II. Overview of the Baltimore Economy

The Baltimore metropolitan region is the 17th largest market in the United States with a population of close to 2.5 million people. The metro region includes the cities of Baltimore and Annapolis, as well as Anne Arundel, Baltimore, Carroll, Harford, and Howard counties. The regional economy ranks among the top twenty nationally in terms of inflation-adjusted personal income and retail sales. The Baltimore region has the potential to be a pivotal gateway to the world with a well-developed transportation infrastructure. It is a central hub for national and international commerce, especially due to the vital resources of the Port of Baltimore and Baltimore/Washington International Airport (BWI). Greater Baltimore is also home to four Fortune 500 companies, Baltimore Gas and Electric Company, Black and Decker Corporation, Integrated Health Services, Inc. and US Food Service.

The traditional base of the regional economy is comprised of the manufacturing, trade, and transportation sectors. The manufacturing sector includes firms involved in the processing and production of durable and non-durable goods. The trade sector encompasses businesses involved in the wholesale and retail sale of durable and non-durable goods. The transportation sector is comprised of firms that offer all forms of transportation services, including trucking, air, and water transportation.

As has been the case nationally, the Baltimore economy has witnessed a steady increase in the importance of its service sector. The service sector encompasses a wide array of services, including personal, business, entertainment, legal, health, educational, social, engineering and management services. More specifically, measured by employment, the Baltimore regional economy is led by the service sector, which accounted for about 35% of the metro area's employment in 2000. Trade, encompassing both wholesale and resale trade, is the second leading sector, with 22% of total employment. Government service is the third most important sector in terms of employment, with 17% of the area's total employment. Manufacturing accounts for 8% of employment, followed by construction and the finance/insurance/real estate sector (FIRE) which each represent about 6% of total employment.¹

Although relatively new to the Baltimore economy, many firms in the high technology and information intensive industries are locating in the area. Firms in the high technology and biotechnology fields may hold the keys to the metro area's future, since these areas are some of the fastest growing industries nationally. These firms do not easily fit into the established system for classifying firms into economic sectors.

¹ Bureau of Labor Statistics, data represents conditions as of 2000.



The national economy is experiencing the increased importance of these new firms that do not fit the standard economic sector definitions. Individual firms within these sectors extend into multiple stages and areas of economic activity. The high tech sector includes firms providing communications services, as well as firms manufacturing computers, computer software, and computer-related services. The biotechnology sector is comprised of firms that develop the industrial use of living organisms or biological techniques to such areas as medical care, food processing, agriculture, pharmaceuticals, and waste management.

Sector earnings is also a useful means of evaluating the regional economy. Between 1990 and 1997, regional earnings increased by 14.5%, representing an additional \$5.2 billion. Financial services, a sub-sector of the services sector, led all sectors with a growth rate of 57.9%. Other leading sectors in earnings growth included transportation and utilities (35%), agricultural services (36.6%), and civilian federal government (30.5%).

According to 1997 data, total earnings for the Baltimore region² was also led by the service sector, which accounted for 35.9%. Government followed, accounting for 22.5% of total earnings. Manufacturing accounted for 10% of earnings. The retail trade sector claimed 9.7% of earnings. With the exception of the FIRE sub-sector, sectors that ranked high as accounting for a percentage of total regional employment also ranked high as accounting for a percentage of total regional earnings.

During 1990-97, employment in the Baltimore regional economy grew by 2.8% to 1,447,600 jobs. The services sector led all sectors in job growth, increasing by 16.7%. Other high-growth areas of employment included transportation and public utilities, which grew by 10.2% over this period, and local government, which grew by 8.5%.

Among two-digit SIC (Standard Industrial Classification) codes, the Baltimore region's top five employment sectors were health services (126,200 jobs), business services (78,000 jobs), eating and drinking places (70,400 jobs), special trade contractors (42,400 jobs) and wholesale trade (33,600 jobs). Growth in all these sectors in the region lagged behind national growth rates. For a complete listing of two-digit and four-digit SIC sectors represented by firms in the Baltimore Metro region, see Appendix II.

Growth rates for some sectors outpaced national growth rates during 1990 - 1997. Social services grew by 6.2% annually in the Baltimore region compared to 3.6% nationally. Educational services grew by 3.6% regionally and 3.2% nationally. Communication services expanded by 1.6% in the region compared to 1.5% nationally.

² See Regional Economic Indicators, Baltimore Metropolitan Council, 2000 edition.



The most rapidly declining sectors in the regional economy included electrical and electronic equipment, which declined by 11.3% annually, and miscellaneous services, which declined by 8.8%. The decline in these sectors was less significant than in the 1980s, when they declined at an annual rate of 15.4% and 18.2% respectively.



III. Selecting Sectors/Industries for This Study

In selecting sectors/industries for initial examination, we took into account: the sector/industry's current importance to the Baltimore economy relative to the nation (see Table I - location quotient),³ sector/industry growth in Baltimore relative to the nation from 1988 to 1997, and sector/industry productivity (approximated as sales per employee) in Baltimore. We conducted this analysis at the two-digit and four-digit SIC levels. Employment data for the Baltimore metropolitan area was compiled from US Census county business data and then aggregated. Sector sales data was obtained from the Dun & Bradstreet database.

Prior to selecting sectors/industries, we contacted the Maryland Department of Transportation (MDOT) regarding their recently completed, but not released, study of freight transportation issues in Maryland. MDOT supplied us with a list of the companies involved in their study. Aside from a few firms from traditional sectors, the study concentrated on firms that supply transportation services. So as not to duplicate the MDOT study, the Berger team, in conjunction with the BMC, eliminated the transport industry from consideration.

Table I - Location Quotients for Selected Sectors of the Baltimore Economy

Sector	SIC	Location Quotient
Construction	15	1.25
Chemicals and Allied Products	28	1.33
Rubber and Misc. Plastic Products	30	0.65
Industrial Machinery & Equipment	35	0.41
Electronics	36	0.18
Instruments and Related Products	38	0.43
Water Transportation	44	2.09
Transportation Services	47	1.61
Wholesale Trade	50	0.87
Educational Services	82	1.69

Source: US Census, 1997 County Business Data.

Initially, three sectors -- Construction; Chemicals and Allied Products; and Educational Services, were identified based on their importance to the overall regional economy. According to our analysis, all three sectors constitute a significantly greater percentage of total employment in the Baltimore economy than in the national economy. At the same time, high tech and biotech industries are emerging within the metro economy, although current statistics do not so

³ An industry's (i.e., sector's) location quotient measures the importance of an industry to a region (the Baltimore Metro Area) relative to the importance of that industry to the nation. Usually, as we did, employment is used as the unit of measurement. We focused particularly on industries that had a location quotient greater than 1.0 for the Baltimore metro area, which means that the industry has a higher concentration of employment in the Baltimore area than it does in the U.S.



demonstrate, since many high tech and biotechnology firms have recently located in the region and local/state development agencies have ongoing initiatives to attract firms particularly in the biotechnology sector.

After further discussions with the BMC staff, and based on the focus of the study to identify changing freight transportation requirements, the Berger Team added high tech and biotech industries for further study because of their importance to the City's economic development strategy.⁴ According to a study released by the American Electronics Association and the Nasdaq stock market, the number of high tech jobs in Maryland grew from 87,861 in 1994 to 114,864 in 2000. From 1999 to 2000, the growth rate of jobs in the high-tech industrial sectors in the state was 4.7 percent.

Studying the freight needs of firms in the biotechnology sector is especially timely given the City's emerging development strategy. There appears to be a potential for the growth of biotech industries within the metro area. A study financed by the Abell and Goldseker foundations found that of the 50 biotech companies nationwide responding to its survey, 88 percent expected to expand within five years and 58 percent would consider renting space near the world-renowned Johns Hopkins Hospital and School of Medicine. The City Administration has already moved ahead with a preliminary plan for a major biotechnology park adjacent to the Johns Hopkins medical complex.

Moreover, the Berger Team determined not to study the freight issues of the construction industry because our previous research suggests that their freight transport needs likely have not changed much in the past several decades. Following the same logic, we decided that even though educational services are a major driver of the Baltimore economy, their freight transport needs are likely to be relatively diverse and less important to their competitiveness, and difficult to profile within the scope of this study. We decided to further concentrate our selection process on important and potentially faster growing industrial sectors within the Baltimore economy that also face evolving freight transport needs.

Based on this criteria, growth rates for major regional industries and sales per employee were compiled – see Tables II and III. The Berger Team added “Rubber and Misc. Plastic Products” as a sector to investigate based on this information. This industry grew 25 percent in the metro area between 1988 and 1997, compared to 16 percent nationally. It accounts for close to one percent of the metro area's total sales and about half a percent of the area's employment. We also added “Instruments and Related Products.” This sector grew by 64 percent between 1988 and 1997 in the metro area compared to a 19 percent decline nationally. The industry also accounts for over one percent of the metro economy's total employment. Of the initial sectors identified, we chose to study Chemicals and Allied Products. This sector grew by 38 percent between 1988 and 1997 in the metro area compared to 0.11 percent nationally. It accounts for

⁴ “City Boosts Tech Park,” [Baltimore Sun](#), May 22, 2001



a little over one percent of the metro economy's total employment. All three sectors when viewed broadly are part of the traditional economic base of the Baltimore region. However, it is very important to focus on the firm level in order to determine possible crossover activity into the high-tech/ knowledge-intensive and biotech sectors by individual firms.

Table II
Growth of Selected Sectors of the Baltimore Economy Relative to the National Economy:
1988-1997

Sector	SIC	Baltimore % Growth	National % Growth
Construction	15	-12.62	11.61
Chemicals and Allied Products	28	38.27	0.11
Rubber and Misc. Plastic Products	30	25.17	16.71
Industrial Machinery & Equipment	35	-12.90	1.58
Electronics	36	-53.64	-4.23
Instruments and Related Products	38	64.31	-18.84
Water Transportation	44	25.34	14.59
Transportation Services	47	83.14	31.17
Wholesale Trade	50	-18.69	13.56
Educational Services	82	64.03	33.88

Source: US Census, 1988 & 1997 County Business Data

Table III
Sales Per Employee of Selected Sectors of the Baltimore Economy

Sector	SIC	Sales Per Employee (\$thousands)
Construction	15	350.21
Chemicals and Allied Products	28	230.61
Rubber and Misc. Plastic Products	30	186.00
Industrial Machinery & Equipment	35	155.47
Electronics	36	93.64
Instruments and Related Products	38	15.36
Water Transportation	44	76.74
Transportation Services	47	186.81
Wholesale Trade	50	508.44
Educational Services	82	62.69

Source: Dun & Bradstreet.

Selecting Companies to Interview

In addition to the analysis at the economic sector level above, involving definition of traditional sectors, the Berger Team reviewed the complete listing of the SIC sectors at the four-digit level and selected all that would be associated with high tech, knowledge-intensive and biotech industries. From this selection, the Regional Information Center, affiliated with BMC, compiled a list of companies in these industries with operations in the Baltimore metro area. In consultation with BMC, the Berger team selected firms as candidates for our interviews. After



further consultation with the Baltimore Development Council, the economic development agency for Baltimore City, several other companies were selected for possible interviews regarding their freight transport needs. Table IV shows the SIC codes and their definition for the firms selected to be interviewed.

Table IV
Business Sectors to Interview

General Sector Description	SIC	SIC Definition
Traditional economic base	2816	Titanium dioxide, anatase or rutile (pigments)
	2819	Catalysts, chemical
	2842	Polishes and sanitation goods
	2844	Cosmetic preparations
	2891	Caulking compounds
	3089	Plastics, kitchenware, etc.
	3546	Power driven hand tools
High-technology	3564	Blowers and fans
	3661	Telephone and telegraph apparatus
	3826	Electrolytic conductivity instruments
	3829	Measuring and controlling devices
	5045	Computers, peripherals, and software
Biotechnology	2834	Pharmaceutical preparations
	5047	Medical and hospital equipment
	2836	Biological products, except diagnostic



IV. The Survey Questionnaire and the Interview Process

The Berger Team used as a starting point the survey instrument developed by The Louis Berger Group for the study titled “Economic Trends and Multimodal Transportation Requirements: NCHRP Report 421” under the National Cooperative Highway Research Program, Transportation Research Board, National Research Council (National Academy Press, Washington, DC, 1999). This survey questionnaire was designed to study freight transport needs on a national level and an industry level. We took the survey and tailored it to the specific focus of this study and the sectors targeted for the Baltimore metro area. Much of the transport-industry-specific questions were deleted, and policy-relevant questions specific to Baltimore were added. Overall, we shortened the questionnaire from over 55 questions to 35 questions. See Appendix I for the survey questionnaire used in the study.

The questionnaire was divided into several sections. The survey begins with a “General Information,” section, where we collect the basic profile of the company, the interviewee, and general freight transport operation in the Baltimore area. This is followed by a section of questions that give detail on the transportation requirements of the company. The third section covers specific transport issues, such as: what is most important, cost or reliability. This section also asked for detail on the importance of costs vs. service for different types of transport movements. The fourth section covers recent changes in transport needs and the importance of freight transport to the costs of the company’s operations. This section concludes by asking for some very specific freight transport infrastructure and institutional improvements that would benefit the company’s operations. The questionnaire concludes with an optional section regarding employee transport issues facing the company.

Initially, the Berger Team envisioned calling a pre-arranged contact identified by BMC, or simply calling the CEO’s office of the targeted company and asking for an interview with the company’s freight transport or logistics director to discuss freight transport issues and constraints facing the company. In the introductory phone call, we explained the structure and mission of the BMC, on behalf of the Baltimore Metropolitan Planning Organization (MPO), and that participating in the survey would enable the company to present specific freight transport problems for policy setting and possible recommendations regarding implementation of specific project needs.

Initial phone contacts with companies where BMC supplied a contact were made during the week of June 4, 2001. Usually, when able to reach the appropriate person, we asked to email or fax the questionnaire for the individual to review. In almost all cases, at least after several calls, we were able to email the questionnaire to the appropriate contact in the company. The Consultant also conducted periodic check-up calls with willing interviewees in order to evaluate



the status of surveys pending completion. Typically, a company's logistics director proved to be the most appropriate contact. However, in the case of very large companies with complex organizational structures, individual firm public relations departments proved very helpful in locating the appropriate company contact. The Berger Team kept names and responses confidential.

Calls to companies selected from the Dun & Bradstreet lists where no specific contact was identified by BMC were more problematic. Some of these contacts eventually resulted in very successful interviews, after repeated phone calls and emails, sometimes directed at the company's CEO.

One of the key problems, especially with the companies in the chemical sector, is that they were weary of the interview process to produce policy results. Apparently, companies in the sector had previously been interviewed by different public institutions on their freight transport problems with the promise of policy reform. After spending substantial time on these previous surveys with no apparent subsequent policy reform, the companies determined that participating in surveys of this nature is a waste of their time. Hence, many were somewhat hostile and not very willing to participate nor forthcoming with their issues.

Another problem in carrying out the interviews - as is usually the case in this type of survey - is that people in the freight transport business are all severely pressed for time, so face-to-face interviews were never granted, despite the Berger Team's willingness to interview them at any time at their offices. Moreover, the survey questionnaire was too long and too time consuming for the appropriate person to complete. As a result, we urged potential participants to just answer the general questions if they had the information immediately at hand, and to focus on the policy-relevant questions, the problems they were facing in moving freight for their businesses, and their suggested solutions. We asked them to be as specific as possible in their responses regarding transport infrastructure constraints.

The Berger Team considers any survey response that answered the policy relevant questions, freight transport problems, and possible solutions as relevant responses to the survey. This resulted in a response rate of about 50%, much above the usual response rate of a mail-in survey, but not as high as a carefully pre-arranged survey of key individuals might produce. Some recommendations for future studies are made below on how to improve the participation rate.



V. Major Findings and Recommendations

The Berger Team contacted 25 companies and one trade association with business activities in the Baltimore Metro Area in June, 2001 to consider their freight transportation requirements and how these needs are changing. Of those contacted, 14 provided insights into their freight transport operations, needs and constraints.

The study focused on firms in several industries, in both the traditional industrial base of Baltimore (excluding transportation services), as well as those in the technology-based and knowledge-intensive industries. The selected technology industries for this study were further categorized into high-technology and those specifically in biotechnology fields. Of those firms that offered responses, 6 represented the traditional economic base of the Baltimore region, 4 represented high-tech industries, and 4 represented biotech industries.

Our findings show that there are some serious freight transport constraints facing firms in Baltimore's traditional base, and those in the biotechnology field. The study revealed that firms in the high-technology field, while they have some concerns, have relatively less freight transport issues than firms in the other two groups.

Interviewed firms from Baltimore's traditional economic base rely on rail for many of their freight transport needs. While not all were willing to discuss their specific service problems and some responses were only general, responses and discussions revealed that rail service for these firms may not be improving, and indeed is worsening in some cases. Concerns raised included freight rates rising to the point where rail will no longer be competitive with trucking, and an increase in rail transit times. One company cited increased rail congestion due to excess freight cars. One company said that there was a shortage of fully trained hazmat crews on rail shifts, causing delayed or missed switches.

While some firms in traditional industries were not willing to discuss their problems, others in the sample indicated that some firms probably are reluctant to discuss their problems with local Government units. Some of the firms contacted are big customers of rail services and their specific problems can easily be recognized, so they may prefer instead to resolve their problems in confidential negotiations with the rail service providers themselves. Moreover, there is a degree of skepticism regarding the ability of Government to help improve freight rail service.

Aside from problems strictly with rail service, companies in traditional economic base industries also suggested a number of other transport initiatives that would improve their competitiveness. On a multi-modal level, firms suggested improving access to rail ramps to facilitate movement of intermodal shipments.



Among other potential improvements cited was the need for better infrastructure to improve road access to the port facilities. Even though Baltimore port terminals are generally viewed as having excellent highway access, the Broening Highway and Clinton Street access routes were specifically mentioned.

Regarding the port, long delays moving containers through piers was cited as a major problem. This, according to a shipper of chemicals, is among the reasons why some shipping lines no longer provide service at the Dundalk Marine Terminal and other port terminals, having shifted their service to Norfolk. This may also be a reason for the lack of an adequate number of global carriers servicing the port, which was an expressed concern of at least one of the responding firms. Some of the comments emphasized the need to operate more efficient marine terminals at the port. Another firm also noted the importance of maintenance dredging of the bay channels and also assuring that bay pilots maintain low service rates.

Regarding highways, these firms said they could increase their efficiency by being permitted to use 57' trailers. Another suggestion made by surveyed firms is for public authorities to exercise better control over evening shutdowns of highway infrastructure being maintained. An example given was that a bridge is scheduled for shutdowns in 15 minute intervals, but is often shut down for longer intervals of up to 30 minutes.

Road congestion, especially in the tunnels, increased transport costs for these firms. This was specifically noted by one firm in Baltimore's traditional economic base. While firms in the high-technology and biotechnology industries did not specifically mention these issues, these time delays can also impose significant transport costs on firms in these industries, especially for biotechnology firms. One high-technology firm noted that it has had to rely on the increased use of auto-CAD drawings, emailed contracts/specifications, and audio-visual teleconferencing as a partial alternative to traditional transport methods due to constraints imposed by congestion.

Firms in biotechnology rely on refrigerated trucking and air transport to move their product. They also rely heavily on overnight express parcel services such as FedEx and other private overnight carriers. However, for certain high-value and sensitive products, these firms do not risk shipment through private overnight carriers. Instead, they contract with refrigerated truck firms to deliver their product either to the customer or to an airport with the most appropriate specialized air transport service to their client. Furthermore, they are concerned about restrictions on moving hazardous and high-value perishable materials. For those that have grown into international markets, the limited specialized refrigerated international freight lift capability at BWI poses a potentially serious constraint to developing a biotechnology industry in the Baltimore Metro area. At least one biotechnology firm is forced to ship product via refrigerated trucks to Dulles, JFK and Miami International Airports to reach its international customers.



This suggests that from the international transport perspective, biotechnology firms likely will prefer to locate in the Dulles corridor over Baltimore if international services are not available.

Firms interviewed in high-technology also rely on private overnight carriers, but to a somewhat lesser extent than do the firms in the biotechnology industry. Their products are less time-sensitive than those in the biotechnology industry, but more so than the firms interviewed in Baltimore's traditional industries. They rely heavily on trucking to meet their freight transport needs. Policy concerns include the impact of a fuel surcharge on the costs of transport. One firm expressed concern over the reduced availability of specialized trailer equipment for the shipment of non-standard sized products by truck. For those with international operations, one problem that, if solved could increase their competitiveness is to improve the turnaround time for freight inspections conducted by the U.S. Customs Service at the Port of Baltimore.

Virtually no firm said that transport issues constrained their ability to attract and retain workers at all levels. For headquarters operations located in the suburban metro area, the commute was actually considered a plus. Their workers had shorter and more pleasant commutes than firms in the more congested sections of the metro area. Respondents generally maintained that freight transportation concerns were more important than those for employees. It should be noted that most interviewees were directly involved with company freight issues and not with employee issues.

Of the firms interviewed, some in Baltimore's traditional economic base had phased out over the past decade their production operations requiring major freight transport services. Firms had relocated these operations to the sunbelt or offshore due to cost considerations. These cost considerations were not always clearly freight-related. Freight costs do not represent a significant competitive factor for the remaining headquarters facilities.

We requested that firms offer detailed information regarding transportation constraints, such as specific intersections and roadways. Firms did not relay any more infrastructure specific locations that are not otherwise mentioned within the text of this paper. Time constraints on the part of respondents most assuredly effected the degree of specificity within their respective survey responses.

Selected Results by Sector

Firms in Baltimore's Traditional Sectors. Of the 14 successful responses, 6 are from companies in the traditional sectors, one of which was from a trade association. All of the firms in these sectors rely primarily on rail, trucking, and to a lesser extent private overnight delivery services. Most are freight distribution centers, serving at least regional markets to New England or on the Eastern Seaboard as well as shipments within the metro area. Several are now reduced



to headquarters functions, so their freight transport needs are limited to private overnight delivery services.

Several firms ship substantial amounts of freight internationally. Freight transport costs range from 2% to 8% of total product costs. All ranked reliability first, speed second and cost third or fourth in importance for their general freight transport priorities. When comparing cost vs. service, for almost all freight movements, service was more important. In examining specific problems as outlined in the section above, however, many concerns show that increased costs resulted from delays and what some may classify as “service” problems. Safety of delivery ranked high among concerns, because many deliver chemicals and other hazardous materials. Container availability with specific characteristics such as temperature controls and certain volume or weight limits are relatively less important to the firms interviewed in this industry grouping. The section above notes some of the comments made regarding rail, port and highway services, and intermodal connections.

Firms in Baltimore’s Biotech Sector. Of the 14 responses, 4 are from companies in the biotechnology sector. Some firms that classify themselves as biotechnology firms manufacture batches of newly discovered medications for transport to distant testing facilities. These firms also technically fall into the pharmaceutical category, which in turn is part of the chemicals sector---one of the “traditional” sectors in the metro economy. These firms, however, are readily identifiable from traditional chemical companies by their freight transport needs: refrigerated, temperature-controlled containers for their products, and high-quality private overnight delivery services for their correspondence and documents. These firms use refrigerated trucks, and when serving distant domestic and international markets, temperature-controlled airfreight.

Due to the high-value and sensitivity of certain products, biotech firms are sometimes unable to rely on private overnight parcel services. All ranked reliability as the most important service factor, followed by low loss damage rates, and temperature-controlled facilities. For those shipping in the metro area, or to nearby metro areas, there were few transport concerns. All share concerns over regulations concerning the movement of hazardous materials, and regulations regarding shipments of temperature-controlled freight. In addition to the policy recommendations made in the above section, one internationally oriented company would like to see the port attract more global carriers, and expressed concerns about keeping port-related freight charges low.

Firms in Baltimore’s High-Technology Sector. Of the 14 responses, 4 are from the various other high-technology sectors. These include manufacturing fiber-optic cable, computer equipment, air pollution control devices, other telecommunications and computer related products. The firms interviewed rely heavily on private overnight delivery services, and trucking services for their freight transport needs. Freight transport costs represent 3% to 8% of total



product costs. Reliability, followed by speed, cost, and geographic coverage ranked highest in the importance of freight transport services they require. All are concerned about rising fuel costs and fuel surcharges. In general, these firms expressed the fewest freight transport constraints facing their business of the three groups of firms interviewed. For some firms, being able to ship oversized products to customers was a primary concern. None reported using rail transport services.

Recommendations

This study of the changing freight transportation needs of selected sectors of the Baltimore regional economy is based on a previous similar study conducted by the Louis Berger Group, Inc. regarding national and regional multi-modal transportation requirements of American Business. The study results provide illustrative evidence of the freight transport constraints facing some of the industries operating or emerging in the Baltimore metropolitan area. The study confirms some common and well-known issues for traditional industries as well as some needs, particularly for biotechnology firms that likely would be confirmed in a study with a larger sample of firms. Based on these findings, the MPO, through BMC, should consider how to best obtain this type of information regularly from various industry groups so that their needs are addressed in adopting transport policies and programs that increase the competitiveness of Baltimore's industrial sector. The findings also point to several in-depth studies that would further enable the MPO to craft policy recommendations that would complement the State and local jurisdictions economic development initiatives, particularly the City Government's push to develop the metro area as a high technology and biotechnology industrial center. The following recommendations should also be pursued:

- Promote implementing the study's findings related to construction and maintenance, such as improving enforcement of the timing of publicly announced traffic interruptions for maintenance on given road links;
- Consider needed infrastructure improvements in the areas identified in this study so they can be pursued for implementation to promote lower cost multi-modal operations;
- Continue to promote policies to relieve highway congestion. In general, many public- and private-sector employers are encouraging increased use of telecommuting. From the Consultant's perspective, additional incentives to promote telecommuting will pay dividends in reduced congestion for Baltimore's firms that rely on timely delivery for their freight;
- Encourage the railroads to participate in efforts to increase the competitiveness of their services through meetings with their major customers in small private working groups. The outcome of these working groups would



hopefully lead to the rail service providers being better able to match the service expectations of their clients;

- Undertake a study of the potential freight transport demand for temperature-controlled long-distance and international air freight that could be served by BWI;
- Work with the Baltimore City government, MDOT, Maryland Aviation Administration, and appropriate jurisdiction and regional authorities to improve BWI's ability to meet the demand for specialized air freight of the emerging regional biotechnology industry; and
- Undertake a study of the transport constraints facing the overnight parcel delivery services. Improving the operation of this segment of the freight transport supply industry is important to maintain the competitiveness of the high-technology and biotechnology industries, particularly as larger metropolitan areas face increasing congestion in their main corridors.

Additional Recommendations for Similar Future Studies

- Our findings are based on results from interviews with a relatively small number of firms in the Baltimore region. Although the study results cannot be considered representative of all industries and economic sectors, they provide an indication of the changing freight transportation requirements for different types of industries and firms in the Baltimore area. A similar approach over time can be used to consider all major industry and sector needs.
- In each set of interviews, it is worthwhile to narrow focus to a specific industry, such as biotechnology, rather than broad sectors, where firms will not have necessarily as common a set of freight requirements.
- While developing the list of potential companies to participate, contact appropriate local and regional trade associations to get their support, input and contacts at potential firms to be surveyed.
- Contact relevant government agencies or units in order to ensure that potential companies to be interviewed have not already been surveyed within the recent past regarding their freight transportation needs. Facilitate the sharing of results with other relevant government agencies or units in order to avoid over-surveying of individual firms and sectors. At the same time, assure the confidentiality of the information provided.
- After an initial list of firms is identified, have the Executive Director of BMC, or the relevant executive member write a letter to the CEO or the director of the firm's operations in Baltimore about the upcoming survey, why the firm should



participate, and that a representative of the consulting firm hired by the BMC will be calling to determine if the firm is interested in participating, and if so, who will serve as the corporate liaison during the survey. Do not expect face-to-face interviews in most cases; in today's fast-paced world, interviews can be facilitated and successfully completed by fax, phone and email contacts.

- Have a long list of potential companies to be interviewed if those on the primary list do not wish to participate.
- Limit the questionnaire to no more than 5 - 10 questions that are very relevant to the purpose of the study. Secondary information is either available from the Dun & Bradstreet data set or other data sources, and it is not worth having potential respondents spend their limited time to generate requested answers that are not tightly focused on the purpose of the study.
- Rely on email as much as possible, or
- As an alternative to a survey, invite key corporate representatives to a workshop to discuss and gather the relevant information.
- The current study has illustrated the time pressure most professionals are operating under in the current state of the economy and in general, it is difficult for them to commit their limited time to participate in a survey. In this regard, follow-up by the BMC on the comments made in this survey will make it easier and more relevant for potential future participants in surveys of this type. The concept of periodic meetings with different industries to obtain input on industry problems might be a viable alternative to individual surveys and an activity that can be managed as part of the ongoing planning process.



Appendix I

Business Questionnaire

The purpose of this study, sponsored by the Baltimore Metropolitan Council, is to consider how recent economic developments and industry trends are affecting the freight transportation requirements of Baltimore’s businesses. This information is important to understand how to improve the freight transportation system to most effectively increase the competitiveness of Baltimore’s businesses in the global economy. This questionnaire is designed to solicit the views of selected firms in Baltimore on their future domestic and international freight transportation needs and their suggestions on how to best fulfill these needs. **Please Note: all responses will be kept confidential.**

A. General Information

1. Name of the Interviewee’s Company or Organization:

2. Name of the Interviewee: _____

3. Date: _____

4. Location of Interview: _____

5. Economic Sector (indicate services or manufacturing, and specific activities)

Chemical and Allied Products

Subsector _____

Rubber and Miscellaneous Plastic Products

Subsector _____

Instruments and Related Products

Subsector _____

Computer Manufacturing

Subsector _____

Computer Services

Subsector _____

Biotechnology Products

Subsector _____

Biotechnology Services

Subsector _____

Other

Subsector _____

6. Size of company’s operations in Baltimore: (annual revenues) _____

(employees) _____

(size of primary manufacturing or distribution center building , sq. ft.) _____



7. Is the company's operations and facilities in Baltimore:
- a) Total company operations and facilities
 - b) Headquarters facility only
 - c) Headquarters and some operations
 - d) subsidiary facility of a U.S. company with domestic operations only
 - e) subsidiary facility of a U.S. company with domestic and international operations
 - f) subsidiary facility of foreign-owned company?

8. What is your role and/or position in your company? _____

9. Do you deal with transportation issues daily? Yes____ No____ If yes, what area of transportation are you involved with in your company?

10. Please briefly describe your company's Baltimore operations and their freight transport requirements?

11. What are the primary transport carriers typically used by your Baltimore operations for freight movements? If possible, please specify which modes (i.e., air, rail, truck, ship) are used, including all modes used in multi-modal movements.

Characteristic/freight handler	Freight Movements—specify average units per week or per day (select one)
High value per lb.—Private overnight carrier	
High value per lb.—UPS or USPS	
Mid-value per lb.—Own truck fleet	
Mid-value per lb.—contract to truck/other carrier or rail (please specify if known)	
Low value—specify carrier or modes used—truck or rail	



B. Overview of Transportation Requirements

1. Approximately what percentage do freight transportation costs represent out of your total product or service costs? _____%.

2. How do freight transportation costs and services influence your Baltimore operations' competitiveness?

3. For non-service industries, what percentage does distribution (i.e., transportation, warehousing and inventory costs) for your Baltimore operations represent out of your product cost or sale price? _____%. Please indicate what you have included as part of distribution:

4. How important are overnight package and document delivery services to your Baltimore operations?

5. For overnight package and document delivery services, what trend do you see occurring for your Baltimore operations over the next five years (please circle one)?

- Increased usage
- Same usage
- Decreased usage

Why? _____

6. In your view how important are person transportation services (business trips) compared to freight transportation services?



C. Specific Freight Transportation Issues

1. Rank in order of importance (number 1 is most important, 2 second, etc.) the main freight transportation service characteristics that are important to your industry in Baltimore (try to respond for your industry in Baltimore, if not possible, answer for your own company's operations in Baltimore).?

Rank:

- _____ Cost
- _____ Speed - Delivery Time
- _____ Just in Time Delivery
- _____ Reliability
- _____ Geographic coverage
- _____ Loss Damage Rate
- _____ Real time status Information
- _____ Container/Equipment/Shipment characteristics (temperature, availability, maximum weight, maximum volume)
- _____ Other, list characteristic _____

2. For each of the freight transport movements you are most familiar with (e.g., raw materials to plant or final product to retailers), indicate your main freight transportation requirements for your Baltimore operations (if not applicable or do not know, put N/A). Then, for each of your choices, indicate the following information (if available):

- whether cost **or** service level is more important for these categories of movements
- how would you characterize the type of materials or products moved and the service requirements? Please use as many of the categories listed below that apply.

For the last column of the table, materials and service requirements categories include: High value, Low value, Bulky--voluminous, Heavy, Perishable, Time-sensitive, Just-in-Time, Hazardous Materials, Emergency shipments, Overnight shipments, Other (please describe).

Movement Description	Cost or service more important?	Type of product/ Service requirements
Raw materials to plants		
Intermediate products to final assembly or production locations		
Products from final production to wholesalers or distribution centers		
Products from distribution centers to retailers/consumer outlets		



Products from final production locations to retailers		
Products from final production locations to consumers		
Products from final production locations to other business		
Products from final production locations to subsidiaries		
Products from suppliers to distribution centers		
Products from retailers to consumers		
Returned or defective products from retailers back to suppliers/producers		

3. What are the most important recent trends affecting your industry's freight transportation requirements in Baltimore and how do they affect total product or service costs?

4. Has your industry faced significant restructuring of its operations recently? Has this restructuring differed for your Baltimore operations or affected your transport needs?

5. What % of freight transportation requirements for your Baltimore operations are international (please estimate for those that apply)?

Raw materials Exports _____% Imports _____%
 Partially finished or assembled products Exports _____% Imports _____%
 Finished products Exports _____% Imports _____%

6. Would faster and more reliable transport service reduce your order cycle time for your Baltimore operations?

Yes _____ No _____



7. If yes to the above question, Is reducing your order cycle time a significant competitive factor? Yes_____ No_____ If yes, how?

8. What are the typical volume/weight restrictions per transport movement By type of service/mode?

9. If your Baltimore operations use rail, how has service changed since Norfolk Southern and CSX Corp. replaced Conrail ? And what do you foresee about the competitiveness of rail versus trucking in the coming year for your Baltimore operations?

D. Final Comments Regarding Freight

1. What are some of the recent changes that you have instituted or are considering that affect your use of transportation services in your Baltimore operations? Do they result in an increase or decrease of transportation costs?

(Please Circle one)

- A. _____ Increase / Decrease
- B. _____ Increase / Decrease
- C. _____ Increase / Decrease
- D. _____ Increase / Decrease

2. To what degree do congestion and transport-infrastructure-related delays affect your freight shipments, and if these are major constraints, do you have suggestions as to the types of transportation initiatives that would help improve your industry's competitiveness in the Baltimore area? Yes_____ No_____

Suggestions: _____

3. Aside from congestion and physical facilities issues, what institutional arrangements or policies could be changed that would help improve your Baltimore area operation's competitiveness:

locally? _____



domestically?

internationally?

4. What short-term improvements in specific freight transportation infrastructure items (e.g., specific highways, signage, rail yard capacity) do you think would help increase the competitiveness of your Baltimore operations or your industry in Baltimore relative to the global economy over the next 2-4 years?

A _____ Why? _____

B _____ Why? _____

C _____ Why? _____

5. What long-term improvements in specific freight transportation infrastructure do you think would help increase the competitiveness of your Baltimore operations or your industry in Baltimore relative to the global economy over the next 5-10 years?

A _____ Why? _____

B _____ Why? _____

C _____ Why? _____

6. Are there any other freight transportation policy changes or initiatives or infrastructure improvements that would improve the competitiveness of your business in Baltimore?

If you have any company reports, industry analysis, or publications that discuss freight transportation requirements, we would appreciate getting a copy.

Thank you for your cooperation.



E. Passenger Transportation (Note: to be answered by the person who deals with passenger issues by phone, IF possible—optional portion of survey)

Even though this study focuses on freight transport issues facing industry and service firms in the greater Baltimore area, we are also concerned if you or your industry face impediments to operating in Baltimore due to problems with passenger transportation. Questions in this section will help us identify these impediments and suggest ways to mitigate these problems.

1. Does your industry (or company) have a problem obtaining and/or retaining qualified employees due to difficult transportation access to your work site(s) in the Baltimore area? Yes_____ No_____

2. If yes, which employee category (below) has access difficulties (please circle all that apply)?

- Professional/managerial/executive employees
- Large skilled labor force
- Low cost unskilled employees
- Employees with unique talents/qualifications (short term contracts)

3. What improvements or policy changes could City, County or State Government units implement to mitigate your passenger transport problems?



Appendix II

Standard Industrial Classification (SIC) System Descriptions

A. 2-digit Level

07-- AGRICULTURAL SERVICES, FORESTRY, AND FISHING

0700 Agricultural services

0800 Forestry

0900 Fishing, hunting, and trapping

10-- MINING

1000 Metal mining

1200 Coal mining

1300 Oil and gas extraction

1400 Nonmetallic minerals, except fuels

15-- CONSTRUCTION

1500 General contractors and operative builders

1600 Heavy construction, except building

1700 Special trade contractors

20-- MANUFACTURING

2000 Food and kindred products

2100 Tobacco products

2200 Textile mill products

2300 Apparel and other textile products

2400 Lumber and wood products

2500 Furniture and fixtures

2600 Paper and allied products

2700 Printing and publishing

2800 Chemicals and allied products

2900 Petroleum and coal products

3000 Rubber and miscellaneous plastics products

3100 Leather and leather products

3200 Stone, clay, and glass products

3300 Primary metal industries

3400 Fabricated metal products

3500 Industrial machinery and equipment

3600 Electronic and other electronic equipment

3700 Transportation equipment

3800 Instruments and related products

3900 Miscellaneous manufacturing industries

40-- TRANSPORTATION AND PUBLIC UTILITIES

4100 Local and interurban passenger transit

4200 Trucking and warehousing



4400 Water transportation
4500 Transportation by air
4600 Pipelines, except natural gas
4700 Transportation services
4800 Communication
4810 Telephone communication
4900 Electric, gas, and sanitary services
50-- WHOLESALE TRADE
5000 Wholesale trade - durable goods
5100 Wholesale trade - nondurable goods
52-- RETAIL TRADE
5200 Building materials and garden supplies
5300 General merchandise stores
5400 Food stores
5500 Automotive dealers and service stations
5600 Apparel and accessory stores
5700 Furniture and homefurnishings stores
5800 Eating and drinking places
5900 Miscellaneous retail
60-- FINANCE, INSURANCE, AND REAL ESTATE
6000 Depository institutions
6100 Nondepository institutions
6200 Security and commodity brokers
6300 Insurance carriers
6400 Insurance agents, brokers, and service
6500 Real estate
6700 Holding and other investment offices
70-- SERVICES
7000 Hotels and other lodging places
7200 Personal services
7300 Business services
7500 Auto repair, services, and parking
7600 Miscellaneous repair services
7800 Motion pictures
7900 Amusement and recreation services
8000 Health services
8100 Legal services
8200 Educational services
8300 Social services
8400 Museums, botanical, zoological gardens
8600 Membership organizations
8700 Engineering and management services
8900 Services, n.e.c.
99-- UNCLASSIFIED ESTABLISHMENTS



B. 4-digit Level

---- TOTAL

07-- AGRICULTURAL SERVICES, FORESTRY, AND FISHING

0700 Agricultural services

0710 Soil preparation services

0720 Crop services

0740 Veterinary services

0750 Animal services, except veterinary

0760 Farm labor and management services

0761 Farm labor contractors

0762 Farm management services

0780 Landscape and horticultural services

0800 Forestry

0900 Fishing, hunting, and trapping

098\ Administrative and auxiliary

10-- MINING

1000 Metal mining

1010 Iron ores

1020 Copper ores

1030 Lead and zinc ores

1040 Gold and silver ores

1041 Gold ores

1044 Silver ores

1060 Ferroalloy ores, except vanadium

1080 Metal mining services

1090 Miscellaneous metal ores

1094 Uranium-radium-vanadium ores

1099 Metal ores, n.e.c.

1200 Coal mining

1220 Bituminous coal and lignite mining

1221 Bituminous coal and lignite surface

1222 Bituminous coal underground

1230 Anthracite mining

1240 Coal mining services

1300 Oil and gas extraction

1310 Crude petroleum and natural gas

1320 Natural gas liquids

1380 Oil and gas field services

1381 Drilling oil and gas wells

1382 Oil and gas exploration services

1389 Oil and gas field services, n.e.c.

1400 Nonmetallic minerals, except fuels

1410 Dimension stone

1420 Crushed and broken stone

1422 Crushed and broken limestone



1423 Crushed and broken granite
1429 Crushed and broken stone, n.e.c.
1440 Sand and gravel
1442 Construction sand and gravel
1446 Industrial sand
1450 Clay, ceramic, and refractory minerals
1455 Kaolin and ball clay
1459 Clay and related minerals, n.e.c.
1470 Chemical and fertilizer minerals
1474 Potash, soda, and borate minerals
1475 Phosphate rock
1479 Chemical and fertilizer mining, n.e.c.
1480 Nonmetallic minerals services
1490 Miscellaneous nonmetallic minerals
149\ Administrative and auxiliary
15-- CONSTRUCTION
1500 General contractors and operative builders
1510 General building contractors
1530 Operative builders
1600 Heavy construction, except building
1610 Highway and street construction
1620 Heavy construction, except highway
1700 Special trade contractors
1710 Plumbing, heating, air-conditioning
1720 Painting and paper hanging
1730 Electrical work
1740 Masonry, stonework, and plastering
1741 Masonry and other stonework
1742 Plastering, drywall, and insulation
1743 Terrazzo, tile, marble, mosaic work
1750 Carpentry and floor work
1751 Carpentry work
1752 Floor laying and floor work, n.e.c.
1760 Roofing, siding, and sheet metal work
1770 Concrete work
1780 Water well drilling
1790 Misc. special trade contractors
1791 Structural steel erection
1793 Glass and glazing work
1794 Excavation work
1795 Wrecking and demolition work
1796 Installing building equipment, n.e.c.
1799 Special trade contractors, n.e.c.
179\ Administrative and auxiliary
20-- MANUFACTURING
2000 Food and kindred products
2010 Meat products
2011 Meat packing plants



2013 Sausages and other prepared meats
2015 Poultry slaughtering and processing
2020 Dairy products
2021 Creamery butter
2022 Cheese, natural and processed
2023 Dry, condensed, evaporated products
2024 Ice cream and frozen desserts
2026 Fluid milk
2030 Preserved fruits and vegetables
2032 Canned specialties
2033 Canned fruits and vegetables
2034 Dehydrated fruits, vegetables, soups
2035 Pickles, sauces, and salad dressings
2037 Frozen fruits and vegetables
2038 Frozen specialties, n.e.c.
2040 Grain mill products
2041 Flour and other grain mill products
2043 Cereal breakfast foods
2044 Rice milling
2045 Prepared flour mixes and doughs
2046 Wet corn milling
2047 Dog and cat food
2048 Prepared feeds, n.e.c.
2050 Bakery products
2051 Bread, cake, and related products
2052 Cookies and crackers
2053 Frozen bakery products, except bread
2060 Sugar and confectionery products
2061 Raw cane sugar
2062 Cane sugar refining
2063 Beet sugar
2064 Candy and other confectionery products
2066 Chocolate and cocoa products
2067 Chewing gum
2068 Salted and roasted nuts and seeds
2070 Fats and oils
2074 Cottonseed oil mills
2075 Soybean oil mills
2076 Vegetable oil mills, n.e.c.
2077 Animal and marine fats and oils
2079 Edible fats and oils, n.e.c.
2080 Beverages
2082 Malt beverages
2083 Malt
2084 Wines, brandy, and brandy spirits
2085 Distilled and blended liquors
2086 Bottled and canned soft drinks
2087 Flavoring extracts and syrups, n.e.c.



2090 Misc. food and kindred products
2091 Canned and cured fish and seafoods
2092 Fresh or frozen prepared fish
2095 Roasted coffee
2096 Potato chips and similar snacks
2097 Manufactured ice
2098 Macaroni and spaghetti
2099 Food preparations, n.e.c.
2100 Tobacco products
2110 Cigarettes
2120 Cigars
2130 Chewing and smoking tobacco
2140 Tobacco stemming and redrying
2200 Textile mill products
2210 Broadwoven fabric mills, cotton
2220 Broadwoven fabric mills, manmade
2230 Broadwoven fabric mills, wool
2240 Narrow fabric mills
2250 Knitting mills
2251 Women's hosiery, except socks
2252 Hosiery, n.e.c.
2253 Knit outerwear mills
2254 Knit underwear mills
2257 Weft knit fabric mills
2258 Lace and warp knit fabric mills
2259 Knitting mills, n.e.c.
2260 Textile finishing, except wool
2261 Finishing plants, cotton
2262 Finishing plants, manmade
2269 Finishing plants, n.e.c.
2270 Carpets and rugs
2280 Yarn and thread mills
2281 Yarn spinning mills
2282 Throwing and winding mills
2284 Thread mills
2290 Miscellaneous textile goods
2295 Coated fabrics, not rubberized
2296 Tire cord and fabrics
2297 Nonwoven fabrics
2298 Cordage and twine
2299 Textile goods, n.e.c.
2300 Apparel and other textile products
2310 Men's and boys' suits and coats
2320 Men's and boys' furnishings
2321 Men's and boys' shirts
2322 Men's and boys' underwear and nightwear
2323 Men's and boys' neckwear
2325 Men's and boys' trousers and slacks



2326 Men's and boys' work clothing
2329 Men's and boys' clothing, n.e.c.
2330 Women's and misses' outerwear
2331 Women's and misses' blouses and shirts
2335 Women's, junior's, and misses' dresses
2337 Women's and misses' suits and coats
2339 Women's and misses' outerwear, n.e.c.
2340 Women's and children's undergarments
2341 Women's and children's underwear
2342 Bras, girdles, and allied garments
2350 Hats, caps, and millinery
2360 Girls' and children's outerwear
2361 Girls' and children's dresses, blouses
2369 Girls' and children's outerwear, n.e.c.
2370 Fur goods
2380 Miscellaneous apparel and accessories
2381 Fabric dress and work gloves
2384 Robes and dressing gowns
2385 Waterproof outerwear
2386 Leather and sheep-lined clothing
2387 Apparel belts
2389 Apparel and accessories, n.e.c.
2390 Misc. fabricated textile products
2391 Curtains and draperies
2392 Housefurnishings, n.e.c.
2393 Textile bags
2394 Canvas and related products
2395 Pleating and stitching
2396 Automotive and apparel trimmings
2397 Schiffli machine embroideries
2399 Fabricated textile products, n.e.c.
2400 Lumber and wood products
2410 Logging
2420 Sawmills and planing mills
2421 Sawmills and planing mills, general
2426 Hardwood dimension and flooring mills
2429 Special product sawmills, n.e.c.
2430 Millwork, plywood and structural members
2431 Millwork
2434 Wood kitchen cabinets
2435 Hardwood veneer and plywood
2436 Softwood veneer and plywood
2439 Structural wood members, n.e.c.
2440 Wood containers
2441 Nailed wood boxes and shook
2448 Wood pallets and skids
2449 Wood containers, n.e.c.
2450 Wood buildings and mobile homes



2451 Mobile homes
2452 Prefabricated wood buildings
2490 Miscellaneous wood products
2491 Wood preserving
2493 Reconstituted wood products
2499 Wood products, n.e.c.
2500 Furniture and fixtures
2510 Household furniture
2511 Wood household furniture
2512 Upholstered household furniture
2514 Metal household furniture
2515 Mattresses and bedsprings
2517 Wood TV and radio cabinets
2519 Household furniture, n.e.c.
2520 Office furniture
2521 Wood office furniture
2522 Office furniture, except wood
2530 Public building and related furniture
2540 Partitions and fixtures
2541 Wood partitions and fixtures
2542 Partitions and fixtures, except wood
2590 Miscellaneous furniture and fixtures
2591 Drapery hardware and blinds and shades
2599 Furniture and fixtures, n.e.c.
2600 Paper and allied products
2610 Pulp mills
2620 Paper mills
2630 Paperboard mills
2650 Paperboard containers and boxes
2652 Setup paperboard boxes
2653 Corrugated and solid fiber boxes
2655 Fiber cans, drums and similar products
2656 Sanitary food containers
2657 Folding paperboard boxes
2670 Misc. converted paper products
2671 Paper coated and laminated, packaging
2672 Paper coated and laminated, n.e.c.
2673 Bags: plastics, laminated, and coated
2674 Bags: uncoated paper and multiwall
2675 Die-cut paper and board
2676 Sanitary paper products
2677 Envelopes
2678 Stationery products
2679 Converted paper products, n.e.c.
2700 Printing and publishing
2710 Newspapers
2720 Periodicals
2730 Books



2731 Book publishing
2732 Book printing
2740 Miscellaneous publishing
2750 Commercial printing
2752 Commercial printing, lithographic
2754 Commercial printing, gravure
2759 Commercial printing, n.e.c.
2760 Manifold business forms
2770 Greeting cards
2780 Blankbooks and bookbinding
2782 Blankbooks and looseleaf binders
2789 Bookbinding and related work
2790 Printing trade services
2791 Typesetting
2796 Platemaking services
2800 Chemicals and allied products
2810 Industrial inorganic chemicals
2812 Alkalies and chlorine
2813 Industrial gases
2816 Inorganic pigments
2819 Industrial inorganic chemicals, n.e.c.
2820 Plastics materials and synthetics
2821 Plastics materials and resins
2822 Synthetic rubber
2823 Cellulosic manmade fibers
2824 Organic fibers, noncellulosic
2830 Drugs
2833 Medicinals and botanicals
2834 Pharmaceutical preparations
2835 Diagnostic substances
2836 Biological products except diagnostic
2840 Soap, cleaners, and toilet goods
2841 Soap and other detergents
2842 Polishes and sanitation goods
2843 Surface active agents
2844 Toilet preparations
2850 Paints and allied products
2860 Industrial organic chemicals
2861 Gum and wood chemicals
2865 Cyclic crudes and intermediates
2869 Industrial organic chemicals, n.e.c.
2870 Agricultural chemicals
2873 Nitrogenous fertilizers
2874 Phosphatic fertilizers
2875 Fertilizers, mixing only
2879 Agricultural chemicals, n.e.c.
2890 Miscellaneous chemical products
2891 Adhesives and sealants



2892 Explosives
2893 Printing ink
2895 Carbon black
2899 Chemical preparations, n.e.c.
2900 Petroleum and coal products
2910 Petroleum refining
2950 Asphalt paving and roofing materials
2951 Asphalt paving mixtures and blocks
2952 Asphalt felts and coatings
2990 Misc. petroleum and coal products
2992 Lubricating oils and greases
2999 Petroleum and coal products, n.e.c.
3000 Rubber and miscellaneous plastics products
3010 Tires and inner tubes
3020 Rubber and plastics footwear
3050 Hose and belting and gaskets and packing
3052 Rubber and plastics hose and belting
3053 Gaskets, packing, and sealing devices
3060 Fabricated rubber products, n.e.c.
3061 Mechanical rubber goods
3069 Fabricated rubber products, n.e.c.
3080 Miscellaneous plastics products, n.e.c.
3081 Unsupported plastics film and sheet
3082 Unsupported plastics profile shapes
3083 Laminated plastics plate and sheet
3084 Plastics pipe
3085 Plastics bottles
3086 Plastics foam products
3087 Custom compound purchased resins
3088 Plastics plumbing fixtures
3089 Plastics products, n.e.c.
3100 Leather and leather products
3110 Leather tanning and finishing
3130 Footwear cut stock
3140 Footwear, except rubber
3142 House slippers
3143 Men's footwear, except athletic
3144 Women's footwear, except athletic
3149 Footwear, except rubber, n.e.c.
3150 Leather gloves and mittens
3160 Luggage
3170 Handbags and personal leather goods
3171 Women's handbags and purses
3172 Personal leather goods, n.e.c.
3190 Leather goods, n.e.c.
3200 Stone, clay, and glass products
3210 Flat glass
3220 Glass and glassware, pressed or blown



3221 Glass containers
3229 Pressed and blown glass, n.e.c.
3230 Products of purchased glass
3240 Cement, hydraulic
3250 Structural clay products
3251 Brick and structural clay tile
3253 Ceramic wall and floor tile
3255 Clay refractories
3259 Structural clay products, n.e.c.
3260 Pottery and related products
3261 Vitreous plumbing fixtures
3262 Vitreous china table and kitchenware
3263 Semivitreous table and kitchenware
3264 Porcelain electrical supplies
3269 Pottery products, n.e.c.
3270 Concrete, gypsum, and plaster products
3271 Concrete block and brick
3272 Concrete products, n.e.c.
3273 Ready-mixed concrete
3274 Lime
3275 Gypsum products
3280 Cut stone and stone products
3290 Misc. nonmetallic mineral products
3291 Abrasive products
3292 Asbestos products
3295 Minerals, ground or treated
3296 Mineral wool
3297 Nonclay refractories
3299 Nonmetallic mineral products, n.e.c.
3300 Primary metal industries
3310 Blast furnace and basic steel products
3312 Blast furnaces and steel mills
3313 Electrometallurgical products
3315 Steel wire and related products
3316 Cold finishing of steel shapes
3317 Steel pipe and tubes
3320 Iron and steel foundries
3321 Gray and ductile iron foundries
3322 Malleable iron foundries
3324 Steel investment foundries
3325 Steel foundries, n.e.c.
3330 Primary nonferrous metals
3331 Primary copper
3334 Primary aluminum
3339 Primary nonferrous metals, n.e.c.
3340 Secondary nonferrous metals
3350 Nonferrous rolling and drawing
3351 Copper rolling and drawing



3353 Aluminum sheet, plate, and foil
3354 Aluminum extruded products
3355 Aluminum rolling and drawing, n.e.c.
3356 Nonferrous rolling and drawing, n.e.c.
3357 Nonferrous wiredrawing and insulating
3360 Nonferrous foundries (castings)
3363 Aluminum die-castings
3364 Nonferrous die-casting except aluminum
3365 Aluminum foundries
3366 Copper foundries
3369 Nonferrous foundries, n.e.c.
3390 Miscellaneous primary metal products
3398 Metal heat treating
3399 Primary metal products, n.e.c.
3400 Fabricated metal products
3410 Metal cans and shipping containers
3411 Metal cans
3412 Metal barrels, drums, and pails
3420 Cutlery, handtools, and hardware
3421 Cutlery
3423 Hand and edge tools, n.e.c.
3425 Saw blades and handsaws
3429 Hardware, n.e.c.
3430 Plumbing and heating, except electric
3431 Metal sanitary ware
3432 Plumbing fixture fittings and trim
3433 Heating equipment, except electric
3440 Fabricated structural metal products
3441 Fabricated structural metal
3442 Metal doors, sash, and trim
3443 Fabricated plate work (boiler shops)
3444 Sheet metalwork
3446 Architectural metal work
3448 Prefabricated metal buildings
3449 Miscellaneous metal work
3450 Screw machine products, bolts, etc.
3451 Screw machine products
3452 Bolts, nuts, rivets, and washers
3460 Metal forgings and stampings
3462 Iron and steel forgings
3463 Nonferrous forgings
3465 Automotive stampings
3466 Crowns and closures
3469 Metal stampings, n.e.c.
3470 Metal services, n.e.c.
3471 Plating and polishing
3479 Metal coating and allied services
3480 Ordnance and accessories, n.e.c.



- 3482 Small arms ammunition
- 3483 Ammunition, exc. for small arms, n.e.c.
- 3484 Small arms
- 3489 Ordnance and accessories, n.e.c.
- 3490 Misc. fabricated metal products
- 3491 Industrial valves
- 3492 Fluid power valves and hose fittings
- 3493 Steel springs, except wire
- 3494 Valves and pipe fittings, n.e.c.
- 3495 Wire springs
- 3496 Misc. fabricated wire products
- 3497 Metal foil and leaf
- 3498 Fabricated pipe and fittings
- 3499 Fabricated metal products, n.e.c.
- 3500 Industrial machinery and equipment
- 3510 Engines and turbines
- 3511 Turbines and turbine generator sets
- 3519 Internal combustion engines, n.e.c.
- 3520 Farm and garden machinery
- 3523 Farm machinery and equipment
- 3524 Lawn and garden equipment
- 3530 Construction and related machinery
- 3531 Construction machinery
- 3532 Mining machinery
- 3533 Oil and gas field machinery
- 3534 Elevators and moving stairways
- 3535 Conveyors and conveying equipment
- 3536 Hoists, cranes, and monorails
- 3537 Industrial trucks and tractors
- 3540 Metalworking machinery
- 3541 Machine tools, metal cutting types
- 3542 Machine tools, metal forming types
- 3543 Industrial patterns
- 3544 Special dies, tools, jigs and fixtures
- 3545 Machine tool accessories
- 3546 Power-driven handtools
- 3547 Rolling mill machinery
- 3548 Welding apparatus
- 3549 Metalworking machinery, n.e.c.
- 3550 Special industry machinery
- 3552 Textile machinery
- 3553 Woodworking machinery
- 3554 Paper industries machinery
- 3555 Printing trades machinery
- 3556 Food products machinery
- 3559 Special industry machinery, n.e.c.
- 3560 General industrial machinery
- 3561 Pumps and pumping equipment



3562 Ball and roller bearings
3563 Air and gas compressors
3564 Blowers and fans
3565 Packaging machinery
3566 Speed changers, drives, and gears
3567 Industrial furnaces and ovens
3568 Power transmission equipment, n.e.c.
3569 General industrial machinery, n.e.c.
3570 Computer and office equipment
3571 Electronic computers
3572 Computer storage devices
3575 Computer terminals
3577 Computer peripheral equipment, n.e.c.
3578 Calculating and accounting equipment
3579 Office machines, n.e.c.
3580 Refrigeration and service machinery
3581 Automatic vending machines
3582 Commercial laundry equipment
3585 Refrigeration and heating equipment
3586 Measuring and dispensing pumps
3589 Service industry machinery, n.e.c.
3590 Industrial machinery, n.e.c.
3592 Carburetors, pistons, rings, valves
3593 Fluid power cylinders and actuators
3594 Fluid power pumps and motors
3596 Scales and balances, exc. laboratory
3599 Industrial machinery, n.e.c.
3600 Electronic and other electronic equipment
3610 Electric distribution equipment
3612 Transformers, except electronic
3613 Switchgear and switchboard apparatus
3620 Electrical industrial apparatus
3621 Motors and generators
3624 Carbon and graphite products
3625 Relays and industrial controls
3629 Electrical industrial apparatus, n.e.c.
3630 Household appliances
3631 Household cooking equipment
3632 Household refrigerators and freezers
3633 Household laundry equipment
3634 Electric housewares and fans
3635 Household vacuum cleaners
3639 Household appliances, n.e.c.
3640 Electric lighting and wiring equipment
3641 Electric lamps
3643 Current-carrying wiring devices
3644 Noncurrent-carrying wiring devices
3645 Residential lighting fixtures



3646 Commercial lighting fixtures
3647 Vehicular lighting equipment
3648 Lighting equipment, n.e.c.
3650 Household audio and video equipment
3651 Household audio and video equipment
3652 Prerecorded records and tapes
3660 Communications equipment
3661 Telephone and telegraph apparatus
3663 Radio and TV communications equipment
3669 Communications equipment, n.e.c.
3670 Electronic components and accessories
3671 Electron tubes
3672 Printed circuit boards
3674 Semiconductors and related devices
3675 Electronic capacitors
3676 Electronic resistors
3677 Electronic coils and transformers
3678 Electronic connectors
3679 Electronic components, n.e.c.
3690 Misc. electrical equipment and supplies
3691 Storage batteries
3692 Primary batteries, dry and wet
3694 Engine electrical equipment
3695 Magnetic and optical recording media
3699 Electrical equipment and supplies, n.e.c.
3700 Transportation equipment
3710 Motor vehicles and equipment
3711 Motor vehicles and car bodies
3713 Truck and bus bodies
3714 Motor vehicle parts and accessories
3715 Truck trailers
3716 Motor homes
3720 Aircraft and parts
3721 Aircraft
3724 Aircraft engines and engine parts
3728 Aircraft parts and equipment, n.e.c.
3730 Ship and boat building and repairing
3731 Ship building and repairing
3732 Boat building and repairing
3740 Railroad equipment
3750 Motorcycles, bicycles, and parts
3760 Guided missiles, space vehicles, parts
3761 Guided missiles and space vehicles
3764 Space propulsion units and parts
3769 Space vehicle equipment, n.e.c.
3790 Miscellaneous transportation equipment
3792 Travel trailers and campers
3795 Tanks and tank components



3799 Transportation equipment, n.e.c.
3800 Instruments and related products
3810 Search and navigation equipment
3820 Measuring and controlling devices
3821 Laboratory apparatus and furniture
3822 Environmental controls
3823 Process control instruments
3824 Fluid meters and counting devices
3825 Instruments to measure electricity
3826 Analytical instruments
3827 Optical instruments and lenses
3829 Measuring and controlling devices, n.e.c.
3840 Medical instruments and supplies
3841 Surgical and medical instruments
3842 Surgical appliances and supplies
3843 Dental equipment and supplies
3844 X-ray apparatus and tubes
3845 Electromedical equipment
3850 Ophthalmic goods
3860 Photographic equipment and supplies
3870 Watches, clocks, watchcases and parts
3900 Miscellaneous manufacturing industries
3910 Jewelry, silverware, and plated ware
3911 Jewelry, precious metal
3914 Silverware and plated ware
3915 Jewelers' materials and lapidary work
3930 Musical instruments
3940 Toys and sporting goods
3942 Dolls and stuffed toys
3944 Games, toys, and children's vehicles
3949 Sporting and athletic goods, n.e.c.
3950 Pens, pencils, office, and art supplies
3951 Pens and mechanical pencils
3952 Lead pencils and art goods
3953 Marking devices
3955 Carbon paper and inked ribbons
3960 Costume jewelry and notions
3961 Costume jewelry
3965 Fasteners, buttons, needles, and pins
3990 Miscellaneous manufactures
3991 Brooms and brushes
3993 Signs and advertising specialities
3995 Burial caskets
3996 Hard surface floor coverings, n.e.c.
3999 Manufacturing industries, n.e.c.
399\ Administrative and auxiliary
40-- TRANSPORTATION AND PUBLIC UTILITIES
4100 Local and interurban passenger transit



- 4110 Local and suburban transportation
- 4111 Local and suburban transit
- 4119 Local passenger transportation, n.e.c.
- 4120 Taxicabs
- 4130 Intercity and rural bus transportation
- 4140 Bus charter service
- 4141 Local bus charter service
- 4142 Bus charter service, except local
- 4150 School buses
- 4170 Bus terminal and service facilities
- 4200 Trucking and warehousing
- 4210 Trucking and courier services, except air
- 4220 Public warehousing and storage
- 4221 Farm product warehousing and storage
- 4222 Refrigerated warehousing and storage
- 4225 General warehousing and storage
- 4226 Special warehousing and storage, n.e.c.
- 4230 Trucking terminal facilities
- 4400 Water transportation
- 4410 Deep sea foreign transportation of freight
- 4420 Deep sea domestic transportation of freight
- 4430 Freight transportation on the Great Lakes
- 4440 Water transportation of freight, n.e.c.
- 4480 Water transportation of passengers
- 4481 Deep sea passenger transportation, ex. ferry
- 4482 Ferries
- 4489 Water passenger transportation, n.e.c.
- 4490 Water transportation services
- 4491 Marine cargo handling
- 4492 Towing and tugboat service
- 4493 Marinas
- 4499 Water transportation services, n.e.c.
- 4500 Transportation by air
- 4510 Air transportation, scheduled
- 4520 Air transportation, nonscheduled
- 4580 Airports, flying fields, and services
- 4600 Pipelines, except natural gas
- 4610 Pipelines, except natural gas
- 4619 Pipelines, n.e.c.
- 4700 Transportation services
- 4720 Passenger transportation arrangement
- 4724 Travel agencies
- 4725 Tour operators
- 4729 Passenger transport arrangement, n.e.c.
- 4730 Freight transportation arrangement
- 4740 Rental of railroad cars
- 4780 Miscellaneous transportation services
- 4800 Communication



4810 Telephone communication
4812 Radiotelephone communications
4813 Telephone communications, exc. radio
4820 Telegraph and other communications
4830 Radio and television broadcasting
4840 Cable and other pay TV services
4890 Communication services, n.e.c.
4900 Electric, gas, and sanitary services
4910 Electric services
4920 Gas production and distribution
4930 Combination utility services
4931 Electric and other services combined
4932 Gas and other services combined
4939 Combination utilities, n.e.c.
4940 Water supply
4950 Sanitary services
4960 Steam and air-conditioning supply
4970 Irrigation systems
497\ Administrative and auxiliary
50-- WHOLESALE TRADE
5000 Wholesale trade - durable goods
5010 Motor vehicles, parts, and supplies
5012 Automobiles and other motor vehicles
5013 Motor vehicle supplies and new parts
5014 Tires and tubes
5015 Motor vehicle parts, used
5020 Furniture and homefurnishings
5021 Furniture
5023 Homefurnishings
5030 Lumber and construction materials
5031 Lumber, plywood, and millwork
5032 Brick, stone, and related materials
5033 Roofing, siding, and insulation
5039 Construction materials, n.e.c.
5040 Professional and commercial equipment
5043 Photographic equipment and supplies
5044 Office equipment
5045 Computers, peripherals and software
5046 Commercial equipment, n.e.c.
5047 Medical and hospital equipment
5048 Ophthalmic goods
5049 Professional equipment, n.e.c.
5050 Metals and minerals, except petroleum
5051 Metals service centers and offices
5052 Coal and other minerals and ores
5060 Electrical goods
5063 Electrical apparatus and equipment
5064 Electrical appliances, TV and radios



5065 Electronic parts and equipment
5070 Hardware, plumbing and heating equipment
5072 Hardware
5074 Plumbing and hydronic heating supplies
5075 Warm air heating and air-conditioning
5078 Refrigeration equipment and supplies
5080 Machinery, equipment, and supplies
5082 Construction and mining machinery
5083 Farm and garden machinery
5084 Industrial machinery and equipment
5085 Industrial supplies
5087 Service establishment equipment
5088 Transportation equipment and supplies
5090 Miscellaneous durable goods
5091 Sporting and recreational goods
5092 Toys and hobby goods and supplies
5093 Scrap and waste materials
5094 Jewelry and precious stones
5099 Durable goods, n.e.c.
5100 Wholesale trade - nondurable goods
5110 Paper and paper products
5111 Printing and writing paper
5112 Stationery and office supplies
5113 Industrial and personal service paper
5120 Drugs, proprietaries, and sundries
5130 Apparel, piece goods, and notions
5131 Piece goods and notions
5136 Men's and boys' clothing
5137 Women's and children's clothing
5139 Footwear
5140 Groceries and related products
5141 Groceries, general line
5142 Packaged frozen foods
5143 Dairy products, exc. dried or canned
5144 Poultry and poultry products
5145 Confectionery
5146 Fish and seafoods
5147 Meats and meat products
5148 Fresh fruits and vegetables
5149 Groceries and related products, n.e.c.
5150 Farm-product raw materials
5153 Grain and field beans
5154 Livestock
5159 Farm-product raw materials, n.e.c.
5160 Chemicals and allied products
5162 Plastics materials and basic shapes
5169 Chemicals and allied products, n.e.c.
5170 Petroleum and petroleum products



5171 Petroleum bulk stations and terminals
5172 Petroleum products, n.e.c.
5180 Beer, wine, and distilled beverages
5181 Beer and ale
5182 Wine and distilled beverages
5190 Misc. nondurable goods
5191 Farm supplies
5192 Books, periodicals, and newspapers
5193 Flowers and florists' supplies
5194 Tobacco and tobacco products
5198 Paints, varnishes, and supplies
5199 Nondurable goods, n.e.c.
519\ Administrative and auxiliary
52-- RETAIL TRADE
5200 Building materials and garden supplies
5210 Lumber and other building materials
5230 Paint, glass, and wallpaper stores
5250 Hardware stores
5260 Retail nurseries and garden stores
5270 Mobile home dealers
5300 General merchandise stores
5310 Department stores
5330 Variety stores
5390 Misc. general merchandise stores
5400 Food stores
5410 Grocery stores
5420 Meat and fish markets
5430 Fruit and vegetable markets
5440 Candy, nut, and confectionery stores
5450 Dairy products stores
5460 Retail bakeries
5490 Miscellaneous food stores
5500 Automotive dealers and service stations
5510 New and used car dealers
5520 Used car dealers
5530 Auto and home supply stores
5540 Gasoline service stations
5550 Boat dealers
5560 Recreational vehicle dealers
5570 Motorcycle dealers
5590 Automotive dealers, n.e.c.
5600 Apparel and accessory stores
5610 Men's and boys' clothing stores
5620 Women's clothing stores
5630 Women's accessory and specialty stores
5640 Children's and infants' wear stores
5650 Family clothing stores
5660 Shoe stores



5690 Misc. apparel and accessory stores
5700 Furniture and homefurnishings stores
5710 Furniture and homefurnishings stores
5712 Furniture stores
5713 Floor covering stores
5714 Drapery and upholstery stores
5719 Misc. homefurnishings stores
5720 Household appliance stores
5730 Radio, television, and computer stores
5731 Radio, TV, and electronic stores
5734 Computer and software stores
5735 Record and prerecorded tape stores
5736 Musical instrument stores
5800 Eating and drinking places
5810 Eating and drinking places
5812 Eating places
5813 Drinking places
5900 Miscellaneous retail
5910 Drug stores and proprietary stores
5920 Liquor stores
5930 Used merchandise stores
5940 Miscellaneous shopping goods stores
5941 Sporting goods and bicycle shops
5942 Book stores
5943 Stationery stores
5944 Jewelry stores
5945 Hobby, toy, and game shops
5946 Camera and photographic supply stores
5947 Gift, novelty, and souvenir shops
5948 Luggage and leather goods stores
5949 Sewing, needlework, and piece goods
5960 Nonstore retailers
5961 Catalog and mail-order houses
5962 Merchandising machine operators
5963 Direct selling establishments
5980 Fuel dealers
5983 Fuel oil dealers
5984 Liquefied petroleum gas dealers
5989 Fuel dealers, n.e.c.
5990 Retail stores, n.e.c.
5992 Florists
5993 Tobacco stores and stands
5994 News dealers and newsstands
5995 Optical goods stores
5999 Miscellaneous retail stores, n.e.c.
599\ Administrative and auxiliary
60-- FINANCE, INSURANCE, AND REAL ESTATE
6000 Depository institutions



6010 Central reserve depository
6020 Commercial banks
6030 Savings institutions
6060 Credit unions
6080 Foreign bank and branches and agencies
6090 Functions closely related to banking
6100 Nondepository institutions
6110 Federal and Federally-sponsored credit
6140 Personal credit institutions
6150 Business credit institutions
6160 Mortgage bankers and brokers
6200 Security and commodity brokers
6210 Security brokers and dealers
6220 Commodity contracts brokers, dealers
6230 Security and commodity exchanges
6280 Security and commodity services
6300 Insurance carriers
6310 Life insurance
6320 Medical service and health insurance
6321 Accident and health insurance
6324 Hospital and medical service plans
6330 Fire, marine, and casualty insurance
6350 Surety insurance
6360 Title insurance
6370 Pension, health, and welfare funds
6390 Insurance carriers, n.e.c.
6400 Insurance agents, brokers, and service
6500 Real estate
6510 Real estate operators and lessors
6530 Real estate agents and managers
6540 Title abstract offices
6550 Subdividers and developers
6552 Subdividers and developers, n.e.c.
6553 Cemetery subdividers and developers
6700 Holding and other investment offices
6710 Holding offices
6720 Investment offices
6730 Trusts
6732 Educational, religious, etc. trusts
6733 Trusts, n.e.c.
6790 Miscellaneous investing
6792 Oil royalty traders
6794 Patent owners and lessors
6798 Real estate investment trusts
6799 Investors, n.e.c.
679\ Administrative and auxiliary
70-- SERVICES
7000 Hotels and other lodging places



7010 Hotels and motels
7020 Rooming and boarding houses
7030 Camps and recreational vehicle parks
7032 Sporting and recreational camps
7033 Trailer parks and campsites
7040 Membership-basis organization hotels
7200 Personal services
7210 Laundry, cleaning, and garment services
7211 Power laundries, family and commercial
7212 Garment pressing and cleaners' agents
7213 Linen supply
7215 Coin-operated laundries and cleaning
7216 Drycleaning plants, except rug
7217 Carpet and upholstery cleaning
7218 Industrial launderers
7219 Laundry and garment services, n.e.c.
7220 Photographic studios, portrait
7230 Beauty shops
7240 Barber shops
7250 Shoe repair and shoeshine parlors
7260 Funeral service and crematories
7290 Miscellaneous personal services
7291 Tax return preparation services
7299 Miscellaneous personal services, n.e.c.
7300 Business services
7310 Advertising
7311 Advertising agencies
7312 Outdoor advertising services
7313 Radio, TV, publisher representatives
7319 Advertising, n.e.c.
7320 Credit reporting and collection
7322 Adjustment and collection services
7323 Credit reporting services
7330 Mailing, reproduction, stenographic
7331 Direct mail advertising services
7334 Photocopying and duplicating services
7335 Commercial photography
7336 Commercial art and graphic design
7338 Secretarial and court reporting
7340 Services to buildings
7342 Disinfecting and pest control services
7349 Building maintenance services, n.e.c.
7350 Misc. equipment rental and leasing
7352 Medical equipment rental
7353 Heavy construction equipment rental
7359 Equipment rental and leasing, n.e.c.
7360 Personnel supply services
7361 Employment agencies



7363 Help supply services
7370 Computer and data processing services
7371 Computer programming services
7372 Prepackaged software
7373 Computer integrated systems design
7374 Data processing and preparation
7375 Information retrieval services
7376 Computer facilities management
7377 Computer rental and leasing
7378 Computer maintenance and repair
7379 Computer related services, n.e.c.
7380 Miscellaneous business services
7381 Detective and armored car services
7382 Security systems services
7383 News syndicates
7384 Photofinishing laboratories
7389 Business services, n.e.c.
7500 Auto repair, services, and parking
7510 Automotive rentals, no drivers
7513 Truck rental and leasing, no drivers
7514 Passenger car rental
7515 Passenger car leasing
7519 Utility trailer rental
7520 Automobile parking
7530 Automotive repair shops
7532 Top and body repair and paint shops
7533 Auto exhaust system repair shops
7534 Tire retreading and repair shops
7536 Automotive glass replacement shops
7537 Automotive transmission repair shops
7538 General automotive repair shops
7539 Automotive repair shops, n.e.c.
7540 Automotive services, except repair
7542 Carwashes
7549 Automotive services, n.e.c.
7600 Miscellaneous repair services
7620 Electrical repair shops
7622 Radio and television repair
7623 Refrigeration service and repair
7629 Electrical repair shops, n.e.c.
7630 Watch, clock, and jewelry repair
7640 Reupholstery and furniture repair
7690 Miscellaneous repair shops
7692 Welding repair
7694 Armature rewinding shops
7699 Repair services, n.e.c.
7800 Motion pictures
7810 Motion picture production and services



7812 Motion picture and video production
7819 Services allied to motion pictures
7820 Motion picture distribution and services
7822 Motion picture and tape distribution
7829 Motion picture distribution services
7830 Motion picture theaters
7832 Motion picture theaters, ex drive-in
7833 Drive-in motion picture theaters
7840 Video tape rental
7900 Amusement and recreation services
7910 Dance studios, schools, and halls
7920 Producers, orchestras, entertainers
7922 Theatrical producers and services
7929 Entertainers and entertainment groups
7930 Bowling centers
7940 Commercial sports
7941 Sports clubs, managers, and promoters
7948 Racing, including track operation
7990 Misc. amusement, recreation services
7991 Physical fitness facilities
7992 Public golf courses
7993 Coin-operated amusement devices
7996 Amusement parks
7997 Membership sports and recreation clubs
7999 Amusement and recreation, n.e.c.
8000 Health services
8010 Offices and clinics of medical doctors
8020 Offices and clinics of dentists
8030 Offices of osteopathic physicians
8040 Offices of other health practitioners
8041 Offices and clinics of chiropractors
8042 Offices and clinics of optometrists
8043 Offices and clinics of podiatrists
8049 Offices of health practitioners, n.e.c.
8050 Nursing and personal care facilities
8060 Hospitals
8070 Medical and dental laboratories
8071 Medical laboratories
8072 Dental laboratories
8080 Home health care services
8090 Health and allied services, n.e.c.
8100 Legal services
8200 Educational services
8210 Elementary and secondary schools
8220 Colleges and universities
8230 Libraries
8240 Vocational schools
8290 Schools and educational services, n.e.c.



8300 Social services
8320 Individual and family services
8330 Job training and related services
8350 Child day care services
8360 Residential care
8390 Social services, n.e.c.
8400 Museums, botanical, zoological gardens
8410 Museums and art galleries
8420 Botanical and zoological gardens
8600 Membership organizations
8610 Business associations
8620 Professional organizations
8630 Labor organizations
8640 Civic and social associations
8650 Political organizations
8660 Religious organizations
8690 Membership organizations, n.e.c.
8700 Engineering and management services
8710 Engineering and architectural services
8711 Engineering services
8712 Architectural services
8713 Surveying services
8720 Accounting, auditing, and bookkeeping
8730 Research and testing services
8731 Commercial physical research
8732 Commercial nonphysical research
8733 Noncommercial research organizations
8734 Testing laboratories
8740 Management and public relations
8741 Management services
8742 Management consulting services
8743 Public relations services
8744 Facilities support services
8748 Business consulting, n.e.c.
8900 Services, n.e.c.
899\ Administrative and auxiliary
99-- UNCLASSIFIED ESTABLISHMENTS

