Feasibility of a Logistics Center Including Container/Trailer Intermodal Transportation in the Fargo/Moorhead Area

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September 2007

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EXECUTIVE SUMMARY

Introduction

The Fargo/Moorhead Council of Governments (F/M COG), Fargo Cass County Economic Development Corporation, City of Moorhead, Minnesota Department of Transportation, North Dakota Department of Transportation, and a committee made up of interested parties from western Minnesota and eastern North Dakota initiated a feasibility study to evaluate enhancing intermodal transportation options. The committee determined that the Upper Great Plains Transportation Institute should conduct a survey to determine the current and potential future volume of intermodal freight trailers and containers in the area. This study provides the groundwork for decisions to be made by shippers, government officials and others regarding the next steps in pursuing enhanced transportation services for businesses in the study region.

Methods

This study explored the feasibility of establishing an intermodal freight loading facility by surveying potential shippers in the region. The goal of the survey was to identify trailer/container on flat car (TOFC/COFC) volumes in the region and estimate feasibility for a facility.

Study Area

The original study was to include an area roughly within a 200-mile radius from Fargo/Moorhead. The study area reached only half way to the Twin Cities, because of the terminals located there, and to the Canadian border. After the announcement of the Commerce Shipping Center in Bismarck, it was determined that the study area should not extend to the Bismarck area. The study area covers eastern portions of North and South Dakota and the western portion of Minnesota. As the survey and site visits progressed, it was clear that southern South Dakota and southwestern Minnesota businesses were not willing participants in the survey. Therefore, most meaningful responses to our survey were within a 100-mile radius of the Fargo/Moorhead metro area[1], and all responses that included TOFC/COFC freight were within the 100-mile radius (Figure 1).

[1] The radius extends approximately 100 highway miles south, east, and west but extends approximately 150 highway miles north of Fargo/Moorhead. The radius is an average 112.5 miles.

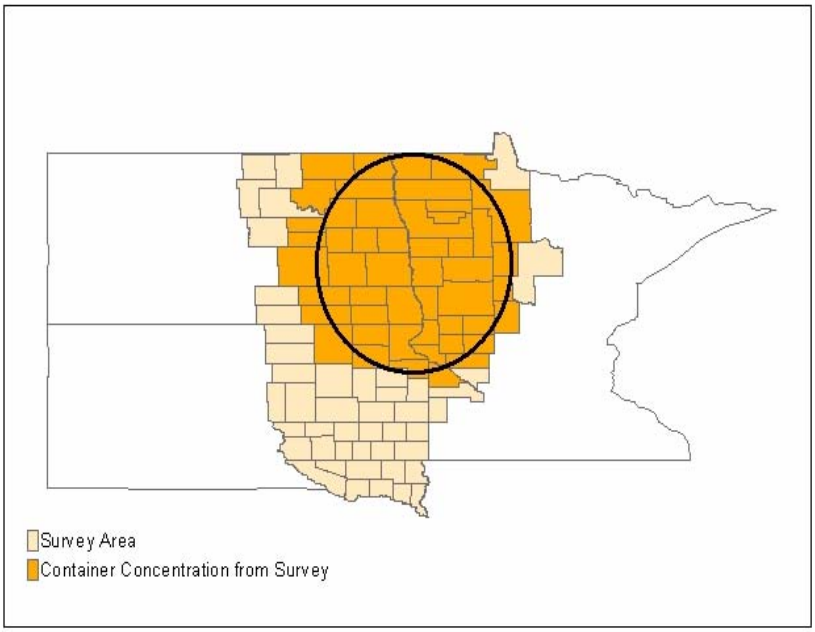

Figure 1 Intermodal Survey Response Area (100-mile radius of Fargo/Moorhead).

Infrastucture Analysis

The Fargo/Moorhead area has access to BNSF mainlines which are the intermodal lines from Seattle/Tacoma to Chicago. The area is also served by two interstate highways. Interstate 94 is the east/west route and Interstate 29 runs from the Canadian border to Texas. The cities are served by the Dilworth, MN, intermodal terminal which survey results show is currently underused. A comparison between the Dilworth, MN, terminal and the Omaha, NE, terminal may provide an explanation.

Dilworth has 1,700 feet of strip track. Omaha has 4,200 feet. Omaha has 409 parking spots and 48 strip track car spots. Dilworth includes only 100 parking spots and 20 strip track car spots. These size differences may provide some clues to the reasons shippers in the study area are moving containers to facilities outside the study area. There is also a distribution center for new vehicles at the Dilworth facility which adds to the viability of the facility. Dilworth is operated by Trailer Transfer, a third party. Trailer Transfer has not participated in this study or the previous study conducted by UGPTI.

Access to the Dilworth facility may be problematic for residents and truckers as the terminal is located within the city of Dilworth. However, there is reasonable access from Interstate 94 to the facility with the recent construction of the overpass at U.S. Highway 10 and Minnesota Highway 336.

It is estimated that Dilworth had 8,900 lifts in 2003, while Omaha had more than 40,000 lifts.[2] If there are two lifts per container/trailer this amounts to 4,450 total container/trailer units inbound and outbound at Dilworth, while Omaha had more than 20,000. The national trend for intermodal

[2] Undisclosed source.

loadings has been the fastest growing sector for the railroads nationally, while the Dilworth facility lost volume between 2002 and 2003.

Survey

A survey was developed to estimate the amount of TOFC/COFC freight generated and terminated in the study area. First an educational brochure was mailed to potential respondents and approximately one week later the survey was mailed. The survey consisted of 11 main questions, with subsets of questions within some questions (Appendix 1). Descriptive statistics were used to explain the survey responses.

The survey responses represented an estimated 8.3 percent of all companies surveyed. The useful responses for all responses representing TOFC/COFC shipments were within the 100-mile radius of the Fargo/Moorhead metro area.

Respondents reported volume for TOFC/COFC shipments within the 100-mile radius as 12,974 outbound units and 3,689 inbound units. This shows the imbalance of equipment positioning represented in the study area.

It was discovered from the reported shipments in and out of the area that respondents used Dilworth for 10 percent of their units. Minneapolis/St. Paul was used most often with an estimated 9,626 units. Shipments in and out of Winnipeg were second with 3,366 units.

Respondents were classified using the (SIC) Standard Industrial Classification System. Using the SIC, an estimate of the total number of employees in the survey area by industry was compiled. Secondly, companies classified by SIC and employee numbers for each class were used to estimate shipments.[3] Ratios were developed to expand shipments over the population.

The estimated TOFC/COFC volume for the study area resulted in a significantly higher number than reported by the survey. Expanding through the employee numbers results in TOFC/COFC numbers of 37,856 containers. It is important to point out the significant imbalance of outbound versus inbound.

Projections for Growth

Growth estimations are presented from various sources along with growth projections from survey respondents. The last question in the survey asked respondents to estimate company growth through 2010. These responses were used to estimate future industry growth in the study area. This can be transferred to TOFC/COFC unit growth by weighting the reported growth percentage projections by the TOFC/COFC units reported. The data was extrapolated to 2015. Growth is relatively constant at an estimated 7 percent annual rate. Estimated volume using the expanded data and capturing all employees gave projections of over 57,000 units by 2010 and over 80,000 by 2015 (Figure 2).

[3] Employee numbers are not listed by SIC because of confidentiality issues with some SIC codes.

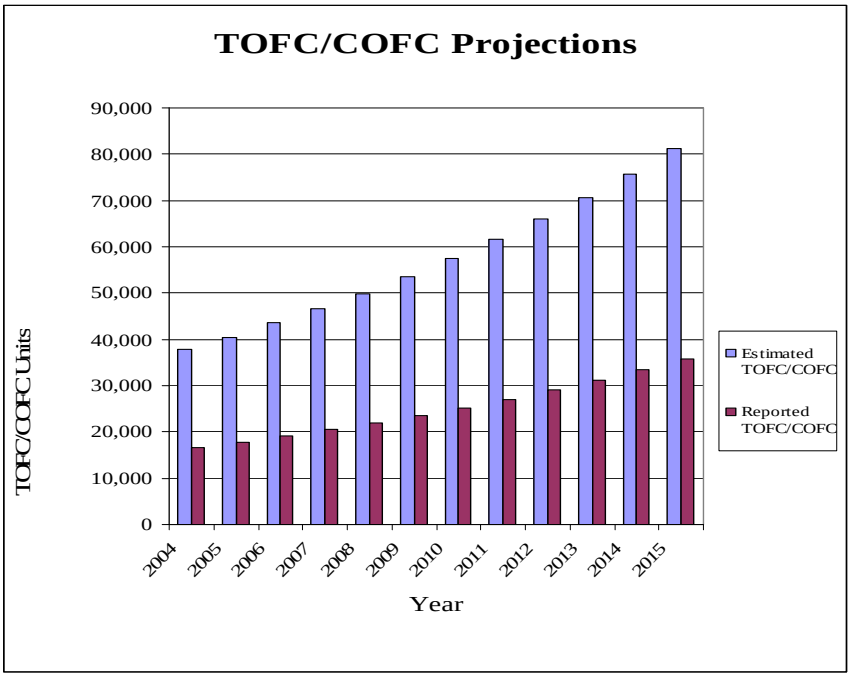

Figure 2 TOFC/COFC Projections.

Trend in Identity Preserved and Traceability

"Traceability" and "Identity Preserved (IP)" are terms used for agricultural product quality verification, assuring a crop has maintained its unique identity from the grower to the processing plant. Wagner and Glassheim (2003)[4] define traceability as "a strict production and delivery method, with known procedures of observing, inspecting, sampling, and testing to assure the presence or absence of certain traits, usually defined by customer demand." Wagner and Glassheim separately define identity preserved as "a process by which a producer contracts with processors to deliver crops with traits that will increase processing quality and efficiency."

The need to increase security and ensure food safety will be magnified over time. The Europeans are rapidly moving to traceability and the need is increasingly apparent with the reports of mad-cow or BSE reported in beef, the Star-link corn problem that plagued that industry several years ago, and the constant threat of terrorism. Increased genetic altering of many crops for desired outcomes highlights the importance. As the variability in the food system grows, so will the need for traceability and preserving identity. These trends will also lead to smaller shipments for many commodities.

The IP grain market is hampered by shipping companies' or steamship lines' reluctance to devote scarce equipment to serve the market because IP grain is of relatively low value. Their interests are better served by returning containers to foreign ports rapidly and loading them with higher revenue products.

[4] Wagner, Gary L. and Glassheim, Eliot. *Traceability of Agricultural Products*, Northern Great Plains Inc., May 2003.

Shipments of IP soybeans and animal feed have increased three fold from 1992 to 2002. These trends are likely to continue, indicating rural shippers' need for access to intermodal terminals and equipment.

Situational Framework for Success

Meeting with railroad officials, consultants, and conducting a literature review provided information about the railroad's needs for successful intermodal operations and the factors necessary to support a successful intermodal terminal.

The common denominators from the sources listed above indicate that at least five factors must exist for successful intermodal operations. The five factors are:

1) volume,
2) balance of traffic,
3) concentration of destination (density),
4) steamship company or equipment operator cooperation,
5) commitment of business and/or community.

Terminal Operations and Costs

A terminal for intermodal freight could take many shapes and sizes. A terminal may offer the ability to provide transloading, TOFC/COFC loadings, warehousing, distribution, cross docking, subassembly, packaging, drayage/trucking, manufacturing, processing, and/or any combination thereof. It is intuitive that a facility provides immediate services and meets the needs of businesses in the area.[5]

Using modeling principles, an economic engineering model was developed to simulate costs for an intermodal facility. The model provides decision makers with an estimate of start-up and annual costs. Moreover, it provides insight into traffic volumes needed to make such a facility feasible.

Facility size is based on the median size and track length of BNSF facilities nationwide. The Dilworth, MN, facility is the smallest considering land area and track length, car spots, and parking. Based on the median size of facilities it could be estimated that a facility with 44 acres and 8,600 feet of track could serve the area with ample parking space, car spots, truck maneuvering, and parking. It is assumed that two powered switches are needed and two internal switches would be required. Fencing the perimeter of 44 acres on three sides would require 3,960 feet of fence. It is assumed that all 44 acres would be paved. However, some areas may need concrete to support the weight of the lifter as it maneuvers to load and unload TOFC/COFC units. It was assumed there would be a need for 15 work lights and 20 reefer hookups. A 2,500-square-foot building would be built for office and storage space. This facility would need one lifter, two hustlers, two chassis, and one forklift. There would be a manager and four yard employees.

The assumptions for the facility resulted in construction cost estimates of just over $3 million. Annual operating costs would be an estimated $840,000. Breakeven revenue analysis estimates 40,000 lifts at $16.31 per lift.

[5] The model developed here is only for illustrative purposes and does not represent any intent of a facility type or size. Phase 2 of the project provides for terminal design, location analysis, and costing.

Economic Impacts of a Transportation and Logistics Terminal

The North Dakota Input-Output Model is a tool for describing the economic linkages and interrelationships of North Dakota's economy.[6] Even though the model was developed for North Dakota, rural economies of the bordering states may have similar linkages. The model was designed to estimate the impacts of various types of project development. The model provides a basis for economic illustration in examining the development of a transportation logistics center in Fargo.

The economic impacts of manufacturing in the region can be illustrated using the I/O model and the job growth projections presented by North Dakota Job Service from 2000 to 2010. Employment projections were used as a proxy of manufacturing growth to illustrate impacts. North Dakota Job Service estimated that 4,766 jobs would be created in the manufacturing sector from 2000 to 2010. Job Service also estimated average wages in the sector at $542 per week in 2003 equating to $28,184 annually. Using the gross receipts multiplier of 4.5, every manufacturing job would reflect more than $125,000 in economic activity. If 4,766 jobs were added to the manufacturing sector, the model estimates it would provide more than $604 million in economic activity annually.

The impacts of adding transportation jobs can be shown using the I/O model. The gross receipts multiplier for transportation is 3.05. North Dakota Job Service estimated the growth in transportation jobs from 2000 to 2010 at 891 jobs. Average annual wage for a transportation and warehouse employee was $30,215. Using the gross receipts multiplier from the I/O model, for every job added to the transportation sector the economic impact would be more than $92,000. If 891 jobs are added to the state's economy and their salaries are spent in the state, this would provide an annual economic impact more than $82 million.

This analysis illustrates the impact manufacturing and transportation jobs have on the economy. Without specific information, it is difficult to estimate how many jobs would be added to the region with a new facility that provides high levels of service and attractive rates. Using "Net Present Value" and a 20-year time frame with a discount factor of 4.25 percent, adding or retaining just 10 manufacturing jobs to the economy would provide an estimated NPV of over $20 million.

Transportation Planning

The literature reveals that transportation planning by federal and state governments highlights the need for investment in intermodal transportation. The North Dakota Statewide Strategic Transportation Plan aims to use state transportation funds in a way that promotes economic development throughout the state. The state of Minnesota also recognizes the need for multimodal planning, promoting growth and addressing other issues faced by the state. The Transportation Equity Act for the 21st Century also highlights intermodal freight transportation.

[6] Coon, Randal C, et al. The North Dakota Input-Output Model: A Tool for Analyzing Economic Linkages. November 1985.

Funding

Funding is one of the main obstacles in constructing an intermodal facility. North Dakota statutes along with the Federal Highway Administration limit the way highway funding can be appropriated in the state. Several loan and grant programs are available. Details for the programs are provided in the report. The following are possible funding sources:

Port/Commerce Authority

A port/commerce authority provides possibilities for cities, counties, and/or regions to band together to organize/operate a terminal using taxing authority along with issuance of bonds to support a facility.

Railroad Revolving Loan Funds

Available in both North Dakota and Minnesota and may be used for rail projects promoting or preserving development projects.

Railroad Rehabilitation and Improvement Financing Program

This program can be used to acquire, improve, or rehabilitate intermodal or rail equipment or facilities including track, components of track, bridges, yards, buildings, and shops; refinance outstanding debt incurred for purposes listed above; or develop or establish new intermodal or railroad facilities. Eligible borrowers include railroads, state and local governments, government sponsored authorities, and joint ventures that include at least one railroad.[7]

USDA-Rural Development Funding

The Farm Bill passed in 2002 expanded the scope of the program for producers. The producer program provides a possibility for funding an intermodal facility. The program has expanded to producer groups or organizations including cooperatives. Product segregation is explicitly mentioned because containerization plays a large role for many specialty and identity-preserved products.

Northern Great Plains Authority

Under the 2002 Farm Bill (HR 2646), Congress established the Northern Great Plains Authority to assist distressed areas experiencing high rates of poverty, unemployment and out-migration in the five-state region.[8]

The Authority must prioritize use of federal funds in the following order:

1. Basic public infrastructure in distressed counties and isolated areas of distress;
2. Transportation and telecommunication infrastructure for the purpose of facilitating economic development in the region;
3. Business development, with emphasis on entrepreneurship;
4. Job training or employment-related education, with emphasis on use of existing public educational institutions located in the region.

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[7] Federal Railroad Administration, www.fra.dot.gov/rdv/finance/rrif.htm.

[8] Conference Report to the Farm Security and Rural Investment Act of 2002. 107th Congress, 2nd Session.

Congressional Earmarks

There are always the possibilities of earmarks from Congress. Congressmen and senators have the ability to put together packages to fund transportation projects. Lobbying efforts may garner vast rewards.

State Departments of Transportation Limitations

North Dakota, under Statute 24-02-37, can only use TEA-21 Federal State Aid funds for highways. This provides no alternatives for other uses. TEA-21 does provide federal credit assistance under the Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA). This, however, is not practical for an intermodal facility in North Dakota because of stipulations. First, it must cost at least $100 million or 50 percent of the state's annual apportionment of federal state aid funds, whichever is less. The project must also be supported in whole or in part from user charges or other non-federal dedicated funding sources and be included in the state's transportation plan. These restrictions immediately disqualify North Dakota from this type of loan. An intermodal facility project would cost much less than the threshold outlined in the TIFIA requirements.[9]

Transportation reauthorization slated for 2005 may provide funding options for intermodal infrastructure. Many areas of the country need to solve problems that exist in congested metro and port areas which may provide funding avenues for intermodal/multimodal projects.

Options

There are three options that the committee/shipper/community may pursue:

1. Do nothing, leave the facility as is.
2. Enhance the Dilworth facility.
3. Move the facility and add desirable services.

The first option provides the same frustration and problems businesses are facing now in accessing intermodal transportation and new and existing markets. However, it is a no cost approach and still allows the intermodal shipping option for shippers that find the facility fits their needs.

Option two, enhancing the Dilworth facility may provide an economically realistic approach to the intermodal problem. There are some operational characteristics that need to be overcome. There are issues for both inbound and outbound freight that need to be worked out with the railroad. Shippers indicated conflicts with current operations and the issues are not clear. Therefore, we only state that there are problems and not what they entail. The railroad does own land south and east of the existing facility that may allow for expansion of parking and other functions. However, the citizens of Dilworth, MN, may not desire a facility in, or closer to the city limits.

Option three is to move the facility out of Dilworth to somewhere in the Fargo/Moorhead metro area where there is ample space and access. This facility would still need to work out operational problems with BNSF, rate issues, equipment problems with steamship lines and find a location that is suitable to neighbors, BNSF, DOTs, and any other parties.

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[9] (U.S. Department of Transportation, Federal Highway Administration, www.fhwa.dot.gov/inovativefinance/brochure/credit.htm).

Key Findings and Conclusions

This study examined container/trailer on flatcar intermodal transportation in eastern North Dakota, western Minnesota, and eastern South Dakota. It was the objective of this study to provide information to the shipper advisory group, Fargo/Moorhead Council of Governments and cities of Dilworth, Moorhead, and Fargo on the potential feasibility of locating a multimodal logistics center somewhere in the metro area. A survey along with site visit sought to gather data and information. With that information as well as secondary research and data sources, this report was developed.

- Analysis of the Dilworth terminal revealed decreasing volumes and size concerns. Decreasing volumes contradict the national trend and the trend in agricultural containerization of products. Site visits and the survey responses report problems with obtaining equipment, service, and rates at the facility.

- The survey and site visits provided TOFC/COFC volume in the region. Within a 100-mile radius of F/M area, respondents reported 12,974 outbound TOFC/COFC units and 3,689 inbound units. Expanded through employee numbers, TOFC/COFC volume is estimated at 29,353 outbound and 8,503 inbound.

- Estimated growth provided by survey respondents indicated TOFC/COFC growth potential of an estimated 7 percent per year. This equates to more than 80,000 units by 2015.

- Of the intermodal terminals used by businesses in the region, Dilworth ranks third, Minneapolis/St. Paul ranks first, and Winnipeg ranks second. If rates and service issues are addressed, the possibility exists for capturing freight being drayed to distant terminals.

- The common denominators from the sources indicate that at least five factors must exist for successful intermodal operations. The five factors are:
  1) volume,
  2) balance of traffic,
  3) concentration of destination (density),
  4) steamship company or equipment operator cooperation,
  5) commitment of business and/or community.

- Of the factors needed for successful intermodal operations, the study area has marginal volume, imbalance of traffic, some concentration and at this time only marginal cooperation of the steamship lines. Commitment of businesses needing intermodal transportation is high, other businesses are apathetic, and beyond the 100-mile radius of Fargo interest deteriorates while communities are taking a wait and see approach.

- Facility costs are variable depending on options. A base case facility could be constructed for less than $4 million with annual operating costs of $850,000. This does not include warehousing, manufacturing, subassembly, or transloading facilities. The break-even point is 40,000 lifts, or 20,000 units being lifted or moved twice.

- Economic impact analysis found the multiplier for manufacturing gross receipts at 4.5 and transportation investments at just over 3. If a facility added jobs, it would provide a positive economic impact to the region.

- Forming a port/commerce authority could provide a funding source through taxes and public/private partnerships which could be used to issue revenue bonds. Funding sources exist in revolving railroad loan funds in both Minnesota and North Dakota. Federal funding sources exist on paper but are an unlikely source. USDA provides for some projects under Rural Development Grants, and The Northern Plains Authority, established in the 2002 Farm Bill, addresses problems of all kinds including transportation.

- Planning documents at the federal and state levels reference the need to explore and enhance intermodal transportation for moving freight.

- A formal meeting with BNSF executives was positive, however, they are cautious.

INTRODUCTION

The Fargo/Moorhead Council of Governments (F/M COG), Fargo Cass County Economic Development Corporation, City of Moorhead, Minnesota Department of Transportation, North Dakota Department of Transportation, along with a committee made up of interested parties from western Minnesota and eastern North Dakota initiated a feasibility study regarding the possible enhancement of intermodal transportation options. The committee determined that the Upper Great Plains Transportation Institute should conduct a survey to determine the current and potential future volume of intermodal freight trailers and containers in the area. This study provides the groundwork for decisions to be made by shippers, government officials, and others regarding the next steps in pursuing enhanced transportation services for businesses in the study region. The vision of the project is for a logistics center that would house facilities for intermodal loading, transloading, warehousing and packaging and an industrial park for light manufacturing or assembly.[10]

BACKGROUND

Within the state of North Dakota, many parties have expressed interest in having closer proximity to reliable container intermodal transportation. Some users of intermodal facilities in the eastern portion of the state experienced service problems at the facility located in Dilworth, MN, related to rates, transit times, and empty container supply. Producers of specialty crops and manufacturers have expressed an interest in locating an intermodal facility in close proximity to their plants or production facilities.

Efforts to establish intermodal service include Minot, Tioga, and a recent announcement of the commerce center in Bismarck that will include a transloading facility and intermodal, or container/trailer on flat car[11] loadings. Eastern North Dakota interests have been looking at intermodal transportation challenges for several years. The Upper Great Plains Transportation Institute conducted a study for the NDDOT (North Dakota Department of Transportation) to analyze the role of intermodal in North Dakota. It was the vision of the NDDOT that groups within the state would coordinate discussions and decisions on a statewide intermodal plan. In other words, work together to provide a plan that provided intermodal transportation options for the state. A steering committee was organized from different groups from around the state. The final analysis resulted in no coordination. As a result, the committee disbanded and all groups pursued their own interests.

METHODS

This study explored the feasibility of establishing an intermodal freight loading facility by surveying potential shippers in the region. The goal of the survey was to identify TOFC/COFC volumes in the region and estimate feasibility for a facility. Methods included:

1) Identify shippers and importers and develop educational material and disseminate that material to the shippers.

[10] The difference between intermodal and transloading is intermodal is container/trailer loaded from a truck onto a rail flat car (TOFC, COFC), while transloading is the transfer of freight from a truck to a box car (container, truck trailer) or vice/versa.
[11] TOFC/COFC references Trailers on Flat Cars and Containers on Flat Cars.

2) Conduct an infrastructure analysis of the study area.

3) Survey shippers and importers and conduct on-site and telephone interviews

4) Provide a projection of economic growth within the study area.

5) Estimate economic impacts of transportation and manufacturing.

6) Estimate facility costs and explore different operating scenarios of a terminal.

7) Evaluate the situational framework for determining the feasibility of a facility.

8) Determine the governmental and legislative framework that is available or needed to help with the feasibility of a facility.

9) Determine and evaluate current and potential funding sources to finance and support a facility.

10) Determine railroad interest.

11) Identify container suppliers and third party facilitators that provide equipment and service to the region.

12) Identify opportunities and barriers that could lead to or hinder the construction, remodeling, or elimination an intermodal terminal.

STUDY AREA

Figure 1 depicts the study area for a Fargo/Moorhead intermodal terminal. The Intermodal Freight Advisory Committee, as organized by the F/M COG determined the area for the survey. The original study was to include an area roughly within a 200-mile radius from Fargo/Moorhead. The study area reached only half way to the Twin Cities, because of the terminals located there, and to the North Dakota/Canadian border. After the announcement of the Commerce Shipping Center in Bismarck, it was determined that the study area should not extend to the Bismarck area. The study area covers eastern portions of North and South Dakota and the western portion of Minnesota. As shown in Table 1, the area includes 26 North Dakota, 39 South Dakota, and 30 Minnesota counties.

Table 1 List of Counties for Survey

North Dakota	South Dakota	Minnesota
BARNES	AURORA	BECKER
BENSON	BEADLE	BELTRAMI
CASS	BON HOMME	BIG STONE
CAVALIER	BROOKINGS	CASS
DICKEY	BROWN	CHIPPEWA
EDDY	BRULE	CLAY
FOSTER	BUFFALO	CLEARWATER
GRAND FORKS	CHARLES MIX	DOUGLAS
GRIGGS	CLARK	GRANT
LAMOURE	CLAY	HUBBARD
LOGAN	CODINGTON	KITTSON
MCINTOSH	DAVISON	LAC QUI PARLE
NELSON	DAY	LAKE OF THE WOODS
PEMBINA	DEUEL	LINCOLN
PIERCE	DOUGLAS	MAHNOMEN
RAMSEY	EDMUNDS	MARSHALL
RANSOM	FAULK	NORMAN
RICHLAND	GRANT	OTTER TAIL
ROLETTE	HAMLIN	PENNINGTON
SARGENT	HAND	POLK
STEELE	HANSON	POPE
STUTSMAN	HUTCHINSON	RED LAKE
TOWNER	HYDE	ROSEAU
TRAILL	JERAULD	STEVENS
WALSH	KINGSBURY	SWIFT
WELLS	LAKE	TODD
	LINCOLN	TRAVERSE
	MCCOOK	WADENA
	MCPHERSON	WILKIN
	MARSHALL	YELLOW MEDICINE
	MINER	
	MINNEHAHA	
	MOODY	
	ROBERTS	
	SANBORN	
	SPINK	
	TURNER	
	UNION	
	YANKTON	

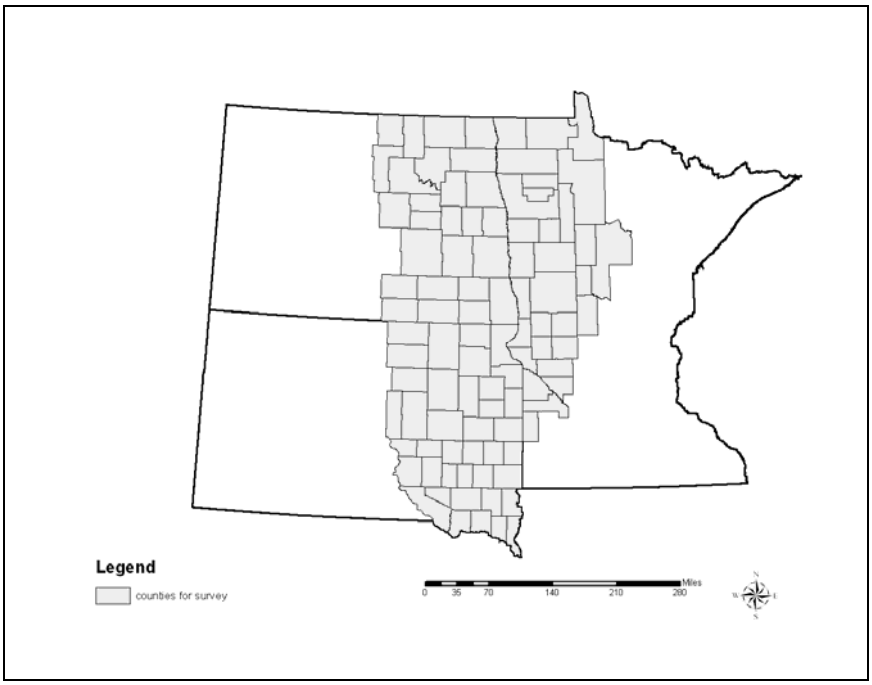

Figure 1 Original Survey Area Designated by Advisory Committee

As the survey and site visits progressed, it was clear that southern South Dakota and southwestern Minnesota businesses were not willing participants in the survey. Therefore, most meaningful responses to our survey were within an approximate 100-mile radius of the Fargo/Moorhead metro area,[12] and all responses that included TOFC/COFC freight were within the 100-mile radius (Figure 2). The southern-most portion of our original survey region captured potential users that are closer to the Omaha, NE, and Minneapolis/St. Paul, MN, intermodal facilities than the Dilworth, MN, facility (Figure 2).

[12] The radius extends approximately 100 highway miles south, east, and west but extends approximately 150 highway miles north of Fargo/Moorhead. The radius is an average 112.5 miles.

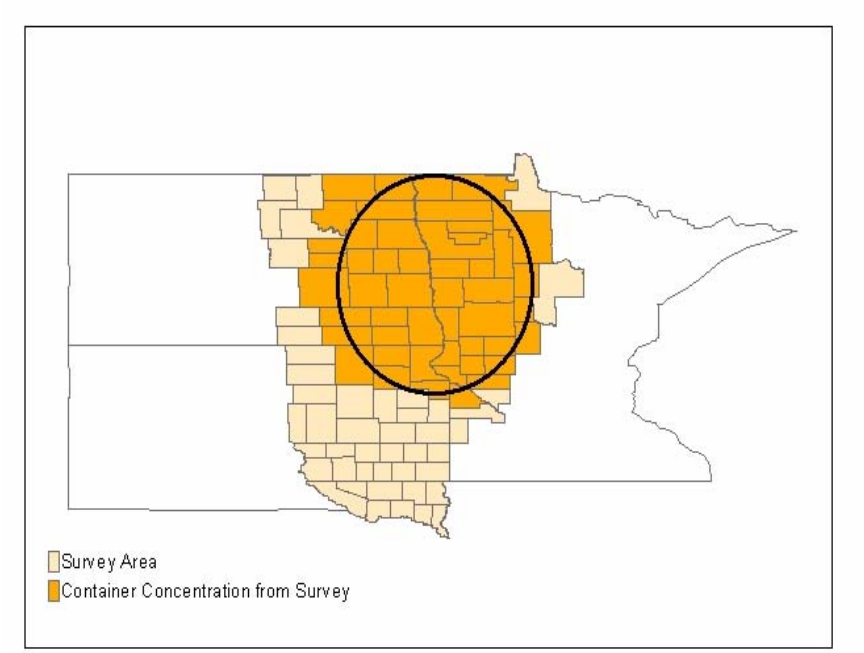

Figure 2 Intermodal Survey Response Area (100-mile radius of Fargo/Moorhead).

INFRASTUCTURE ANALYSIS

Good transportation infrastructure increases accessibility and mobility for the region's passengers and freight. Efficient transportation infrastructure allows regional products to compete or excel in distant markets. Prices of commodities in rural areas are largely affected by the infrastructure and the transportation rates and services provided by that infrastructure. Many commodities grown in our region are low-value and large-volume products that are transported long distances to final markets. Many manufacturers in the region also transport their products to distant markets. If it is grown, processed, or manufactured, adding value locally provides new wealth for operators, communities, and the region. Adding value may be as simple as providing a traceable product that is produced, handled, and delivered using the methods and/or manner desired by the final customer, or it can be raw materials used to manufacture a product. Most value-added producers and manufacturers that ship long distances, especially internationally, rely on containerized intermodal transportation where the container is sealed at the point of production or processing and opened at the customer's place of business. It is perceived that the region is not being provided the optimal opportunity to participate in the growth that is occurring in the containerized freight arena because of lack of access and service.

This section will look generally at the infrastructure in the region but will concentrate on the intermodal facility at Dilworth, MN. The road and rail network will be identified but the focus is on intermodal.

Railroad Network

There is an extensive rail network in the study area. The study area includes two Class 1 railroads and several railroads classified as either regional and/or short lines. In North Dakota, there are one regional, and two short line railroads. In Minnesota, there are three short lines operating. In South Dakota, there are one regional and seven short lines. The difference in the state of South Dakota is that the state owns many miles of track upon which railroads are allowed to operate through different agreements. The common

railroads in the study area are Class I which include Burlington Northern Santa Fe and the Canadian Pacific. Many rail yards and sidings exist in the study area and are displayed in Figure 3. There are various sizes and capabilities. Many sidings are used for grain loading and others are used for car loadings, car switching, car storing and other purposes. However, there is only one intermodal loading facility in the study region and that is located at Dilworth, MN.

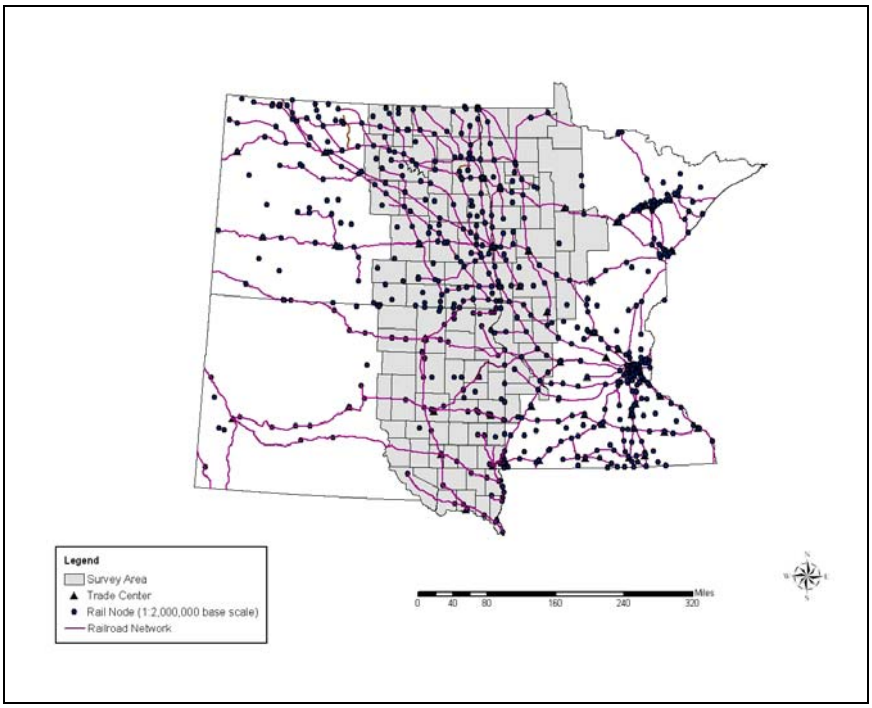

Figure 3 Survey Area and Railroad Network and Nodes (Source: Mapping Center, BTS).

Appendix 5 provides maps and figures of many of the rail yards and sidings in the study area. The maps and figures in Appendix 5 focus only on the larger communities. There are numerous sidings and yards in the study area as shown in Figure 3.

Federal-Aid Highway System

The highway system in the rural areas of North Dakota, South Dakota, and Minnesota is used extensively for moving goods originating, terminating, and moving through the region. The Federal-Aid Highway System connects the study area to the outside world. There are two interstate highways that intersect at Fargo. The collection system served by the Federal-Aid Highway System and their extensions bring rural and urban centers together Figure 4.

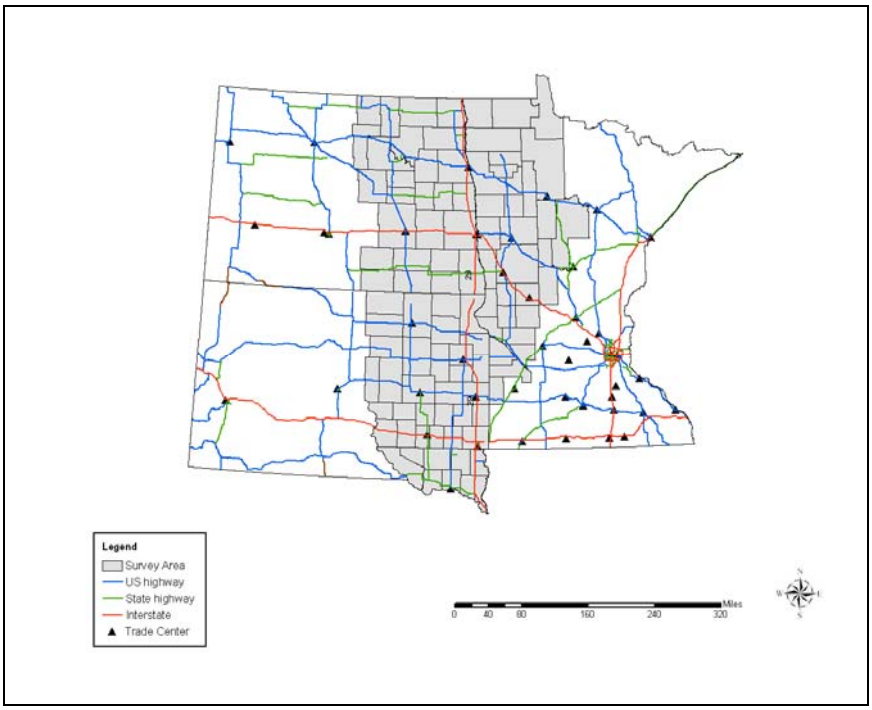

Figure 4 Federal-Aid Highway System (Source: BTS, ESRI Data & Maps, and Minnesota DOT).

The focus of this study is intermodal terminals. The closing of intermodal facilities has been common during the last 15 years and there are no facilities or terminals in North or South Dakota. Only one, located in Dilworth, MN, remains in the study area.

Dilworth Intermodal Yard

Even though the railroad owns property around the Dilworth facility, the physical size of the Dilworth intermodal facility, in comparison to other facilities, is small. Dilworth is 7 acres compared to the Billings, MT, facility at 30 acres, and Omaha, NE, at 19 acres. Lift volumes are comparable between Billings and Dilworth. However, Omaha has much higher volumes and is growing. Dilworth has one side loader and one yard hostler, whereas the Billings facility has one side loader and two hostlers. Omaha has two side loaders, but only one hostler. A side loader lifts the containers/trailers on and off the train/truck, and a hostler is a truck/tractor that moves equipment around in the yard. Dilworth has 1,700 feet of strip track. Omaha has 4,200 feet. Omaha has 409 parking spots and 48 strip track car spots. Dilworth includes only 100 parking spots and 20 strip track car spots. These size differences may provide some clues to why shippers in the study area are moving containers to facilities outside the study area. There is also a distribution center for new vehicles at the Dilworth facility which adds to the viability of the facility. Dilworth is operated by Trailer Transfer, a third party. Trailer Transfer has not participated in this study or the pervious study conducted by UGPTI.

Access to the Dilworth facility may be problematic for residents and truckers as the terminal is located within the city of Dilworth. However, there is reasonable access from Interstate 94 to the facility with the recent construction of the overpass at U.S. Highway 10 and Minnesota Highway 336.

Figure 5 is an aerial image of the facility which shows the general layout. The Fargo/Moorhead Rail Corridor Consolidation Feasibility Study suggests that rail yards be consolidated at Dilworth which may provide an opportunity for expansion of the intermodal facility. As shown in the image however, there are residential areas north and south of the facility.

Figure 5 Rail Yard Arial Imagery in Dilworth, MN (source: Terraserver-Usa.com).

It is estimated that Dilworth had 8,900 lifts in 2003. If there are two lifts per container/trailer this amounts to 4,450 total container/trailer units inbound and outbound. Figure 6 compares the lifts at Dilworth and Omaha. It is estimated that the Omaha facility grew 40 percent in volume between 1999 and 2003.

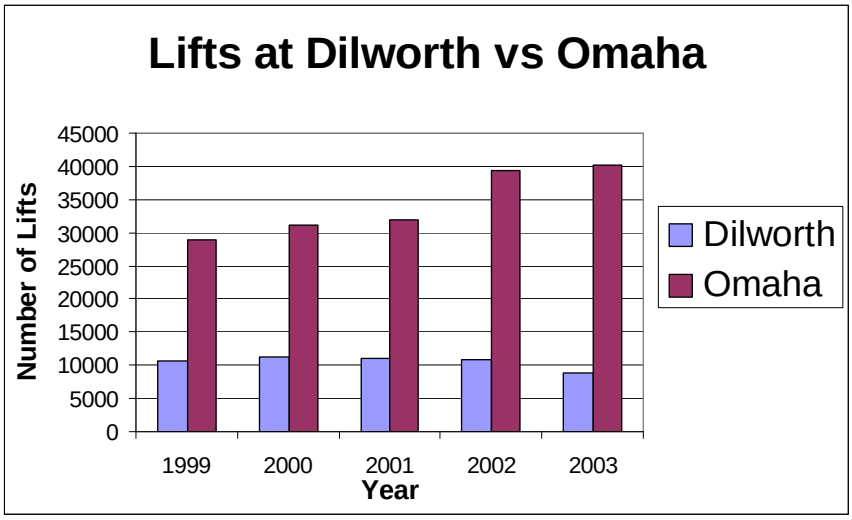

Figure 6 Estimated TOFC/COFC Lifts at Dilworth and Omaha. (Undisclosed Source)

The large number of shippers using distant terminals, shown in the survey section, requiring high cost drayage provides anecdotal evidence that the Dilworth terminal is problematic. Respondents from the survey cited barriers to using intermodal transportation and reported long distance to terminals as the top barrier, high rates was the second-most-reported barrier at 33 percent, and poor service was reported by 27 percent of respondents.[13] However, there were several written comments proclaiming the need to keep or expand the intermodal terminal in the area.

In examining the Fargo/Moorhead Rail Corridor Consolidated Feasibility Study, expansion at the Dilworth yard is possible and suggested as the primary scenario to meet the objectives of reducing the conflict of rail and highway traffic.

Examining national and other trends again shows that the Dilworth intermodal facility has not participated in the growth trend (Figures 6 and 7). The TOFC/COFC sector of the Class I railroads has been growing despite a slow economy. The growth for the last five years in the container portion of rail intermodal has been exceptional (Figure 7). It is estimated that volumes at Dilworth have declined during the last three years.

[13] See appendix 1 and Figure 21 for further detail.

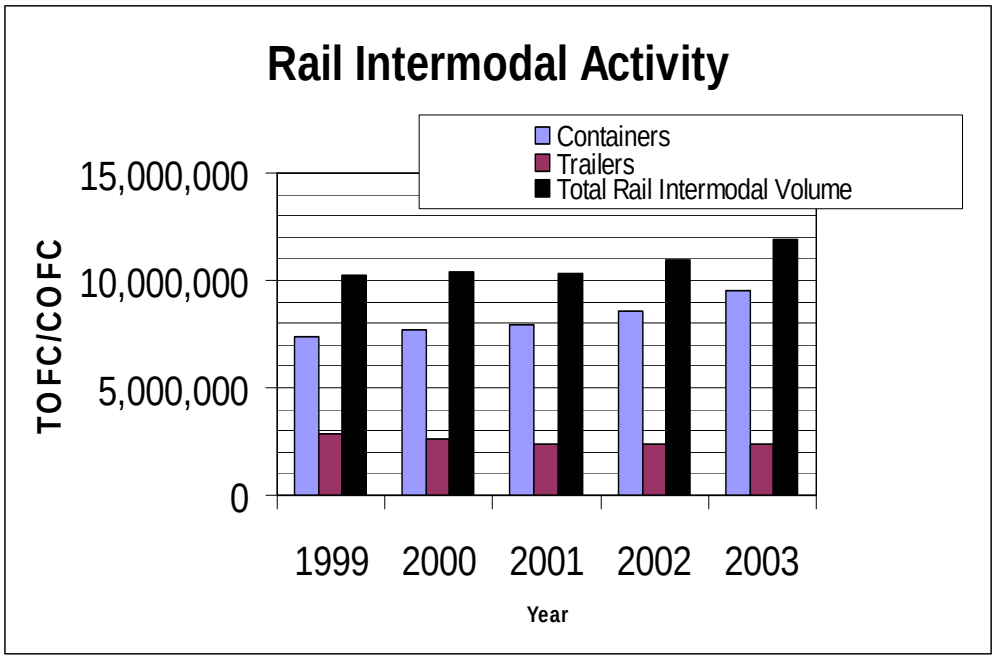

Figure 7 National, Annual Rail Activity. (Source: Intermodal Association of America).

It is estimated that BNSF's St. Paul, MN facility has increased its volume over the past 5 years by 14 percent (Figure 8). This growth is an annualized growth rate of almost 3 percent.

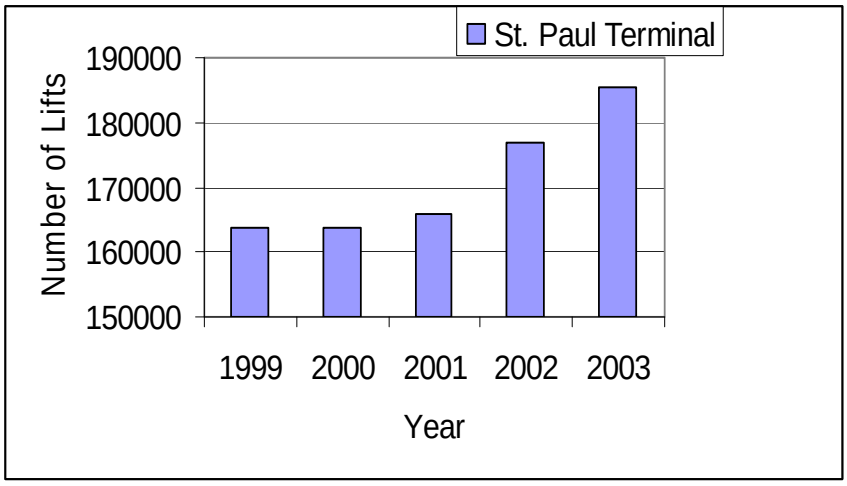

Figure 8 Estimated Number of Lifts at St. Paul Terminal.

Additionally, port loadings have increased an estimated 27 percent including the U.S. and Canada (Figure 9). The significant increases since 1980 have caused port congestion and equipment shortages as improvements to ports and new container construction has not kept up. This provides long-term problems for low-volume, low-valued product shippers. The highest revenue for the steamship company or equipment operator is the import movement to the U.S. A backload on the return trip may be unimportant if it presents equipment problems such as repositioning or container shortages. The steamship companies' goal is to turn the containers at the port and transload the content into a trailer, which may then be put on a train and shipped to the intermodal terminal closest to the final destination. The top container suppliers for this region are Evergreen, Hanjin, Maersk, Hyundai, and OOCL.

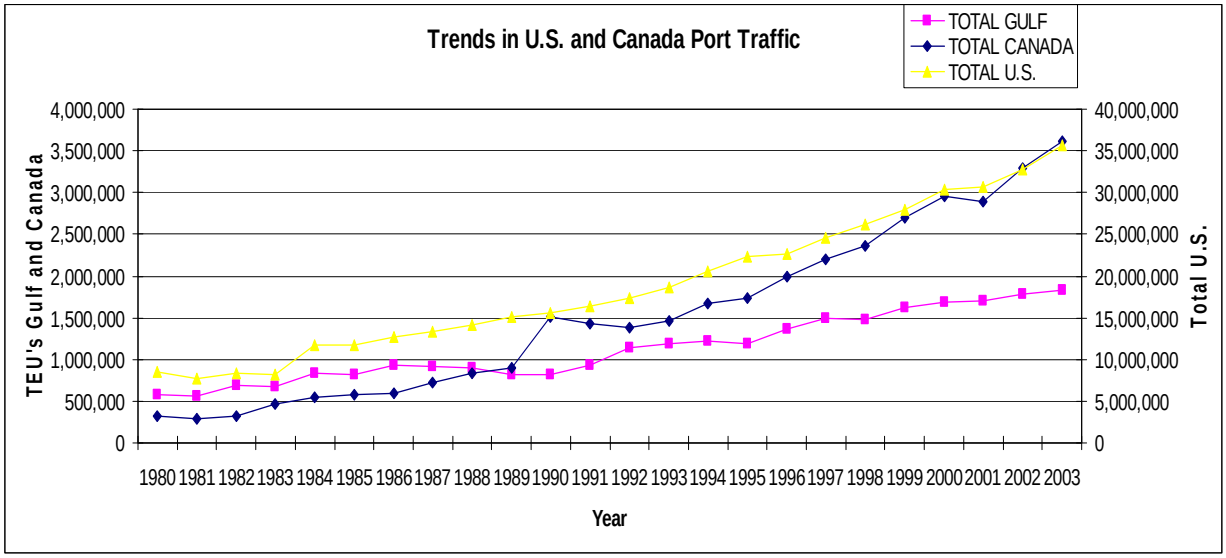

Figure 9 Trends in Port Traffic. (Source: American Association of Port Authority http://www.aapaports.org/pdf/CONTAINER_TRAFFIC_CANADA_US.xls).

SURVEY

A survey was developed to estimate the amount of TOFC/COFC freight generated and terminated in the study area. First an educational brochure was mailed to the potential respondents and approximately one week later the survey was mailed. The survey consisted of 11 main questions, with subsets of questions within some questions (Appendix 1). Descriptive statistics were used to explain the survey responses.

The survey was sent to 2,765 companies. Of those original surveys, 190 were undeliverable. The number of companies identified in the area of responses was 1,798. The response rate was 8.3 percent.

Question one of the intermodal survey asked companies why they use their particular transportation mode. More than 50 percent of the 149 firms responded that service is reliable and customers prefer the current mode (57 percent and 53 percent respectively). Moreover, 42 percent answered that they have direct access, while 39 percent reported low rates as a reason for using the mode; and 27 percent answered their products receive less damage with their current mode. The remaining 13 percent answered "other" to question one with more than half of those responses indicating the mode used is their only choice (Figure 10).

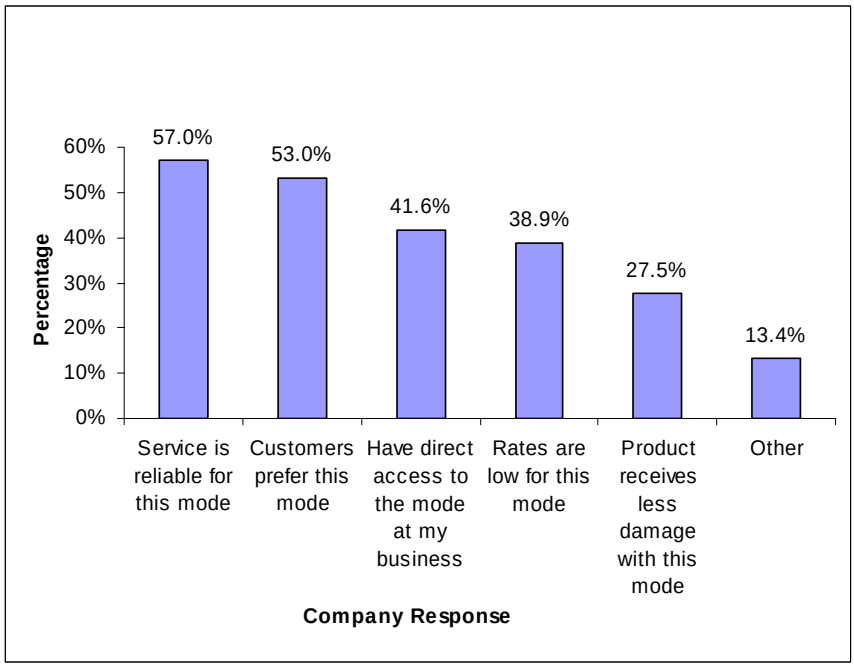

Figure 10 Responses to "Why do you use the transportation modes that you use?" (Source: Survey Data, 2004) - 146 firms responding.

Question two asked companies if they use intermodal shipping. The second part of the question asked which intermodal facility(s) they use. Question two also asked companies to list percentage use at each facility.

Of the 149 responding companies, 22 percent indicated they use container/trailer on rail (intermodal) shipping now; 71 percent indicated they did not; while 7 percent did not respond. Of companies reporting they use intermodal shipping, 50 percent use the Dilworth facility. However, it only results in 10 percent of intermodal volume in the study area.

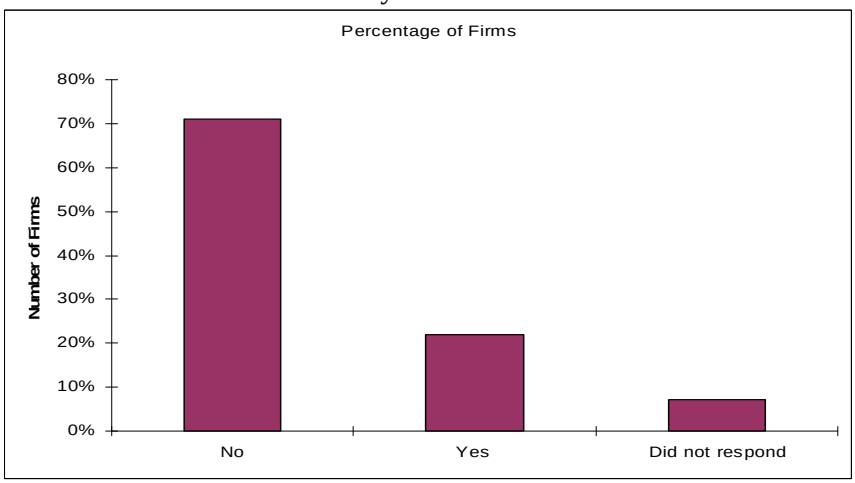

Figure 11 Responses to "Do you use container/trailer on rail (intermodal) shipping now?" (Source: Survey Data, 2004) - 149 firms responding.

Twenty-eight percent of respondents use Winnipeg's intermodal facility, resulting in 20 percent of the volume from the study area. Almost 70 percent of the respondents report using the Minneapolis/St. Paul facility, resulting in 58 percent of the total volume. More than 12 percent of intermodal shippers report using the Chicago facility, resulting in 6 percent of the total volume. Just over 12 percent of respondents reported using the Omaha facility but the Omaha facility resulted in less than 1 percent of the total volume. About 5 percent of the volume reported was not attributed to a terminal (Figure 12).

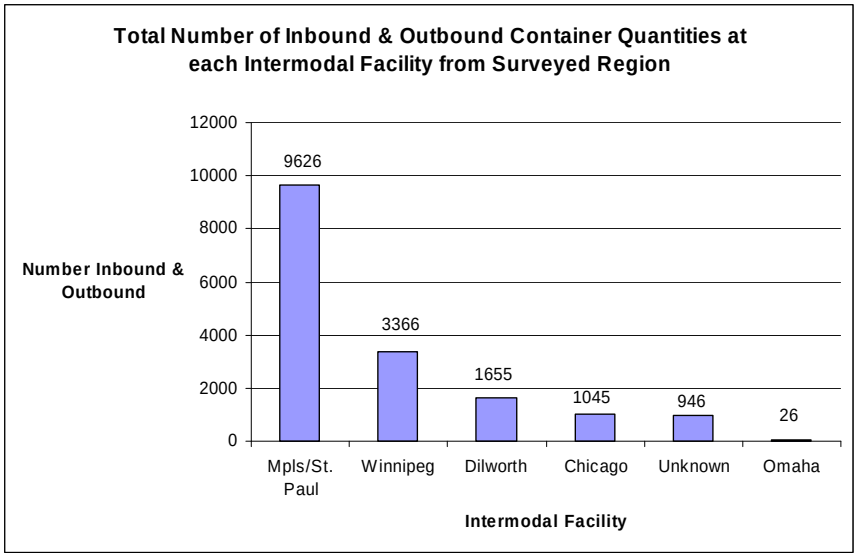

Figure 12 Reported Quantities of Inbound and Outbound Containers at each Intermodal Facility (*Includes all sizes of inbound and outbound containers). (Source: Survey Data, 2004).

Question three asked companies to identify the number of inbound and outbound TOFC/COFC units and the size of the units shipped (e.g. 20-foot container, 53-foot van trailer, etc.). Figure 13 shows 3,689 total inbound units and 12,974 total outbound units. The totals for inbound and outbound containers include all TOFC/COFC units.

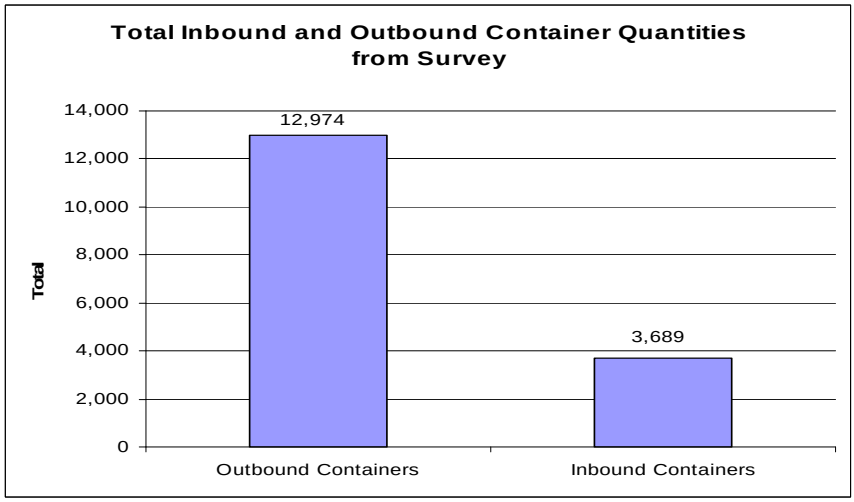

Figure 13 Total Number of Inbound and Outbound Container Quantities. (Source: Survey Data, 2004).

Question 4 asked respondents if they were denied or had difficulty with intermodal service. More than 57 percent of respondents using intermodal shipping reported a problem with intermodal service (Figure 14).

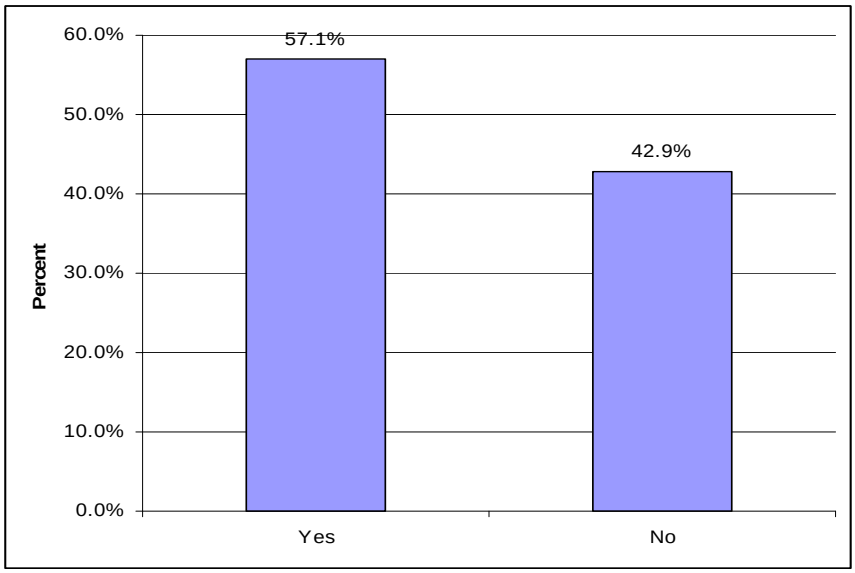

Figure 14 Response to Difficulty with Intermodal Service. (Source: Survey Data, 2004).

Question five asked firms to list the number, type, and annual volume of shipments and, if a shipment was international, what port(s) were used. Truck types included vans, flats, and hoppers. Respondents indicated 297,517 inbound trucks and 97,460 outbound trucks (Figure 15).

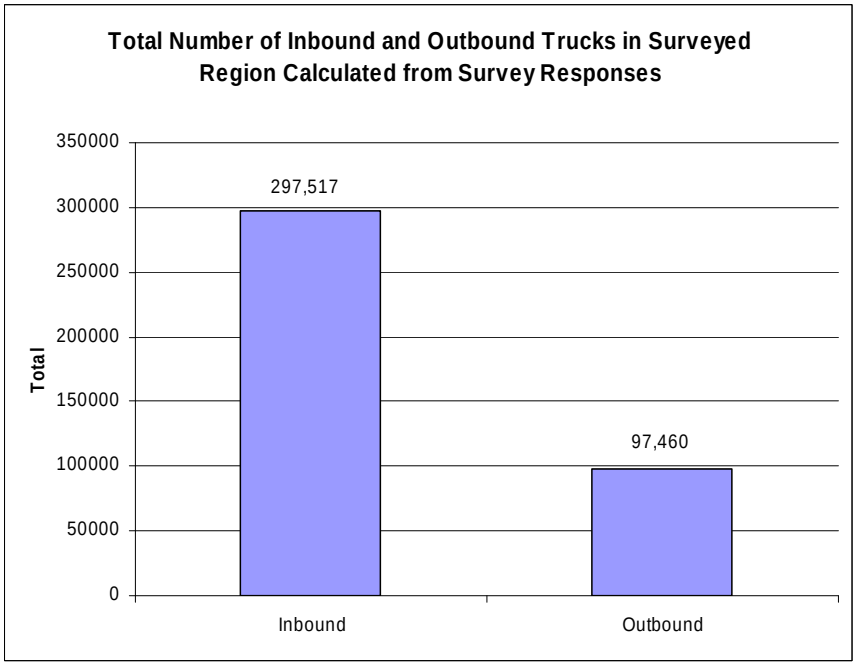

Figure 15 Reported Truck Shipments. (Source: Survey Data, 2004).

There were 26,832 outbound rail shipments and 9,948 inbound rail shipments reported for survey question 5. These are mostly box car shipments (Figure 16).

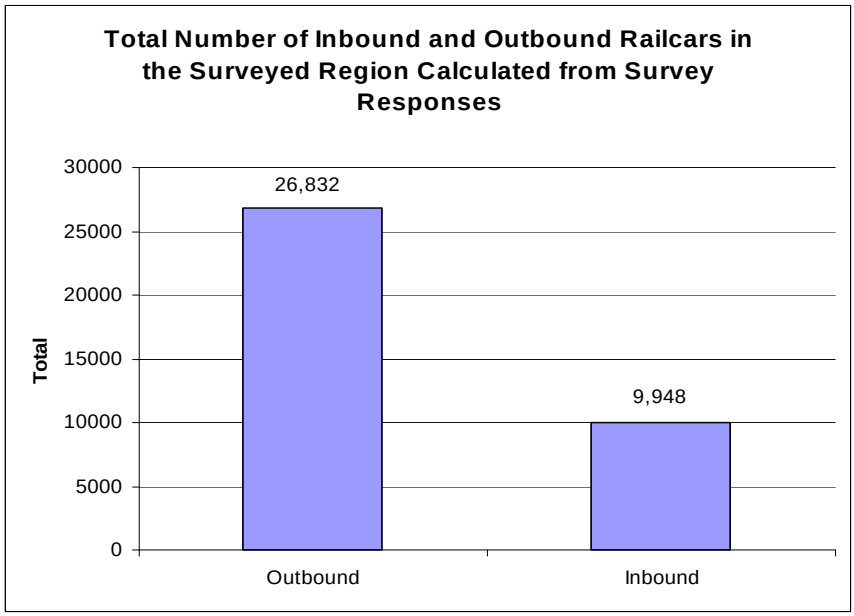

Figure 16 Reported Rail Shipments. (Source: Survey Data, 2004).

Question five also asked respondents which port(s) are used for inbound and outbound international shipments and the approximate percentage use. Figures 17 and 18 show port locations for inbound and outbound international shipments and reported use at each location. The locations were separated into regions defined by the author. The defined regions include: North (Midwest Canadian border), South (Mexico border and Gulf of Mexico), Northwest (Seattle, Tacoma, Portland), Southwest (California), Northeast (Maine to Virginia), and Southeast (North Carolina to the southern tip of Florida). The percentages in each region do not include all declared inbound container shipments because a number of surveyed firms did not indicate which ports were used for inbound international shipments. However, 99.5 percent of the total inbound international container shipments were captured and a weighted average of responses pertaining to ports used for inbound international shipments was used. More than 37 percent of inbound containers came from the northeast followed by the northwest and southwest at about 28 percent each.

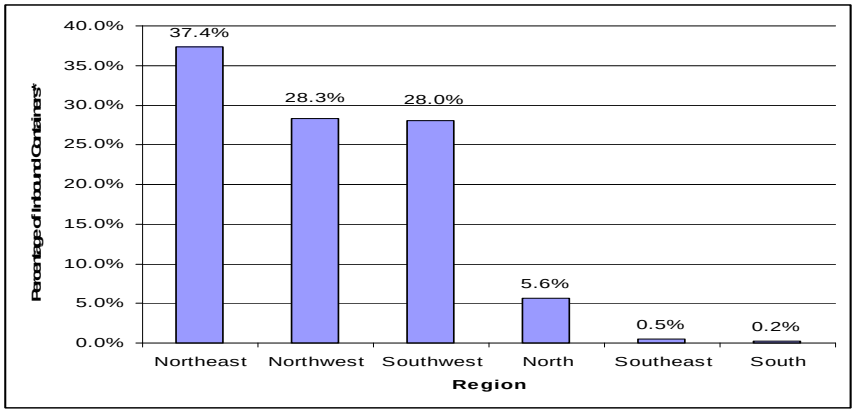

Figure 17 Reported Inbound Port Locations and Usage. (Source: Survey Data, 2004).

Figure 18 shows the general region of port destinations and percentage of containers from surveyed firms. As previously mentioned, the percentages for each regional destination do not include all declared outbound container shipments due to a number of surveyed firms that did not indicate ports used for international shipments. However, 61 percent of the total outbound international container shipments were captured and a weighted average of responses pertaining to ports used for outbound international shipments was used. Approximately 26 percent of the outbound containers were shipped to the north followed by the northwest and southwest at about 23 percent each.

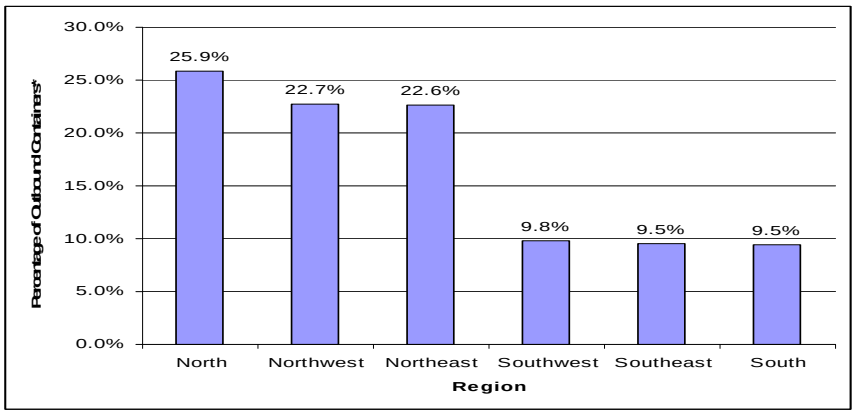

Figure 18 Reported Outbound Port Locations and Usage. (Source: Survey Data, 2004).

Question six asked respondents to list their top products which provided a wide array of shipped products ranging from IP grains to manufactured equipment. Question seven asked respondents to provide their total freight bill per year. The results of questions six and seven were used to better analyze the received data. However, to ensure confidentiality for individual firms, the information is withheld from this report.

Question eight asked respondents about their source of inbound products. The survey respondent selected from any or all of three categories: local, regional, or international.[14] For each category, the survey asked the annual number and the origin of inbound shipments. Figure 19 shows the reported distribution and location (local, regional, international) from all modes which inbound products are received. According to responses, only 1 percent of inbound shipments are international.

[14] Local was defined as the tri-state area of MN, ND, and SD. Regional was defined as domestic shipments. International was defined as all international including Canada and Mexico.

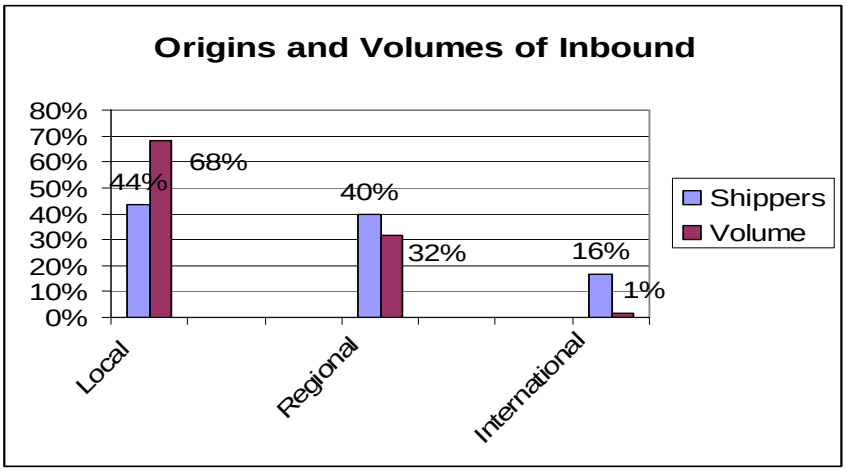

Figure 19 Reported Distribution of Inbound Products. (Source: Survey Data, 2004).

Question nine asked respondents the destination of their outbound products. The survey respondent was asked to select from any or all of three categories: local, regional, or international. For each category, the survey asked the annual number of shipments and specific destination for outbound shipments. Respondents reported 25 percent of the outbound volumes shipped locally (ND, SD, MN) and 23 percent internationally. Fifty-two percent of the volume shipments from the region are shipped to destinations within the United States. (Figure 20).

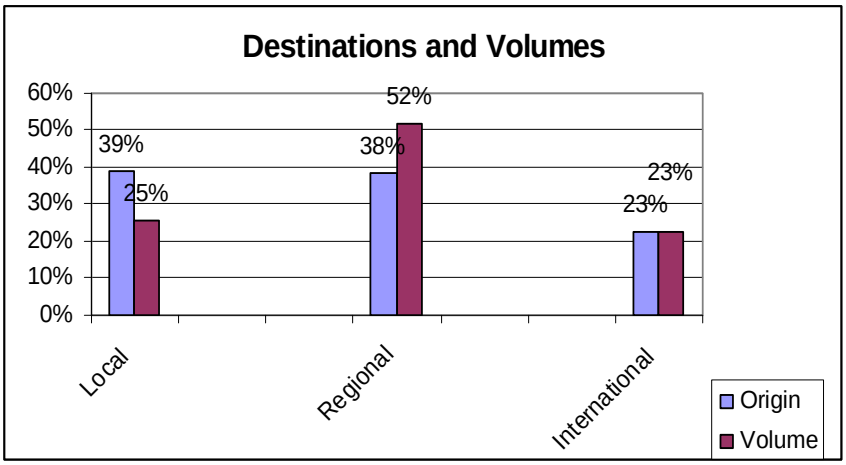

Figure 20 Reported Distribution of Outbound Products. (Source: Survey Data, 2004).

Question 10 asked firms to indicate barriers to using intermodal service. Firms were allowed to check all that applied. Respondents most frequently choose long distance to terminal, followed by high rates, other, and poor service (Figure 21).

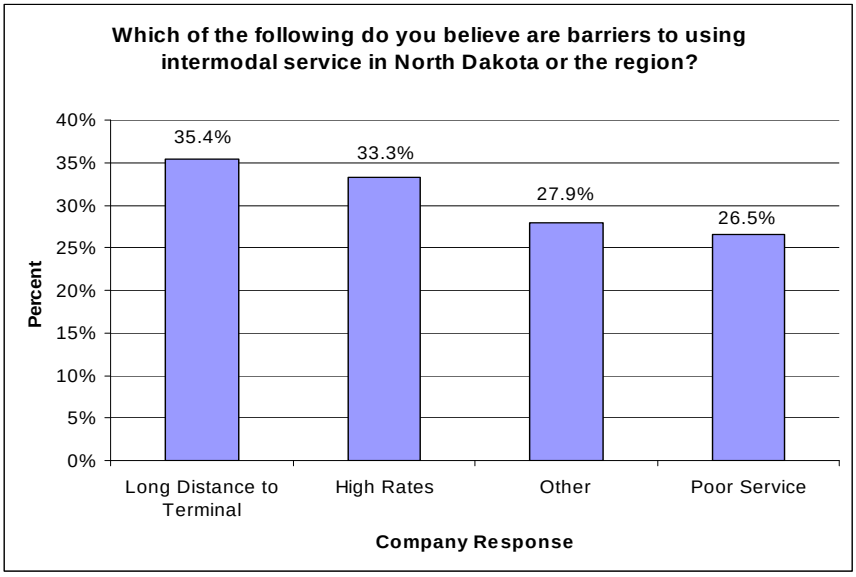

Figure 21 Reported Barriers to Using Intermodal Service in North Dakota or the Region. (Source: Survey Data, 2004).

The last question asked respondents to provide annual projections of growth in percentage terms. These projections were weighted by freight volume. Respondents were only asked to project to 2010. Using trend analysis, researchers extended growth to 2015. Figure 22 shows reported average annual projections of growth weighted by the number of shipments. It is very close to 7 percent annual growth.

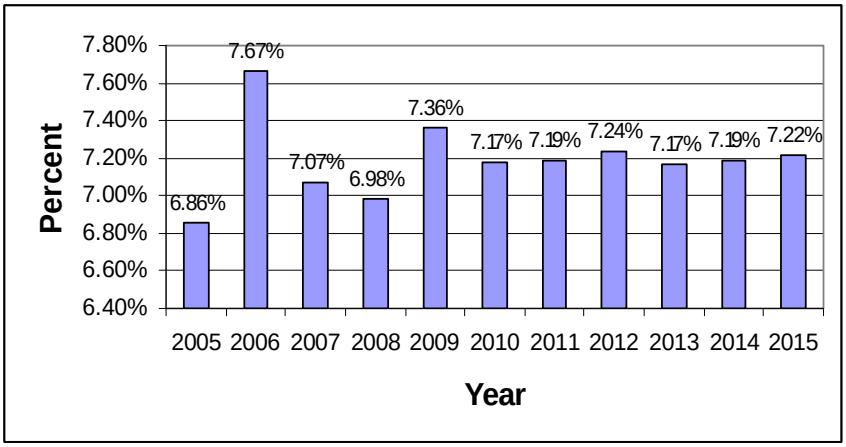

Figure 22 Reported Weighted Average Growth 2005 to 2015 Based on Number of Shipments. (Source: Survey Data, 2004).

Figures 23 through 27 were developed through analysis and compilation of the results from various questions asked throughout the survey. Figure 23 shows inbound shipments by mode as a percentage of total inbound shipments. Survey respondents reported trucks making up 95.6 percent of their total inbound shipments.

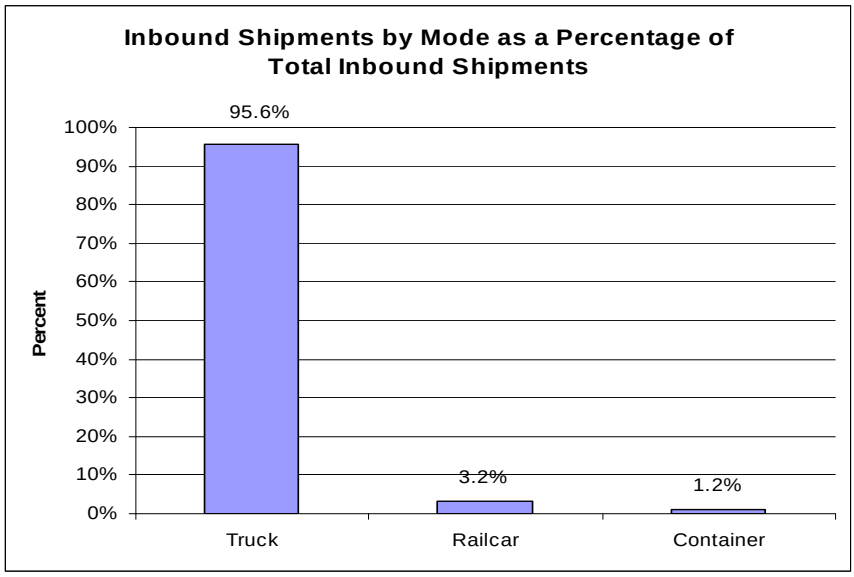

Figure 23 Percentage of Total Inbound Shipments by Mode. (Source: Survey Data, 2004).

Survey respondents reported trucks making up 71 percent of their total outbound shipments. Railcars made up 19.5 percent of shipments and TOFC/COFC were 9.5 percent (Figure 24).

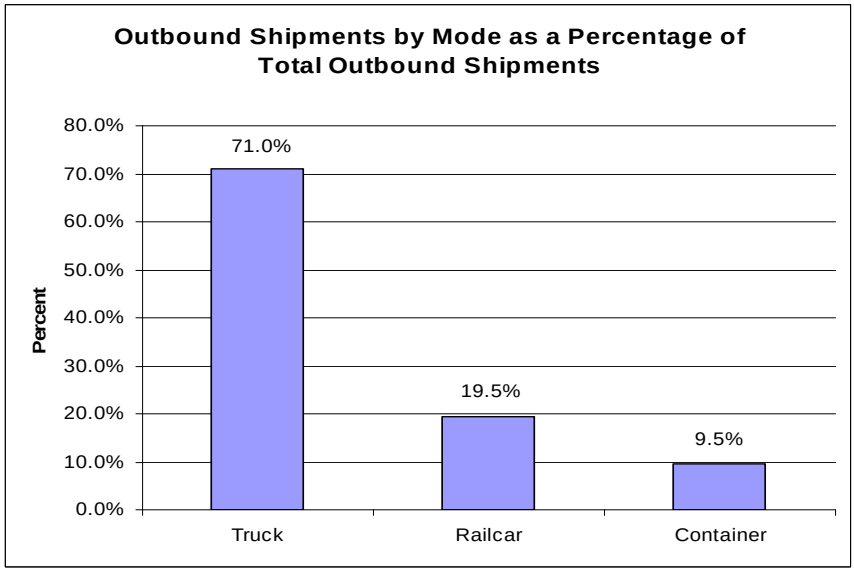

Figure 24 Percentage of Total Outbound Shipments by Mode. (Source: Survey Data, 2004).

Figure 25 reports inbound shipments by mode as a percentage of total inbound and outbound shipments. Trucks comprise 66 percent of the total inbound shipments when taken as a percent of the total reported inbound and outbound shipments. Inbound railcars only comprised 2.2 percent of total shipments and inbound TOFC/COFC made up less than 1 percent.

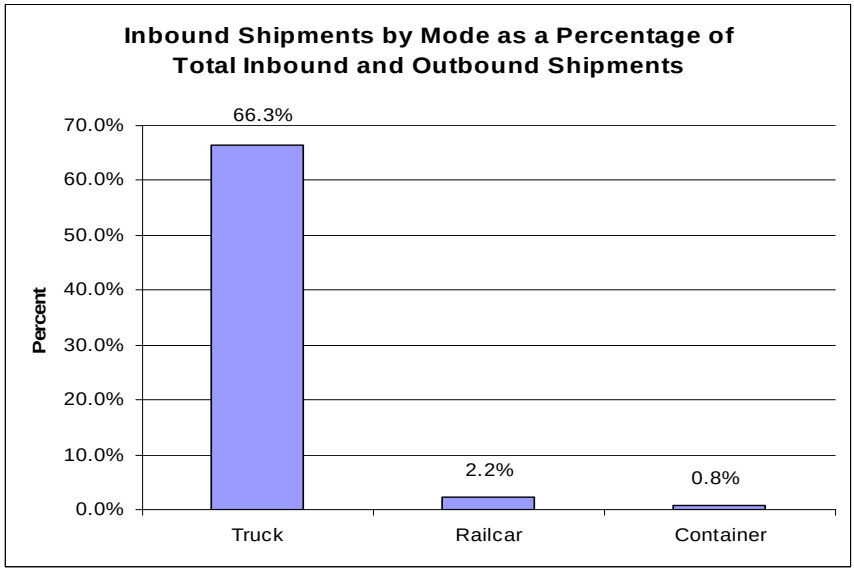

Figure 25 Inbound Percentage of Reported Inbound and Outbound Shipments. (Source: Survey Data, 2004).

Figure 26 shows outbound shipments by mode as a percentage of total inbound and outbound shipments. Trucks comprise almost 22 percent of the total outbound shipments when taken as a percentage of the total reported inbound and outbound shipments.

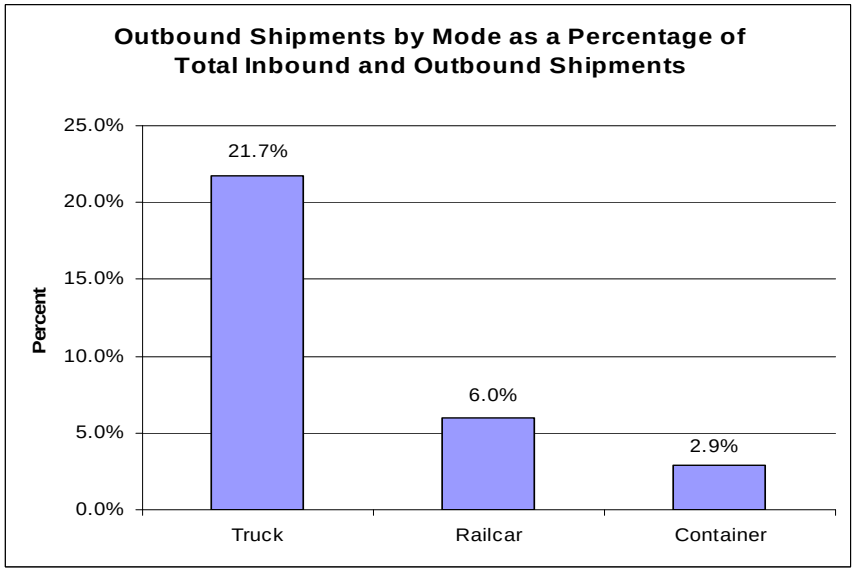

Figure 26 Outbound Percentage of Reported Inbound and Outbound Shipments. (Source: Survey Data, 2004).

Figure 27 shows total inbound and outbound shipments for all modes (truck, rail, and container) of transportation as reported in the intermodal survey. The disparity in inbound and outbound is a result that some respondents are agricultural processors and their inbound shipments are commodities grown locally.

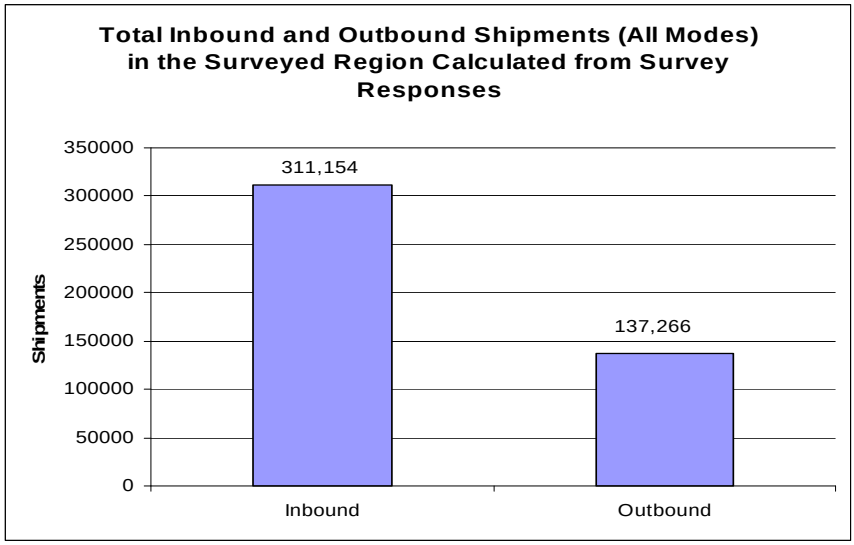

Figure 27 Total Inbound and Outbound Shipments (All Transportation Modes). (Source: Survey Data, 2004).

Estimates of Population Freight Shipments within a 100-Mile Radius of Fargo

Survey data provided a framework for estimating all intermodal traffic in the region. All survey respondents reporting TOFC/COFC shipments were within a 100-mile radius of Fargo. This is to be expected, because the further away from the feasibility study area companies are, the less interest they will have in a facility in or near Fargo. The eastern edge of the study area assumes companies are closer to the Twin Cities. The southern end of our survey area has the option of being served by either Omaha or the Twin Cities which lessens their interest in an eastern North Dakota, or western Minnesota facility.

The survey identified intermodal volumes and in most cases respondents reported what type container or trailer was being transported. However, to estimate total volume, units are reported, not specific type.

Respondents were classified using the (SIC) Standard Industrial Classification System. Using the SIC, an estimated total number of employees in the survey area by industry was compiled. Secondly, companies classified by SIC and employee numbers for each class were used to estimate shipments.[15] Ratios were developed to expand shipments over the population.

[15] Employee numbers are not listed by SIC because of confidentiality issues with some SIC codes.

Table 2 SIC-2 Digit Code for Surveyed Area

20	Food and kindred products
22	Textile mill products
23	Apparel and other textile products
24	Lumber and wood products
25	Furniture and fixtures
26	Paper and allied products
27	Printing and publishing
28	Chemicals and allied products
29	Petroleum and coal products
30	Rubber and miscellaneous plastics products
31	Leather and leather products
32	Stone, clay, and glass products
33	Primary metal industries
34	Fabricated metal products
35	Industrial machinery and equipment
36	Electronic and other electric equipment
37	Transportation and equipment
38	Instruments and related products
39	Miscellaneous manufacturing industries

Company respondents reported employee numbers and ratios which were established using the SIC code. Shipments were expanded to cover all employees in the SIC within the 100-mile radius of Fargo. Only the SIC codes reported by respondents were used, and only county employee numbers were used if a respondent reported from that county.[16] Respondents reported 9,154 employees, which represents an estimated 27 percent of all employees in the SIC products used for our analysis. Respondents reported 16,498 TOFC/COFC units. Expanding to the population of employees, estimates of trucks, boxcars, and TOFC/COFC units are made.

[16] Chi Squared Analysis was used to determine if the sample was a representation of the entire population. Companies with an interest in TOFC/COFC shipping were more likely to respond to the survey and this may conflict with Chi Squared analysis as the sample is not completely random. In conducting Chi Squared Analysis, p value was less than or equal to 0.001, therefore the distribution is significant.

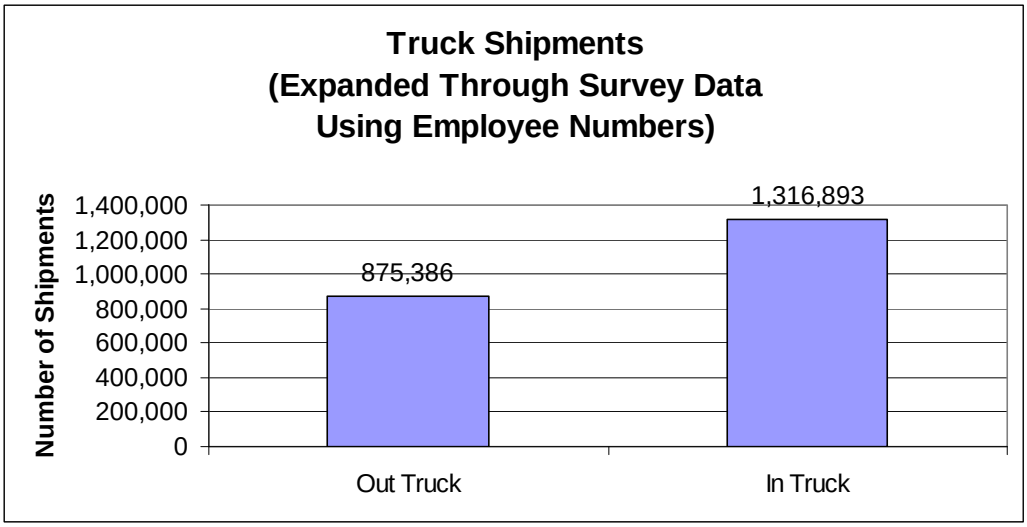

Figure 28 Truck Shipments Expanded.

As stated previously, balance of inbound/outbound trucks may provide opportunity for TOFC/COFC. Figure 28 shows imbalance in truck shipments which may be due to a lack of intermodal service and the high percentage of draying to and from other intermodal terminals. Also, as previously mentioned, agricultural processors reported inbound products that included commodity production resulting in a high number of shipments.

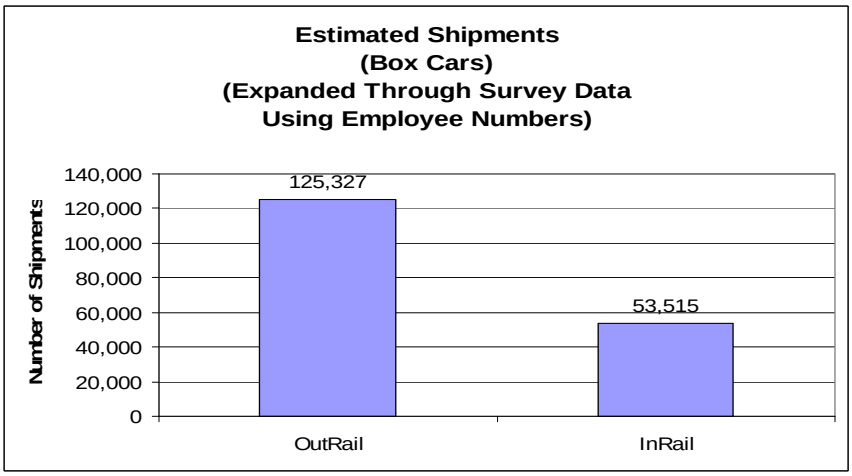

Figure 29 Estimated Shipments of Boxcars.

Figure 29 shows the estimated number of railcars of freight. The imbalance in the shipments of boxcars is the opposite of the reported truck volumes. Twice as many rail cars are reported shipping outbound. This also holds true for TOFC/COFC shipments (Figure 30).

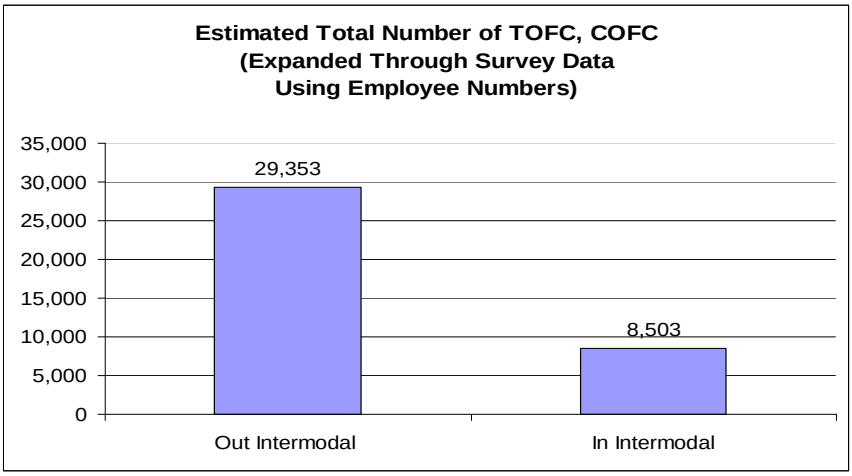

Figure 30 Estimated Number of TOFC/COFC Shipments.

The estimated TOFC/COFC volume for the study area resulted in a significantly higher number than reported by the survey. Expanding through the employee numbers results in TOFC/COFC numbers of 37,856 containers. It is important to point out the significant imbalance of outbound versus inbound. This estimation when split among the different terminals can be seen in Figure 31.

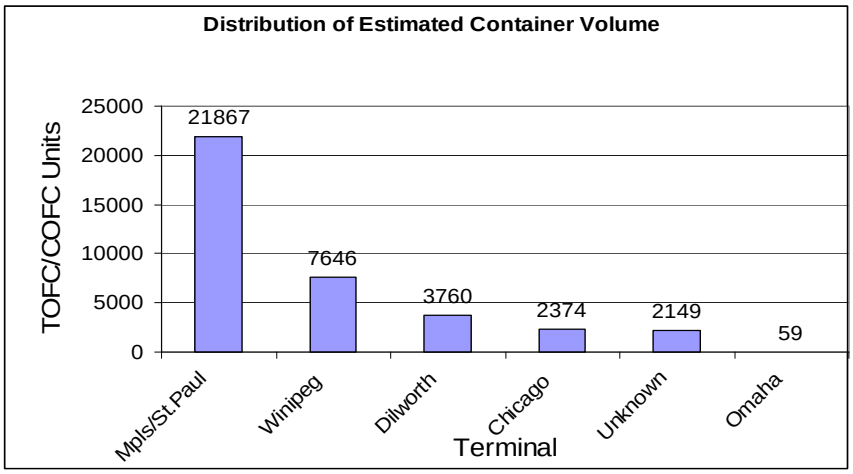

Figure 31 Distribution of Estimated TOFC/COFC Volume.

PROJECTIONS FOR GROWTH

Growth estimations are presented from various sources along with growth projections from survey respondents. The last question in the survey asked respondents to estimate company growth through 2010. These responses were used to estimate future industry growth in the study area. The projections for freight movements on the Federal-Aid Highway System are presented in Appendix 4.

The United States Department of Labor provides employment statistics by sector. Data presented by the Bureau of Labor Statistics for the manufacturing sector shows the national trend in employment as negative over the last 24 years. The increase in productivity of 3.8 percent annually provides for a

reported 2.6 percent increase in annual output, which more than makes up for the loss of labor force. This data suggests that manufacturers' technological and other innovations, including logistics and supply chain practices, have provided a trade of labor for innovation.

North Dakota Job Service provides projections for employment from 2000 to 2010. The data is stratified by SIC and conflicts with the national trend. It is estimated that the manufacturing sector of non-durable goods will grow in employee numbers by 11.7 percent, while durable goods manufacturing will grow by an estimated 17.5 percent. The estimations provided by North Dakota Job service are for the entire state and do not consider that growth is occurring at a faster pace in the more populated Red River Valley than other areas of the state. Also, this projection was done with data derived from the trends of the 1990s when North Dakota added several value-added processors. History has proven that not all value-added processing is automatic and market conditions take their toll in some cases, resulting in failure. Table 3 shows the North Dakota Job Service projections.

Table 3 North Dakota Job Service Projections for Employment

SIC	Industry Title	2000 Employment	2010 Projections	Total Growth	% Total Growth
	Total All Industries	387374	414992	27618	7.13
01-07	Agriculture, Forestry, Fishing	41389	38248	-3141	-7.59
12-14	Mining	3719	4278	559	15.03
15-17	Construction	15802	17945	2143	13.56
20-23 & 27-31	Non-Durable Goods Manufacturing	9848	11003	1155	11.73
24-26 & 32-39	Durable Goods Manufacturing	15471	18191	2720	17.58
40-47	Transportation	13254	14145	891	6.72
48-49	Communications&Utilities	7640	7389	-251	-3.29
50-51	Wholesale Trade	21421	22774	1353	6.32
52-59	Retail Trade	60322	65836	5514	9.14
60-67	Finance and Insurance and Real Estate	16863	18579	1716	10.18
70-89	Services	145832	160141	14309	9.81
90-93	Government	35813	36463	650	1.81

Estimated Future Volumes for TOFC/COFC Volumes in Study Area

Using the expanded numbers gathered from the survey data and the growth projections from respondents, it is then possible to estimate growth for TOFC/COFC shippers in the study area. Projections for growth in employee numbers by North Dakota Job Service and the Bureau of Labor Statistics show increases in productivity and provide confidence in the growth projections reported by respondents. These projections are weighted by reported shipments.

The survey respondents were asked for their estimations of growth to 2010. The data was then extrapolated to 2015. Growth is relatively constant at an estimated 7 percent annual rate. Estimated volume using the expanded data and capturing all employees increases the projections to more than 57,000 units by 2010 and to more than 80,000 by 2015 (Figure 32).

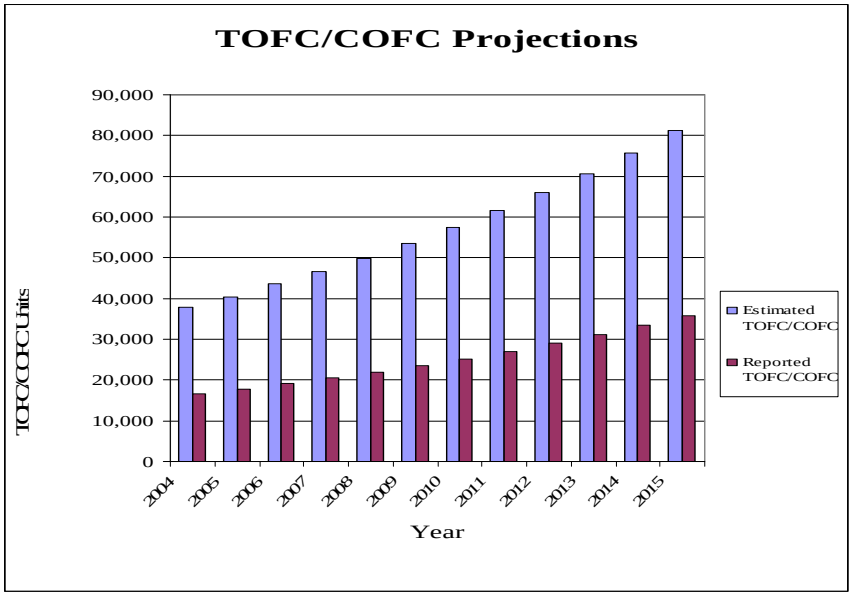

Figure 32 TOFC/COFC Projections.

TREND IN IDENTITY PRESERVED AND TRACEABILITY

"Traceability" and "Identity Preserved (IP)" are terms used for agricultural product quality verification, assuring a crop has maintained its unique identity from the grower to the processing plant. Wagner and Glassheim (2003)[17] define traceability as "a strict production and delivery method, with known procedures of observing, inspecting, sampling, and testing to assure the presence or absence of certain traits, usually defined by customer demand." Wagner and Glassheim separately define identity preserved as "a process by which a producer contracts with processors to deliver crops with traits that will increase processing quality and efficiency."

Wagner and Glassheim provide seven observations and future trends for commodities grown in the Northern Great Plains:

1. A paradigm shift by Northern Great Plains producers will allow the supply chain for grain and oilseeds to adjust production to take into account the products consumers are demanding or avoiding.
2. The need to rapidly adapt and adopt these products into the market will increase the pressure on both public regulators and private supply chains to ensure safety and quality.
3. To ensure that these markets continue to purchase from U.S. companies, identity preserved and traceability systems will have to be established to provide confidence to foreign importers.
4. Commodity driven, pooled production will increasingly be viewed as yesterday's technology and those that continue to adhere to this concept will find themselves excluded from an increasing number of markets.
5. Some feel the true cost of this new system is much higher. If identity preserved/traceability systems are going to succeed, they will need to become more cost effective.

[17] Wagner, Gary L. and Glassheim, Eliot. *Traceability of Agricultural Products*, Northern Great Plains Inc., May 2003.

6. On-farm quality assurance will involve setting standards, record keeping and audits. This will require farmers to make more sophisticated use of financial instruments, make new investments in logistics equipment, and invest in more training to ensure agronomics and quality systems function appropriately.
7. Many exporters feel that if a farm is not close to the Mississippi River or a railroad that serves the Northwest, transportation costs can reduce the value of the premiums paid for identity preserved crops.[18]

The vision reported above points out the need for smaller shipments of raw commodities and processed goods to meet the goals of IP and traceability. The need to increase security and protect and assure food safety will be magnified with time. The Europeans are rapidly moving to traceability and the need is increasingly apparent with the reports of mad-cow or BSE reported in beef, the Star-link corn problem that plagued that industry several years ago and the constant threat of terrorism. Increased genetic altering of many crops for desired outcomes highlights the importance. As the variability in the food system grows, so will the need for traceability and identity preservation, these trends will lead to smaller shipments for many commodities.

The IP grain market is hampered by shipping companies' or steamship lines' reluctance to devote scarce equipment to serve the market because IP grain is relatively low in value. Their interests are better served returning containers to foreign ports rapidly to load them with higher revenue products.

Graphical Representation of Identity Preserved Agricultural Products

Growth in containerized agricultural food and animal products has been growing nationally and locally. Container exports of soybean and animal feed in 20-foot containers exported from 1992-2002 is illustrated in Figure 33. Container exports for both commodities have steadily increased over the 10-year period.

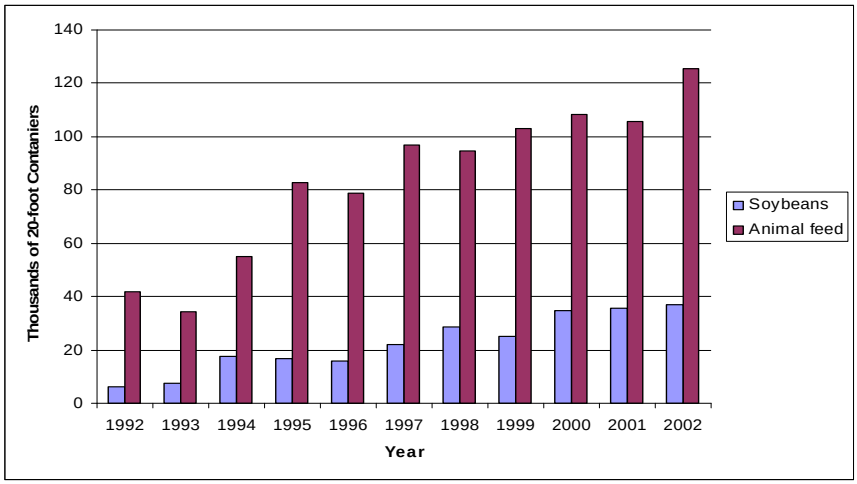

Figure 33 US 20-foot Soybean and Animal Feed Containers Exported from 1992-2002. (Source: PIERS).

[18] Wagner, Gary L. and Glassheim, Eliot, *Traceability of Agricultural Products*, Northern Great Plains Inc., May 2003.

Figure 34 shows 20-foot soybean containers exported from the US from 1995 to 2002. As the figure shows, the trend for US soybean container exports has increased rather steadily during the eight-year period.

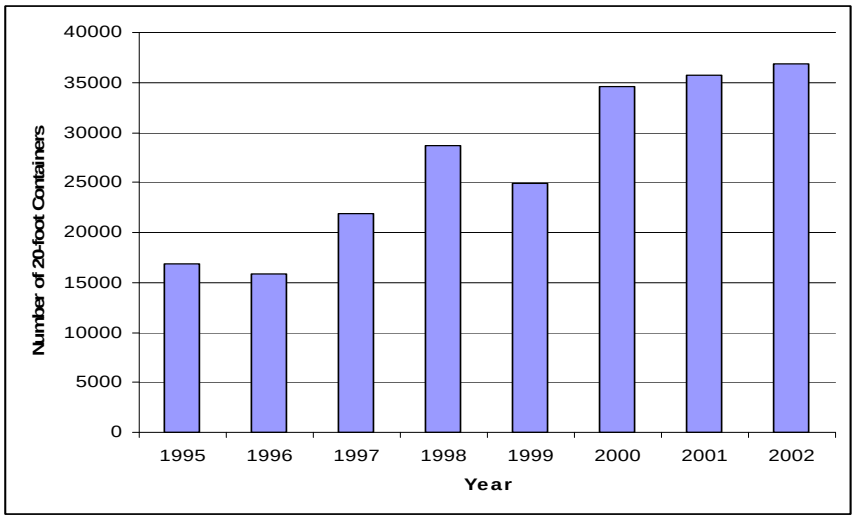

Figure 34 US 20-foot Soybean Containers Exported from 1995-2003. (Source: Port Import Export Reporting Service (PIERS).

Figure 35 shows total agricultural container exports from North Dakota, Minnesota, and South Dakota in 2003 and estimated container exports in 2004. In 2004, estimated container exports decreased for agricultural products due to smaller crops in the region because of weather-related problems.

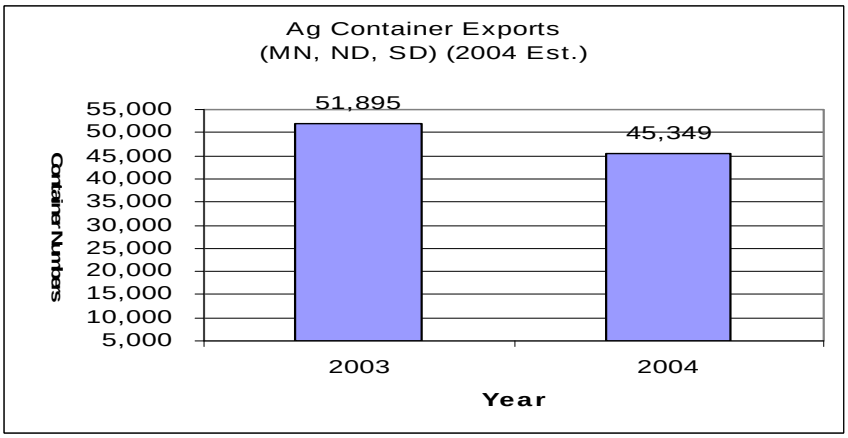

Figure 35 Total Agricultural Container Exports from North Dakota, Minnesota, and South Dakota (2003-2004).

Figure 36 presents the percentage share of US soybeans produced in a 100-mile radius of Fargo/Moorhead. Over the nine-year period, the percentage has increased from 3 percent of total U.S. production in 1995 to more than 7 percent in 2003. With steady increases in soybean production, the number of container exports in the 100-mile radius of Fargo/Moorhead has also grown steadily.

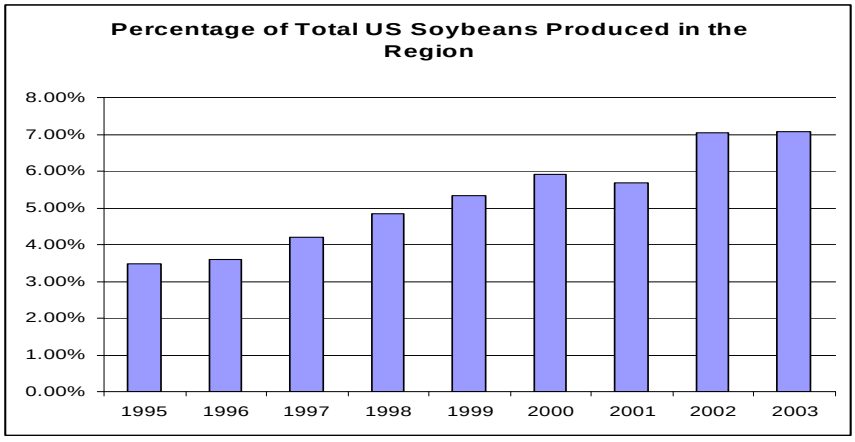

Figure 36 Share of Total US Soybeans Produced in 100-mile Radius of Fargo/Moorhead from 1995-2003.

Historical data shows the estimated soybean container exports within the 100-mile radius of Fargo/Moorhead have steadily increased from 1995 to 2003 (Figure 37). As farmers in the region look to expand into higher-valued rotational crops, soybeans have become an increasingly popular option.

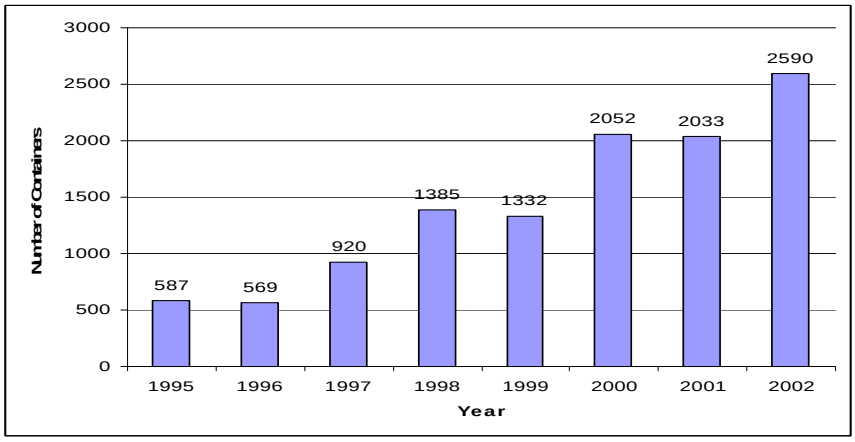

Figure 37 Estimated 20-foot Soybean Container Exports in 100-mile Radius of Fargo/Moorhead Based on Export Data from PIERS.

SITUATIONAL FRAMEWORK FOR SUCCESS

Meeting with railroad officials, consultants and conducting literature reviews provided information about the railroad's needs for successful intermodal operations. Insight into the goals of railroads in intermodal transportation services can be obtained by examining changes in Santa Fe railway intermodal operations in the early 1990s.

Insight into Railroad Intermodal Success

Santa Fe railway turned intermodal from its least profitable segment to a level comparable to carload traffic. It modeled its management after motor carriers, viewing intermodal operations as "profit centers." Santa Fe created an intermodal business unit which runs independently, creating a new organizational structure. The main advantage of the new department was a complete picture of the business. Previous responsibilities were spread out among many departments. The railroad focused heavily on intermodal marketing companies (IMC). Santa Fe found that 20 percent of IMC customers produced 80 percent of the business, so it dropped the number of IMCs used from 260 to 55 (Giblin, 1998).[19] It aggressively invested in new longer 48-foot containers, compared to the old 45-foot units. In 1994, Santa Fe offered six levels of service with six different prices. It found that premium traffic provided the most profit and customers were willing to pay for guaranteed service (Giblin, 1998).

Another efficiency gain for Santa Fe was improved lane balance. Lane balance is the ratio of full to empties moving in any given direction. Trucks usually operate with a ratio of 95 percent full and 5 percent empty, while Santa Fe was 55 percent full and 45 percent empty. Through aggressive pricing Santa Fe improved the ratio to about 95 percent full, Santa Fe also exited from all lanes where it did not see a clear competitive advantage.

Much of the success of intermodal operations can be attributed to the development of intermodal hubs, or terminal locations, where trains are gathered and cars are exchanged or switched to form new trains. "These 'hub-and-spoke' operations take advantage of reducing the number of point-to-point operations when the volume is not large enough to make them cost efficient" (Muller, 1999).[20]

However, while a generalized version of the 'hub-and-spoke' system has been used to make railroads successful in intermodal operations, some rural areas have been excluded from this system. Many rural areas in the western part of the U.S. have low intermodal traffic volumes and are at such long distances from large volume intermodal facilities that they have not been fully included in the intermodal 'hub and spoke' system. In many cases, their intermodal service has been eliminated. This service has been reduced from approximately 1,500 operations in 1970 to less than 370 in 1998 (Muller, 1999), and may be less than 200 today (Ogard, 2004).[21] This reduction in facilities has limited transportation options for many shippers in small cities or rural areas.

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[19] Giblin, J. "Mission Impossible? Making Rail Intermodal Profitable." *Trains Magazine*. V58, n7, p64(4). July, 1998.
[20] Muller, Gerhardt. *Intermodal Freight Transportation* 4th ed. Eno Transportation Foundation, Inc., Virginia, 1999.
[21] Ogard Libby. *Intermodal Freight Facilities in Small to Medium Sized Communities.* Presentation in Rural Freight Conference. Sep. 9, 2004.

Initial BNSF Meeting

A meeting with Burlington Northern Santa Fe officials revealed four factors in evaluating intermodal service. First and foremost is volume, second is balance of traffic, third is concentration for destinations, and finally the steamship companies need to agree to provide equipment (Steve Salzman, 9/13/04)[22]. Mr. Salzman also stated that because of the surge in demand for intermodal transportation services, there is presently an equipment shortage. Mr. Karl from BNSF also revealed that IP (Identity Preserved) agriculture shippers should not rule out box car use in bags or totes. The meeting with BNSF was positive toward multimodal improvement options in the region.

Views and Commonalities

A study conducted by the Upper Great Plains Transportation Institute for the NDDOT looking at the role of intermodal transportation in North Dakota identified conditions for successful intermodal in rural areas. The conditions include 1) adequate container volume, 2) the availability of multiple railroad alternatives, 3) locations on an intermodal rail line, 4) location on the National Highway System, 5) the availability of accessorial services such as a fuel stop at the location.

A presentation by Libby Ogard, a transportation consultant from Green Bay, Wisconsin, discussed factors that provide for successful intermodal transportation. The factors include, 1) adequate population, 2) proximity to Class 1 carriers, 3) production (volume), 4) productivity (balance and density), 5) political will of the community.

The common denominators from the sources would indicate that at least five factors must exist for successful intermodal operations. The five factors are:
1) volume,
2) balance of traffic,
3) concentration of destination (density),
4) steamship company or equipment operator cooperation,
5) commitment of business and/or community.

Longevity at the Port of Montana may be attributed to its diversification of services. It provides many different logistical functions in addition to container loadings to provide revenue. Success is also achieved by locating a distribution center in an area providing business volume and balance of traffic.

If an intermodal facility serving the region is not fully included in the railroad's 'hub-and-spoke' network, it must meet one of two special criteria: (1) it must have a traffic volume large enough to generate efficient shipment sizes to final destinations without consolidation with other traffic, or (2) it must have ancillary services available to the railroad that would provide a reason to stop trains and allow for car switching during the process. Few locations in rural areas can meet the criteria listed above. In the following section, intermodal transportation is examined from the shipper's perspective, providing insight into the types of intermodal facilities and services that are likely to generate the most amount of traffic.

[22] Meeting with BNSF representatives (Mr. Salzman and Mr. Karl). Sep. 13, 2004.

Shippers' View of Intermodal Service

Shippers note that improvements in timeliness and price competitiveness are important enhancements that would cause them to shift to intermodal usage (Spraggins, 1997).[23] A survey reaffirmed that the service gap between intermodal and truckload services is the greatest barrier to improving intermodal transportation's share of the North American freight market. Intermodal transportation generally is thought of as a practical alternative for general freight (non-bulk) that moves in full trailerload or containerload lots (Spraggins, 1997). In general, intermodal usage varies by the size of the company, products being shipped, and distance from an intermodal hub.

The largest barrier for many companies desiring intermodal service is the location of intermodal hub facilities. An intermodal loading facility located within a reasonable distance is essential to justify using intermodal transportation as a viable transport mode. As distance to an intermodal facility increases, rate savings decrease as transit times and drayage costs increase. This explains why many small, rural companies simply continue to use trucks to transport product.

Third-party logistics providers offer door-to-door services tailored to specific customer needs. Most intermodal loading facilities are not operated by the railroad that services the facility. Therefore, third-party providers act as a liaison between shippers and the railroads, providing customer service, access to equipment, and attractive rates because of large volumes associated with the third-party provider (Muller, 1999).

For an intermodal terminal to provide efficient service, close cooperation among all parties is necessary. Muller (1999) identified the requirements for a successful intermodal terminal as follows:

- Furnish necessary personnel and container-handling equipment to receive, store and deliver intermodal trailers and containers.
- Prepare all necessary documents for receiving and delivering intermodal containers and trailers, ensuring that all port, airport, and other terminal charges, customs duties, and freight charges have been paid.
- Maintain a status report of all trailers and containers received, delivered, and on hand in the terminal for submittal to carriers involved.
- Maintain accurate inventory and locations of all intermodal trailers, containers, and equipment.
- Preplan all loading and unloading operations from data supplied by carriers and their agents.
- Provide necessary personnel and equipment to service loading and unloading operations between modes.
- Prepare all cargo plans, hazardous cargo manifests, and related documents for delivery to the carrier and its vehicles.
- Maintain security for all containers and equipment in the terminal.

[23] Spraggins, Barry H. *"The Potential for International Movements of Goods from Alberta to the U.S. and Mexico."* 39th Transportation Research Forum Annual Meeting Procedings. Montreal, Canada: October 16-18, 1997.

- Prepare all reports relative to terminal functions.
- Furnish adequate supervision to ensure proper performance of all operations.

Other characteristics of a good terminal include a convenient location, access, and adequate infrastructure.

TERMINAL OPERATIONS AND COSTS

A terminal for intermodal freight could take many shapes and sizes. A terminal may offer: transloading, TOFC/COFC loadings, warehousing, distribution, cross docking, subassembly, packaging, drayage/trucking, manufacturing, processing, and/or any combination thereof. It is intuitive that the facility provides immediate services and meets the needs of businesses in the area.[24]

Intermodal Terminal Costing Model

Using modeling principles, an economic engineering model was developed to simulate costs for an intermodal facility. The model provides decision makers with an estimate of start-up and annual costs. Moreover, it provides insight into traffic volumes needed to make such a facility feasible.

The model was developed to evaluate costs for intermodal facilities with varying sizes, equipment configurations, equipment types, and traffic levels. The model consists of changeable fixed and variable cost sections to replicate different sizes and configurations of facilities which allows for scenario analysis and provides a range of investment levels as well as unit costs for decision making purposes.

Base Case Facility Assumptions

Facility size is based on the median size and track length of BNSF facilities nationwide. The Dilworth, MN, facility is the railway's smallest, considering land area and track length, car spots, and parking. Based on median size of facilities it could be estimated that a facility with 44 acres and 8,600 feet of track could serve the area with ample parking space, car spots, truck maneuvering and parking. It is assumed that two powered switches are needed and two internal switches would be required. Fencing the perimeter of 44 acres on three sides would require 3,960 feet of fence. It is assumed that all 44 acres would be paved. However, some areas may need concrete to support the weight of the lifter as it maneuvers to load and unload TOFC/COFC units. It was assumed there would be a need for 15 work lights and 20 reefer hookups. A 2,500-square-foot building would be built for office and storage space. This facility would need one lifter, two hustlers, two chassis, and one forklift. There would be a manager and four yard employees. Table 4 shows the initial assumptions along with possible options.

[24] The model developed here is only for illustrative purposes and does not represent any intent of a facility type or size. Phase 2 of the project provides for terminal design, location analysis, and costing.

Table 4 Assumptions and Options for the Hypothetical Intermodal Facility

Land acres	44	Cost per acre	$3,000.00
Feet of track	8,600	Cost per foot of track	$100.00
No. of powered switches	2	Cost of powered switches	$130,000.00
No. of fence feet	3,960	Cost of fence per foot	$10.00
Acres of pavement	44	Cost per acre	$10,000.00
No. of work lights	15	Cost of lights	$10,000.00
No. of reefer hookups	20	Cost of reefer hookup	$2,000.00
Square feet of building	2,500	Cost per square foot	$50.00
Feet of water line	1,500	Cost per foot	$10.00
Feet of sewer line	1,500	Cost per foot	$20.00
No. of lifters	2	Cost of lifter	$500,000.00
No. of hustlers	2	Cost of hustlers	$50,000.00
No. of forklifts	1	Cost of forklifts	$25,000.00
No. of Chassis	2	Cost of hassis	$5,000.00
Facility Estimated Useful Life (Years)	20	Equipment estimated useful life (Years)	15
Tax rate	5%	Insurance	.5%
Interest rate	8%	Estimated facility life	20 Years
Maintenance and repair	Variable		

Table 5 shows the estimated investment expenditure for the base case facility. As the table shows, a base case facility capable of handling 100,000 lifts per year is estimated to cost in excess of $2 million.

Table 5 Investment for the Hypothetical Intermodal Facility

Land	$132,000
Track	$860,000
Powered Switches	$260,000
Internal Switches	$320,000
Fence	$39,600
Building	$187,500
Office Equipment	$32,500
Lighting	$150,000
Reefer Hookups	$40,000
Water Line	$20,000
Sewer Line	$30,000
Equipment (1 lifter, 2 hustlers, 2 chasis, 1 Forklift)	$635,000
Total	**$3,026,600**

Table 6 estimates annual fixed and variable costs for the base case intermodal facility. Estimated fixed costs include facility and equipment depreciation, return on investment, taxes, insurance, management, accounting expenses, building expenses and maintenance. Variable costs include worker wages, benefits, and fuel. As the table shows, it is estimated that such a facility would cost over $800,000 per year to operate and maintain.

Table 6 Estimated Annual Operating Costs for Intermodal Terminal

Total Annual Costs	
Fixed	
Land Track & Building	$95,664
Equipment	$33,867
T,I,MR,ROI	$299,950
Management	$101,200
Building Expense	$15,225
Accounting	$2,500
Total Fixed	**$548,406**
Variable	
Wages	$202,400
WC & SS	$24,288
Benefits	$30,360
Fuel	$35,360
Total Variable	**$292,408**
Annual Costs	
Total	**$840,814**

Highest cost items under fixed costs include taxes, insurance, maintenance, and return on investment (ROI). The next highest fixed cost is management. Management may be a variable cost because it could change, but it is fixed in this case because it is a necessary part of a facility. The work force may be reduced, but management is necessary. In the model, management costs are based on the number and wages of employees. Under the variable costs, the highest category is wages. It is estimated to require at least four full-time employees to run a facility of this size. It is estimated that the ramp operations in Omaha employ three full-time employees and management.

The base case estimates facility costs and annual operating costs. Costs may be decreased using used equipment, less land and labor, or by using existing track or other changes. ROI makes up almost $210,000 of the estimated annual operating costs. ROI includes the opportunity cost for dollars invested, covers interest and principal payments, and/or provides return to investors.

An estimate of the costs for maintaining and operating a facility per lift is provided. This is useful in making an assessment of the traffic levels necessary to make such a facility feasible. Table 7 provides an estimate of the total costs per lift for the base case facility at various lift volumes. As the table shows, the total estimated costs per lift decrease with increased volume.

Table 7 Model Sensitivity Cost Per Lift at Different Annual Lift Volumes

Lifts/YR	Fixed Costs/lift	Variable Cost/lift	Total Costs/lift
5000	$110	$2.60	$112.28
10000	$55	$2.60	$57.44
15000	$37	$2.60	$39.16
20000	$27	$2.60	$30.02
25000	$22	$2.60	$24.53
30000	$18	$2.60	$20.88
35000	$16	$2.60	$18.26
40000	**$14**	**$2.60**	**$16.31**
45000	$12	$2.60	$14.78
50000	$11	$2.60	$13.56
55000	$10	$2.60	$12.57
60000	$9	$2.60	$11.74
65000	$8	$2.60	$11.03
70000	$8	$2.60	$10.43
75000	$7	$2.60	$9.91
80000	$7	$2.60	$9.45
85000	$6	$2.60	$9.05
90000	$6	$2.60	$8.69
95000	$6	$2.60	$8.37
100000	$5	$2.60	$8.08
105000	$5	$2.60	$7.82
110000	$5	$2.60	$7.58
115000	$5	$2.60	$7.36

Some insight into the types of volumes that would be necessary to support a facility might be obtained by comparing an average revenue per lift to the costs per lift.[10] Leeper, et. al (1996) estimate that the lift revenues at Dilworth, MN, are in the range of $10 to $15. If these numbers are put in current dollars using the GDP Implicit Price Deflator, the range is $10.94 to $16.41 in 2001 prices.

Given the potential difficulty in generating a large amount of traffic for such a facility, any new potential facility would likely need to provide other types of services in addition to intermodal container service. It is important to remember that these numbers are for one specific type of facility, with specific assumptions regarding the costs of different inputs. It may be possible to configure a facility in a way that results in lower costs per lift.

Model Sensitivity to Variables

Capital expenditures in equipment provide small increments of annual operating costs. The model's sensitivity to equipment costs is shown in Table 8. Adding $50,000 in equipment costs adds less than $8,000 to annual operating costs.

[10]It is important to note that these cost estimates and average revenue estimates are reasonable estimates given the information we have. However, the point where average revenue per lift is equal to cost per lift from this model should not be considered as a solid break-even point. Rather, the numbers are illustrative of a range of traffic where such a facility may be feasible.

Table 8 Annual Operating Costs Varying Lifter Costs

Costs For Lifter(s)	Annual Operating Costs
$0	$763,247
$50,000	$771,004
$100,000	$778,761
$150,000	$786,517
$200,000	$794,274
$250,000	$802,031
$300,000	$809,787
$350,000	$817,544
$400,000	$825,301
$450,000	$833,057
$500,000	$840,814
$550,000	$848,571
$600,000	$856,327
$650,000	$864,084
$700,000	$871,841
$750,000	$879,597
$800,000	$887,354
$850,000	$895,111
$900,000	$902,867
$950,000	$910,624
$1,000,000	$918,381

It is difficult to estimate facility costs without having a site selected and/or the type and size of facility desired. It may be important to purchase enough land to protect the interests of the facility and allow for expansion. The terminal may need space to allow for manufacturing, processing, warehousing, and other logistics functions. Table 9 shows facility size versus cost per acre annual operating costs.

Table 9 Facility Size versus Cost Per Acre (Annual Operating Costs)

Cost/Acre→	**$1,000**	**$2,000**	**$3,000**	**$4,000**	**$5,000**
Acres ↓	**Annual Operating Cost**				
20	$831,854	$833,454	$835,054	$836,654	$838,254
40	$833,454	$836,654	$839,854	$843,054	$846,254
60	$835,054	$839,854	$844,654	$849,454	$854,254
80	$836,654	$843,054	$849,454	$855,854	$862,254
100	$838,254	$846,254	$854,254	$862,254	$870,254
120	$839,854	$849,454	$859,054	$868,654	$878,254
140	$841,454	$852,654	$863,854	$875,054	$886,254
160	$843,054	$855,854	$868,654	$881,454	$894,254

The table's illustrating scenario analysis shows how annual costs change by increasing lifter costs or land volume costs. The model demonstrates that changing some of the parameters does not change annual operating costs at the same rate.

ECONOMIC IMPACTS OF A TRANSPORTATION AND LOGISTICS TERMINAL

It is difficult to estimate the economic impacts that a modern transportation and logistics terminal could provide to the area. The existing facility in Dilworth currently provides intermodal service. However, this facility may not be large enough, provide the necessary rate structure, or have other operating characteristics desirable to all shippers. There is no guarantee that a facility would draw new business to the area or what other conditions and factors would be necessary to draw businesses. Second, the statistics on the manufacturing growth show the sector is losing jobs nationally. Although, productivity gains have provided growth and the same is true for agricultural producers and processors. Growth may not equate to new jobs. However, revenue growth does create wealth and provides similar economic impacts on a community.

This does not mean enhanced transportation options for shippers are not desirable. Shipping options are tools needed for economic development and should provide effective and efficient service to customers and provide possibilities of expansion into new markets. Transportation options are positive tools for marketing an area to potential new businesses or retaining existing businesses.

The North Dakota Input/Output model provides an illustration of the economic impact manufacturing and transportation jobs have on a community. The model demonstrates the importance of job creation and retention in the manufacturing and transportation sectors

North Dakota Input/Output Model

The regional economy can grow and deliver improved living standards by adding jobs or increasing productivity. Transportation investment directly influences productivity. Investments that improve service levels and reduce transportation and logistics costs may increase and sustain economic growth. Efficient and reliable freight transportation systems enhance economic productivity in terms of economic performance and success.

The North Dakota Input-Output Model is a tool for describing the economic linkages and interrelationships of North Dakota's economy[25]. Even though the model was developed for North Dakota, rural economies of the bordering states may have similar linkages. The model was designed to estimate the impacts of various types of project development. The model provides a basis for economic illustration in examining the development of a transportation logistics center in Fargo. Tables 10 and 11 identify input-output interdependence coefficients of 17 statewide sectors based on technical coefficients for the transportation and agricultural processing and miscellaneous manufacturing sectors in North Dakota. The coefficients in Tables 10 and 11 list each sector's gross income from one dollar invested toward transportation or agricultural processing and miscellaneous manufacturing in the state. The sectors are rounded to the nearest cent, and show that each dollar invested toward transportation will generate a gross income of 5 cents in the livestock sector, 55 cents in the retail trade sector, and approximately 79 cents in the household sector. Summing all of the linkages will result in a gross receipts multiplier. Each dollar of income received from transportation services supplied in the state is re-spent three times within the region's economy. Table 11 shows that each dollar spent in agriculture processing and miscellaneous manufacturing is re-spent 4.5 times within the state's economy.

[25] Coon, Randal C, et al. The North Dakota Input-Output Model: A Tool for Analyzing Economic Linkages. November 1985.

Table 10 Input-Output Interdependence Coefficients for the Transportation Sector

Sector	Transportation
Ag, Livestock	0.0455
Ag, Crops	0.0178
Nonmetallic Mining	0.0092
Construction	0.0496
Transportation	1.0079
Comm & Public Util	0.0839
Ag Proc & Misc Mfg	0.0277
Retail Trade	0.5475
Finance, Insurance, Real Estate	0.1204
Business & Personal Services	0.0461
Professional & Social Services	0.0519
Households	0.7876
Government	0.2583
Coal Mining	0.0000
Thermal-Elec Generation	0.0000
Petroleum Exp/Ext	0.0000
Petroleum Refining	0.0000
Gross Receipts Multiplier	3.0534

(Source: Coon, Randal C. et al. November 1985, The North Dakota Input-Output Model: A Tool for Analyzing Economic Linkages).

Table 11 Input-Output Interdependence Coefficients for the Ag Processing & Miscellaneous Manufacturing Sector

Sector	**Agriculture Processing & Misc. Manufacturing**
Ag, Livestock	0.1911
Ag, Crops	0.6488
Nonmetallic Mining	0.0063
Construction	0.0618
Transportation	0.0128
Comm & Public Util	0.0766
Ag Proc & Misc Mfg	1.7401
Retail Trade	0.6113
Finance, Insurance, Real Estate	0.1322
Business & Personal Services	0.0514
Professional & Social Services	0.0530
Households	0.7859
Government	0.0796
Coal Mining	0.0000
Thermal-Elec Generation	0.0000
Petroleum Exp/Ext	0.0000
Petroleum Refining	0.0000
Gross Receipts Multiplier	4.4509

(Source: Coon, Randal C. et al. November 1985, The North Dakota Input-Output Model: A Tool for Analyzing Economic Linkages)

Every dollar spent in transportation and the agricultural processing and miscellaneous manufacturing sector provides an economic impact to the community and or region. However, it is difficult to assess the impacts a transportation facility will have on the community or region without specifics of plans for new processing plants or manufacturing facilities.

The economic impacts of manufacturing in the region can be illustrated using the I/O model and the job growth projections presented by North Dakota Job Service from 2000 to 2010. Employment projections were used as a proxy of manufacturing growth to illustrate impacts. North Dakota Job Service estimated that 4,766 jobs would be created in the manufacturing sector from 2000 to 2010. Job Service also estimated average wages in the sector at $542 per week in 2003 equating to $28,184 annually. Using the gross receipts multiplier of 4.5, every manufacturing job would reflect more than $125,000 in economic activity. If 4,766 jobs were added to the manufacturing sector, the model estimates it would provide more than $604 million in economic activity annually. The impacts and the economic slow down from the Sept. 11 terrorist attacks and the recession that followed have somewhat slowed employment growth in the manufacturing sector in North Dakota.

The impacts of adding transportation jobs can be shown using the I/O model. The gross receipts multiplier for transportation is 3.05. North Dakota Job Service estimated the growth in transportation jobs from 2000 to 2010 at 891 jobs. Average annual wage for a transportation and warehouse employee was $30,215. Using the gross receipts multiplier from the I/O model, for every job added to the transportation sector, the economic impact would be over $92,000. If 891 jobs are added to the state's economy and the salaries are spent in the state, this would provide an annual economic impact over $82 million.

The jobs portion of the gross receipts multiplier provides an estimate on household income only. Gross expenditures or income from manufacturing firms exporting goods would provide a higher economic

impact because of expenditures on inputs from the region. Because we have no estimate of what a facility would add in gross receipts to the economy, an illustration of varying job growth may provide some insight. Adding 100 jobs to the manufacturing sector at $30,000 annually with a constant 2 percent inflation rate and using the "net present value" of the income stream over 20 years with a discount factor of 6 percent provides an estimated present value of $174 million. Table 12 estimates the net present value of adding 10 to 100 jobs at different discount rates. Increasing the discount rate is the equivalent of adding risk factors. The lower discount rate is relatively risk free using an estimate of the real interest rate including inflation.

Table 12 Illustration of Job Impacts on the Economy Using I/O Model and Net Present Value (Assumes 2% inflation)

Discount Rate	**4.25%**	**6.00%**	**8.00%**
Job Numbers			
10	$20,584,425	$17,455,995	$14,676,988
20	$41,168,850	$34,911,989	$29,353,975
30	$61,753,275	$52,367,984	$44,030,963
40	$82,337,700	$69,823,978	$58,707,950
50	$102,922,125	$87,279,973	$73,384,938
60	$123,506,550	$104,735,967	$88,061,925
70	$144,090,975	$122,191,962	$102,738,913
80	$164,675,400	$139,647,956	$117,415,900
90	$185,259,825	$157,103,951	$132,092,888
100	$205,844,250	$174,559,945	$146,769,876

This analysis highlights the impacts of adding or retaining manufacturing jobs. The benefits of providing necessary tools to attract high quality manufacturing jobs are evident in Table 12.

Illustration for Locating an Intermodal Terminal

The Census Bureau reports the number of businesses and employees by NAICS. In reviewing the reported data for warehousing, manufacturing, and rail support activities, average employee numbers per establishment may be estimated. This illustration will provide an estimate of the economic impact if a rail support terminal, warehouse or average manufacturer were to locate in the area because of a new logistics center providing intermodal freight transportation service.

The average number of employees at a manufacturing facility in the United States in 1997 was reported to be 46. If a manufacturer located in Fargo as a result of a logistics center with an average wage of $28,164, an estimate can be made of the economic impact to the region. Using the North Dakota I/O gross receipts multiplier of 4.5 and and the income stream over a 20-year time frame with a discount rate of 4.25 percent and assuming a 2 percent inflation rate results in a "Net Present Value" or economic impact to the region of over $95 million. Using the same methodology and estimating the economic impact of a support activity for rail transportation or an intermodal terminal, the U.S. Census Bureau estimates the average number of employees to be 23. Again, using the I/O model, the gross receipts multiplier of 3.05 with the average wage for transportation workers reported again by North Dakota Job Service of $30,215 results in an economic impact of over $34.5 million using NPV over 20 years. The last simulation would be if a distribution center or large warehousing facility located at the new facility. The national average number of employees at a distribution center and/or warehouse is 16.9. Using the same methods used in the previous examples, the total NPV of the 20-year income stream results in an economic impact of $25 million.

TRANSPORTATION PLANNING

The North Dakota Statewide Strategic Transportation Plan aims to use state transportation funds in a way that promotes economic development throughout the state. The state of Minnesota also recognizes the need for multimodal planning, promoting growth and addressing other issues faced by the state. The following section of the report reviews the plans and demonstrates that an intermodal facility may be complementary to strategic goals. The Transportation Equity Act for the 21st Century also highlights intermodal freight transportation.

TransAction: North Dakota's Statewide Strategic Transportation Plan

The implications of the vision, mission and goals of the planners for the state of North Dakota depict recognition and the importance of intermodal freight transportation to the state of North Dakota. The promotion of an intermodal freight facility(s) in North Dakota may fit within the plan's many mentions of public private partnerships to promote economic development across the state.

There are many references to intermodal transportation in the plan. The implications for intermodal are stated in the vision, mission, and goals. The first reference to the need for an intermodal facility is in the emerging trends section which identifies specialized agriculture. Also identified is the increasing world demand for value-added agricultural products or finished food products. There is also mention of a growing manufacturing sector that would promote the existence of an intermodal loading facility.

Table 13 Mission, Vision and Goals of North Dakota's Strategic Transportation Plan

Mission: "North Dakota will provide a transportation system that offers personal choices, enhances business opportunities, and promotes the wise use of all resources."
Vision: "North Dakota's transportation system is an important part of regional, national, and global systems, developed strategically to help grow and diversify the economy and enhance our quality of life."
Goals: "Create safe and secure transportation for residents, visitors and freight. Create a transportation system that: -allows optimum personal mobility. -allows the efficient and effective movement of freight -enhances economic diversity, growth and competitiveness. Create funding sufficient to protect North Dakota's transportation investment and address future transportation needs.

(North Dakota's Statewide Strategic Transportation Plan, 2002)

Within the plan, 16 initiatives were identified. Strategies were attached to the initiatives that provide solutions or guidance to act on the initiative. Of the 16 initiatives, 15 could apply to container highway/rail intermodal service within the state. These initiatives are:

1. North Dakota will strategically prioritize its use of tranportation resources.
2. North Dakota will define the levels of transportation service it will strive to provide and maintain.
3. North Dakota will enhance communication and facilitate cooperation and collaboration between and within governmental units, tribal authortities, modes of transportation, and the public and private sectors.
4. North Dakota will improve the performance of priority transportation corridors and facilities.

5. North Dakota will incorporate economic competitiveness as an integral component of transportation investment.
6. North Dakota will analyze the economic impacts of load limits and the benefits of establishing a statewide program to coordinate the administration of load limits.
7. ***North Dakota will determine the feasibility of, and identify the conditions necessary for, developing an intermodal freight facility or facilities.***
8. North Dakota will determine the opportunities for, and economic and safety impacts of, a regional uniform truck size, weight, and permitting system.
9. North Dakota will appropriately use Intelligent Transportation System (ITS) technologies.
10. North Dakota will conduct a statewide freight origin and destination study and identify priority transportation corridors and facilities.
11. North Dakota will create a special transportation program (infrastructure funding and technical assistance) to facilitate economic development and competitiveness.
12. North Dakota will take a lead role in promoting public private partnerships to bring about selected transportation initiatives.
13. North Dakota will actively participate in regional and national initiatives, programs, studies, and projects.
14. North Dakota will increase its emphasis on safety and security as integral components in planning, developing, and maintaining the transportation system.
15. North Dakota will develop a statewide passenger service and transit plan.
16. North Dakota will monitor trends in agriculture, manufacturing, tourism, and energy production to identify potential transportation impacts and opportunities.

These 16 initiatives may in the future provide the NDDOT the freedom to provide funding for projects other than highway projects. The new plan was the coordinated effort of several different parties which provides a broad view of the NDDOT's role. The plan provides evidence that market forces are dictating that the state maintain competitive legislative cooperation and revisions of the current law as necessary to provide alternative transportation options in the form of intermodal transportation.

Minnesota Multimodal Transportation Plan

A major objective in the statewide transportation plan is to develop a long-term, multimodal performance measurement framework for the state transportation system. Transportation planning and policy-making have traditionally focused on single transportation modes. In a multimodal transportation system, modes are provided and operated in a seamless system that is more efficient and flexible, more environmentally sound, and meets the needs of the travelers and shippers alike. A multimodal planning approach ensures that transportation alternatives are addressed at the same time, and evaluated on the basis of overall needs and investment strategies. The multimodal approach also allows comparative environmental effects to be considered in the planning process (2003 Minnesota Statewide Transportation Plan).

The 2003 Minnesota Statewide Transportation Plan desires to adhere to the United States Department of Transportation and TEA 21 multimodal and intermodal approach that offers:

1. Lowering overall transportation costs by allowing each mode to be used for the portion of trips to which it is most cost-effective;
2. Increasing economic productivity and efficiency, thereby enhancing the nation's global competitiveness;
3. Reducing congestion and the burden on overstressed infrastructure components;
4. Generating higher returns from public and private infrastructure investments;

5. Improving mobility for the elderly, disabled, isolated, and economically disadvantaged; and
6. Reducing energy consumption and contributing to improved air quality and environmental conditions."

TEA 21

TEA 21encourages and promotes development of a national intermodal transportation system in the United States to move people and goods in an energy-efficient manner. The transportation system provides the foundation for improved productivity growth, the nation's ability to compete in the global economy, and the optimum yield from the nation's transportation resources. Its specific objectives are to promote economic prosperity, improve quality of life and safety, enhance the environment, and ensure national security by:

- promoting intermodalism,
- improving planning and public participation,
- empowering state and local officials,
- strengthening partnerships,
- encouraging performance management,
- promoting innovative financing,
- encouraging new technologies,
- encouraging better infrastructure investment and management.

Further, TEA 21 encourages increased economic growth and competitiveness through efficient and flexible transportation at regional, domestic, and international levels.

FUNDING

Funding is one of the main obstacles in constructing an intermodal facility. North Dakota statutes along with the Federal Highway Administration limit the way highway funding can be appropriated in the state. The Federal Department of Transportation's Railroad Rehabilitation and Improvement Financing Program (RRIF) provides loans only for projects of $100 million or more. This limits smaller rural intermodal transportation terminal projects. Other funding possibilities exist including using Port or Commerce Authority, USDA funding, as well as other possibilities. This section will review transportation planning and review funding possibilities for an intermodal transportation terminal.

Port/Commerce Authority

The term port authority refers to a state or local government that owns, operates, or otherwise provides wharf, dock, and other terminal investments at ports.[26] Ports can be municipal airports or other public transportation systems moving people and goods.

Many cities, counties, regions, and/or states have provided terminal facilities to promote transit and efficient freight transportation. In the case of freight, the port authority may operate portions or all of the facility or lease facilities to private firms. A taxing authority may provide funding for constructing and operating a port facility. Many states, counties, and or municipalities have used port authority as a tool for providing shipping options for existing and new development. Legislation dealing with port authority is

[26] Coyle, J., Barbi, E., & Novak, R. *Transportation*. 4th ed. West Publishing Company, St. Paul, MN, 1994.

common. Both Minnesota and North Dakota have port authority statutes that are similar in nature except that the Minnesota statute also covers water ports.

Minnesota Port Authority Activities

Minnesota statute 469.064 describes the state's port authority activities which includes cooperating or acting as an agent for federal or state government, state public body, agency, instrumentality of a government or public body, or any other related federal, state, or local law in the area of river, harbor, and industrial development district improvement. The port authority can study and analyze industrial development needs in its port district including desirable patterns for industrial land use, community growth and other factors affecting local industrial development in the district and make the result of the studies available to the public and to industry in general. The port authority may also accept conveyances of land from all other pubic agencies, commissions, or other units of government. Furthermore, a port authority may carry out the law on industrial development districts to develop and improve the lands in an industrial development district to make it suitable and available for industrial uses and purposes. The port authority may dredge, bulkhead, fill, grade, and protect the property and do anything necessary and expedient, after acquiring the property, to make it suitable and attractive as a tract for industrial development. The port authority may lease some or all of its lands or property and may set up local improvement districts in all or part of an industrial development district. In general, with respect to an industrial development district, a port authority may use all the powers given a port authority by law. Powers include issuing bonds, borrowing (under prescribed rules), and taxing authority.[27]

North Dakota Commerce Authority

The North Dakota commerce authority allows for cities, counties and/or regions to cooperate in forming a port authority. House Bill 1426 provided new sections to many statutes. A commerce authority may be created to:

1. Promote, stimulate, develop and advance commerce, economic developments and general prosperity within its jurisdiction and the state:
2. Endeavor to increase the volume of commerce within its jurisdiction and the state through planning, advertising, acquisition, development, construction, improvement, maintenance, operation, and regulation, of transportation, storage, or other facilities that promote the safe, efficient, and economical handling of commerce.
3. Cooperate and act in conjunction with other organizations in the development and promotion of commerce, industry, manufacturing, services, natural resources, agriculture, livestock, recreation, tourism, health care, and other economic activity, and
4. Support the creation, expansion, modernization, retention, and relocation of new and existing businesses and industries and to otherwise stimulate, assist in and support growth of all kinds of economic activity that promote commerce and business development, maintain economic stability and prosperity of its jurisdiction and this state, and thus provide maximum opportunities for employment and improvement in the standard of living of citizens of its jurisdiction and this state. The Bill provides access to the tax base for funding for an intermodal facility. It also provides a Port Authority status may only provide for maintenance of a facility and not enough capital for initial construction.

North Dakota's statute allows a commerce authority to issue bonds and provides for taxing authority based on the rules set forth in the statute. The taxing authority is to be approved and authorized annually by the governing bodies of the municipalities and counties that make up the authority.

[27] 2004 Minnesota Statutes Chapter 469.

Minnesota Revolving Loan Fund

Minnesota statute 446A.085 describes the state's transportation revolving loan fund. The fund provides loans for public transportation projects eligible for financing or aid under any federal act or program or state law, including, without limitation, the study of the feasibility of construction, reconstruction, resurfacing, restoring, rehabilitation, or replacement of transportation facilities; acquisition of right-of-way; and maintenance, repair, improvement, or construction of city, town, county, or state highways, roads, streets, rights-of-way, bridges, tunnels, railroad-highway crossings, drainage structures, signs, maintenance and operation facilities, guardrails, and protective structures used in connection with highways or transit projects. Enhancement items, including without limitation bicycle paths, ornamental lighting, and landscaping, are eligible for financing provided they are an integral part of overall project design and construction of a federal-aid highway. Money in the fund may not be used for any toll facilities project or congestion-pricing project.

A highway account is established in the fund for highway projects eligible under United States Code, title 23. A transit account is established in the fund for transit capital projects eligible under United States Code, title 49. A state funds general loan account is established in the fund for transportation projects eligible under state law. Other accounts may be established in the fund as necessary for its management and administration. The transportation revolving loan fund receives federal money under the act and money from any source.

North Dakota Freight Railroad Improvement Program

Title 49 of the United States Code describes three potential purposes or uses of federal financial assistance to states under the Rail Freight Assistance Program: rail-line acquisition, rail-line rehabilitation, and construction of new facilities.

A state may use federal funds to acquire an interest in a rail-line or property for the purpose of maintaining existing service or providing future rail freight service. Federal funds can be used for improving and rehabilitating rail property on a rail-line, but only to the extent necessary to allow adequate and efficient transportation on the line. Federal funds can also be used for building rail or rail-related facilities that will improve the quality and efficiency of rail freight transportation. Eligible uses include new connections between at least two existing rail lines, intermodal freight terminals, sidings, bridges, and relocation of existing lines.

The NDDOT established the Freight Railroad Improvement Program (FRIP) in 1997 from interest on repaid loans. Eligible applicants under the FRIP include a county, city, railroad company, or a current or potential user of freight railroad service. An eligible project is generally one in which the line related to the project has carried less than 5 million gross ton-miles of freight per mile the year previous to the year of application and which accomplishes any of the following objectives:

- rehabilitates a segment of rail line,
- results in economic development,
- improves transportation efficiency,
- promotes safety,
- promotes the viability of the statewide system of freight rail service,
- assists intermodal freight movement,
- provides industry access to the national railroad system.

If a significant public interest exists, the NDDOT director may waive the 5 million gross ton-miles requirement for the project.

FRIP project applications are evaluated on the basis of five criteria:

- the benefit-cost ratio of the project,
- traffic density (revenue carloads per mile),
- the extent to which the proposed project enhances system connectivity,
- the extent to which the proposed project enhances North Dakota's economy,
- the extent to which the railroad has been a prior beneficiary of public assistance.

The fifth criterion is designed to promote equity in the distribution of public funds.

Railroad Rehabilitation and Improvement Financing Program

Another loan program is the Railroad Rehabilitation and Improvement Financing Program (RRIF). This program can be used to: acquire, improve, or rehabilitate intermodal or rail equipment or facilities, including track, components of track, bridges, yards, buildings, and shops; refinance outstanding debt incurred for purposes listed above; develop or establish new intermodal or railroad facilities. Eligible borrowers include railroads, state and local governments, government sponsored authorities and joint ventures that include at least one railroad.[28] This program may provide an option for a city or region looking at borrowing funds for an intermodal terminal. This may be used in conjunction with other funding such as port authority.

USDA-Rural Development Funding

Value-Added Agriculture Product Market Development Grants (VADG) were authorized in 2000 and amended in the 2002 Farm Bill. The Farm Bill established four related programs:

1. VAGD producer grants.
2. A resource center.
3. Series of innovation centers.
4. University research on the impact of value-added activities.

The Farm Bill passed in 2002 expanded the scope of the program for producers. The producer program is the only possibility for funding an intermodal facility. The program has expanded to producer groups or organizations including cooperatives. Product segregation is explicitly mentioned, which for many specialty and identity preserved products, containerization plays a large role.

Eligible groups may request funding for developing business plans and/or feasibility studies and acquiring working capital to operate a value-added venture. Value-added is defined as "1) a change in the physical state or form of the product (such as milling wheat into flour or making strawberries into jam); 2) the production of a product in a manner that enhances its value, as demonstrated through a business plan (such as organically produced product); or 3) the physical segregation of an agricultural commodity or product in a manner that results in the enhancement of the value of that commodity or product (such as an identity preserved marketing system)".[29]

The maximum grant is $500,000 but to maximize the program benefits, smaller grant requests receive priority. Profitable use of technology and uses of biomass will also receive priority.

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[28] Federal Railroad Administration, www.fra.dot.gov/rdv/finance/rrif.htm

[29] Rural Business Cooperative Service, www.rurdev.usda.gov/rbs/coops/vadg.htm

Northern Great Plains Authority

Under the 2002 Farm Bill (HR 2646), Congress established the Northern Great Plains Authority to assist distressed areas experiencing high rates of poverty, unemployment and out-migration in the five-state region.[30]

The Authority covers five states and 399 counties. No states are required to participate in the Authority.

- Iowa- 99 counties
- Minnesota- 87 counties
- Nebraska- 93 counties
- North Dakota- 53 counties.
- South Dakota- 66 counties

The Authority is authorized for fiscal years 2002 through 2007, at a level of $30 million annually. Appropriations will be subject to congressional approval each year. $1.49 million is appropriated for 2005-2006.

The Authority must prioritize use of federal funds in the following order:

1. Basic public infrastructure in distressed counties and isolated areas of distress;
2. Transportation and telecommunication infrastructure for the purpose of facilitating economic development in the region;
3. Business development, with emphasis on entrepreneurship;
4. Job training or employment-related education, with emphasis on use of existing public educational institutions located in the region.

Allocation of appropriations:

1. At least 75 percent of the appropriations made to the Authority, after administrative awards to the local development districts are made, shall be awarded to distressed counties and areas in the region.
2. At least 50 percent of the appropriations made to the Authority shall be awarded for transportation, telecommunications, and basic public infrastructure projects.

North Dakota Agriculture Products Utilization Commission

Another funding source may include the North Dakota Agriculture Products Utilization Commission (APUC). APUC's mission is "to create new wealth and jobs through the development of new and expanded uses of North Dakota agricultural products." APUC provides North Dakota producers and ag-related business owners funding to pursue development activities. The grant programs include basic and applied research grants, marketing and utilization grants, cooperative marketing grants, and farm diversification grants.

APUC accepts grant applications on a quarterly basis. The projects are judged by the directors to determine if the project meets the eligibility requirements.

The aforementioned programs represent some possible and some not-so-possible funding opportunities for an intermodal terminal. One of largest barriers to funding is that conflicts exist between the goals of the Transportation Equity Act for the 21st Century (TEA-21), the North Dakota's Statewide Strategic Transportation Plan (Transaction), and ND Statute 24-02-37. Both TEA-21 and Transaction call for

[30] Conference Report to the Farm Security and Rural Investment Act of 2002. 107th Congress, 2nd Session.

investment in intermodal infrastructure to promote the efficient movement of people and freight. Statute 24-02-37 limits the North Dakota Department of Transportation investment decisions to only highway investment. Without changes or additions to the statute, it does not appear to be possible for the NDDOT to engage in a public/private or public/public investment in a rail/highway intermodal loading facility.

Congressional Earmarks

There are always the possibilities of earmarks from Congress. Congress members and senators have the ability to put together packages to fund transportation projects. Lobbying efforts may garner vast rewards.

State Departments of Transportation Limitations

North Dakota, under Statute 24-02-37, can only use TEA-21 Federal State Aid funds for highways. This provides no alternatives for other uses. TEA-21 does provide Federal credit assistance under the Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA). However, this assistance is not practical for an intermodal facility in North Dakota because of stipulations. First, it must cost at least $100 million or 50 percent of the state's annual apportionment of Federal State Aid funds, whichever is less. The project must also be supported in whole or in part from user charges or other non-federal dedicated funding sources and be included in the state's transportation plan. These restrictions immediately disqualify North Dakota from this type of loan. An intermodal facility project would cost much less than the threshold outlined in the TIFIA requirements.[31]

Transportation reauthorization slated for 2005 may provide funding options for an intermodal facility. Many areas of the country need to solve problems in congested metro and port areas which may provide funding avenues for intermodal/multimodal projects.

Options

There are three options that the committee/shipper/community may pursue:

- Do nothing, leave the facility as is.
- Enhance the Dilworth facility.
- Move the facility and add desirable services.

The first option provides the same frustration and problems businesses are facing now in accessing intermodal transportation and new and existing markets. However, it is a no cost approach, and still allows the intermodal shipping option for shippers that find the facility fits their need.

Option two, enhancing the Dilworth facility, may provide an economically realistic approach to the intermodal problem. There are some operational characteristics that need to be overcome. There are issues for both inbound and outbound freight that need to be worked out with the railroad. Shippers addressed conflicts with current operations and the issues are not clear. Therefore, we only state that there are problems and not what they entail. The railroad does own land south and east of the existing facility that may allow for expansion of parking and other functions that are desired. However, the citizens of Dilworth, MN, may not desire a facility in or that close to the city limits.

[31] (U.S. Department of Transportation, Federal Highway Administration, www.fhwa.dot.gov/inovativefinance/brochure/credit.htm).

Option three is to move the facility out of Dilworth to somewhere in the metro area where there is ample space and access. This facility would still need to work out operational problems with BNSF, rate issues, equipment problems with steamship lines, and find a location that is suitable to neighbors, BNSF, DOTs, and any other parties.

KEY FINDINGS AND CONCLUSIONS

This study examined container/trailer on flatcar intermodal transportation in eastern North Dakota, western Minnesota, and eastern South Dakota. It was the objective of this study to provide information to the shipper advisory group, Fargo/Moorhead Council of Governments, and cities of Dilworth, Moorhead, and Fargo as to the potential feasibility for locating a multimodal logistics center somewhere in the metro area. A survey along with site visits sought to gather data and information. With that information, as well as secondary research and data sources, this report was developed.

- Analysis of the Dilworth, MN, terminal revealed decreasing volumes and size concerns. Decreasing volumes contradict the national trend and the trend in agricultural containerization of products. Site visits and the survey responses report problems with obtaining equipment, poor service, and high rates at the facility.

- The survey and site visits provided TOFC/COFC volume in the region. Within a 100-mile radius of Fargo/Moorhead area, respondents reported 12,974 outbound TOFC/COFC units and 3,689 inbound units. Expanded through employee numbers, TOFC/COFC volume is estimated at 29,353 outbound and 8,503 inbound.

- Estimated growth provided by survey respondents indicated TOFC/COFC growth potential of an estimated 7 percent per year. This equates to more than 80,000 units by 2015.

- Of the intermodal terminals used by businesses in the region, Dilworth ranks third, Minneapolis/St. Paul ranks first and Winnipeg ranks second. If rates and service issues are addressed, the possibility exists for capturing freight being drayed to distant terminals.

- The common denominators from the sources indicate that at least five factors must exist for successful intermodal. The five factors are:
    1) volume,
    2) balance of traffic,
    3) concentration of destination (density),
    4) steamship company or equipment operator cooperation,
    5) commitment of business and/or community.

- Of the factors needed for successful intermodal, the study area has marginal volume, imbalance of traffic, some concentration, and at this time, only marginal cooperation of the steamship lines. Commitment of businesses needing intermodal transportation is high, other businesses are apathetic, and beyond the 100-mile radius of Fargo, interest deteriorates while communities are taking a wait and see approach.

- Facility costs are variable depending on options. A base case facility could be constructed for less than $4 million with annual operating costs of $850,000. This does not include warehousing, manufacturing, subassembly, or transloading facilities. The break-even point is 40,000 lifts, or 20,000 units being lifted or moved twice.

- Economic impact analysis found the multiplier for manufacturing gross receipts at 4.5 and transportation investments at just over 3. If a facility added jobs, it would provide a positive economic impact to the region.

- Forming a port/commerce authority could provide a funding source through raising taxes, and public/private partnerships could be used to issue revenue bonds. Funding sources exist in revolving railroad loan funds in both Minnesota and North Dakota. Federal funding sources exist on paper but are an unlikely source. USDA provides for some projects under Rural Development Grants and the Northern Plains Authority, established in the 2002 Farm Bill, addresses problems of all kinds including transportation.

- Planning documents at the federal and state levels reference the need to explore and enhance intermodal transportation for moving freight.

- A formal meeting with BNSF executives was positive, however, they are cautious.

REFERENCES

Berwick, M., and Dooley, F. Truck Costs for Owner/Operators. Mountain Plains Consortium No. 97-81. Upper Great Plains Transportation Institute, North Dakota State University, Fargo, October 1997.

Coon, Randal C, et al. The North Dakota Input-Output Model: A Tool for Analyzing Economic Linkages. November 1985.

Coyle, J., Barbi, E., & Novak, R. *Transportation*. 4th ed. West Publishing Company, St. Paul, MN, 1994.

Federal Railroad Administration, www.fra.dot.gov

Giblin, J. "Mission Impossible? Making Rail Intermodal Profitable." *Trains Magazine*. V58, n7, p64(4). July, 1998.

Leeper, Cambridge, & Campbell. Grand Forks Intermodal Study and Implementation Plan. McLean VA, June 1996.

Manufacturer's News, Inc. Directory of North Dakota Manufacturers, 2002.

Muller, Gerhardt. *Intermodal Freight Transportation* 4th ed. Eno Transportation Foundation, Inc., Virginia, 1999.

North Dakota Department of Economic Development and Finance, The Economic Performance and Industrial Structure of the North Dakota Economy, May 2000.

North Dakota Job Service Data Warehouse Projections, website: http://www.jobsnd.com/

Northern Great Plains Inc. and Northeast-Midwest Institute. Toward New Horizons: Trends in Transportation and Trade-Moving the Northern Great Plains Region to a Stronger Economic Future. 2002.

Ogard, Libby. *Intermodal Freight Facilities in Small to Medium Sized Communities.* Presentation in Rural Freight Conference. Sep. 9, 2004.

Regional Transportation Online Center, National Association of Development Organizations, North Dakota's Statewide Strategic Transportation Plan, 2002

Spraggins, Barry H. *"The Potential for International Movements of Goods from Alberta to the U.S. and Mexico."* 39th Transportation Research Forum Annual Meeting Procedings. Montreal, Canada: October 16-18, 1997.

U.S. Department of Commerce, Bureau of Economic Analysis, National, Industry, International, and Regional Economic Data, website: www.bea.doc.gov

U.S. Department of Labor, Current Employment Statistics, Bureau of Labor Statistics, website: www.bls.gov/home.htm

U.S. Department of Transportation, Bureau of Transportation Statistics, Commodity Flow Survey, website: www.bts.gov

U.S. Department of Transportation, Federal Highway Administration, www.fhwa.dot.gov/inovativefinance/brochure/credit.htm

U.S. Department of Transportation/Federal Highway Administration, Highway Cost Allocation Study, Washington, D.C., 1997.

APPENDIX 1
Intermodal Survey

Company Name_____

Phone Number (in case of questions)_____

Your Name_____

Title_____

City_____ State_____

LOGISTICS AND TRANSPORTATION QUESTIONS

Type of Shipping Used
Important Shipping Characteristics

1. Why do you use the transportation modes that you use? (*Check all that apply*)

❑ My customers prefer this mode ❑ Rates are low for this mode
❑ Service is reliable for this mode ❑ Product receives less damage ❑ I have direct access to the mode at my business with this mode
❑ Other (please state) _____

2. Do you use container/trailer on rail (intermodal) shipping now? ❑ Yes ❑ No
If yes, which intermodal facility(s) do you currently use? If no, skip to question #5.
Please list percentage use at each facility.

❑ Dilworth _____% ❑ Winnipeg _____%
❑ Minneapolis/St. Paul_____% ❑ Chicago _____%
❑ Omaha _____%

3. Please identify the number of units, size shipped *(e.g. 20-foot container, 53-foot van trailer etc.),* total freight bill, and which port is used for inbound and outbound shipments.

_____Quantity Inbound _____Quantity Outbound

_____Inbound Size _____Outbound size

4. Within the last year have you been denied or had difficulty with intermodal service?

❑ Yes ❑ No

If yes, please comment on difficulty. _____
_____

Whether you ship by container or not, please answer the following questions. Port identification is needed to determine concentration of freight in particular shipping lanes.

5. Please indicate methods of shipping. In the space provided please list the number, type and annual volume of shipments and, if international, what ports are used.

Inbound (Annually)

_____Number of **Trucks** inbound _____ Number of **Railcars** inbound

_____Type (Van, Flat, Hopper) _____ Type (Box, Tank, Flat, Refer, etc)

_____Tons and/or volume (list units) _____ Tons and/or volume (list units)

_____ Other types of inbound shipments (Air, DHL, UPS, FedEx, etc)

What port(s) are used for inbound international shipments? What is the approximate percentage use?

_____

_____

Outbound (Annually)

_____Number of **Trucks** outbound _____ Number of **Railcars** outbound

_____Type (Van, Flat, Hopper) _____ Type (Box, Tank, Flat, Refer, etc)

_____Tons and/or volume (list units) _____ Tons and/or volume (list units)

_____ Other types of outbound shipments (Air, DHL, UPS, FedEx, etc)

What port(s) are used for outbound international shipments? What is the approximate percentage use?

_____

_____

6. Please list the top products you ship. _____

7. What is your total freight bill per year? _____

SHIPMENT CHARACTERISTICS

8. Where do your **Inbound** products come from? *(Number of shipments)*

❑ Local (ND, SD, MN)
Please list where _____
Annual number of shipments _____

❑ Regional
Please list where _____
Annual number of shipments _____

❑ International
Please list where _____
Annual number of shipments _____

9. Where do your **Outbound** products go? (*Number of shipments)*

❑ Local (ND, SD, MN)
Please list where _____
Annual number of shipments _____

❑ Regional
Please list where _____
Annual number of shipments _____

❑ International
Please list where _____
Annual number of shipments _____

10. Which of the following do you feel are barriers to using intermodal service in North Dakota or the region? (*check all that apply*)

❑ High rates

❑ Poor service

❑ Long distance to terminal

❑ Other (please specify)_____

Please provide annual projections of growth in percentage terms by your company over the next 6 years.

Year	Estimated Quantity
2005	_____
2006	_____
2007	_____
2008	_____
2009	_____
2010	_____

Comments: Please provide any comments you may have regarding transportation.

_____
_____
_____
_____
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APPENDIX 2
Freight Volume in ND, SD, MN

North Dakota

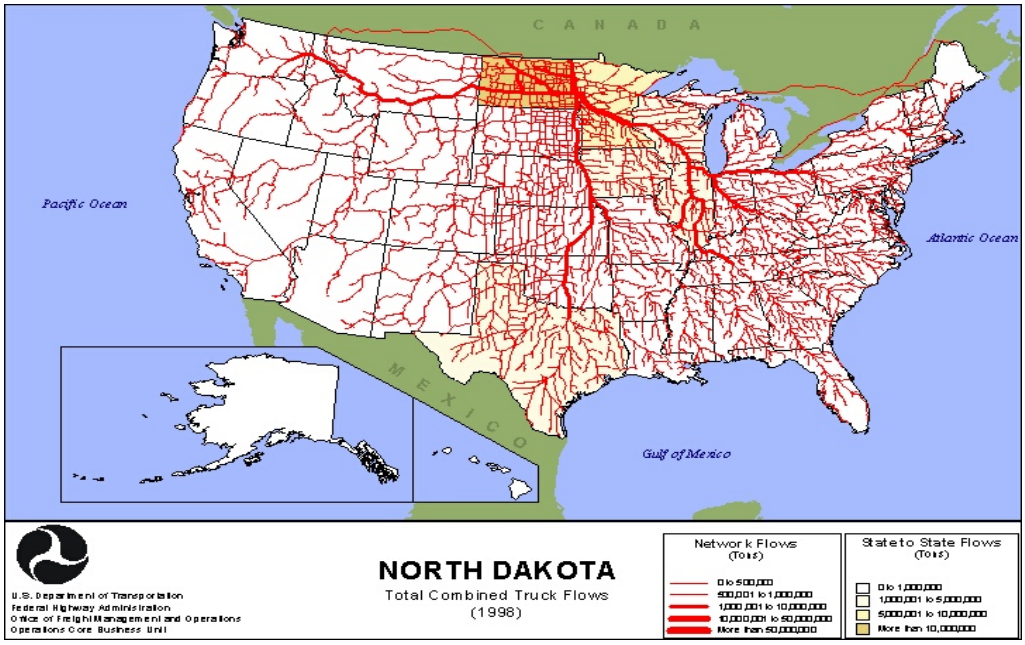

Figure 38 Freight Flows to, from, within North Dakota by Truck in 1998 (tons). (Source: FHWA Freight Management and Operations)

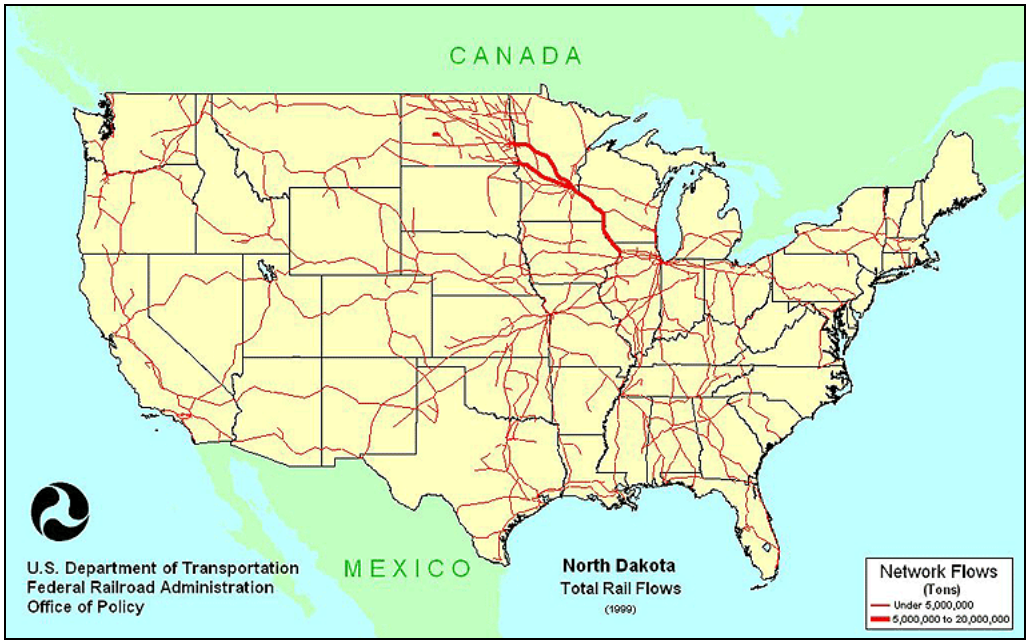

Figure 39 Freight Flows to, from, within North Dakota by Rail in 1998 (tons). (Source: FHWA Freight Management and Operations)

South Dakota

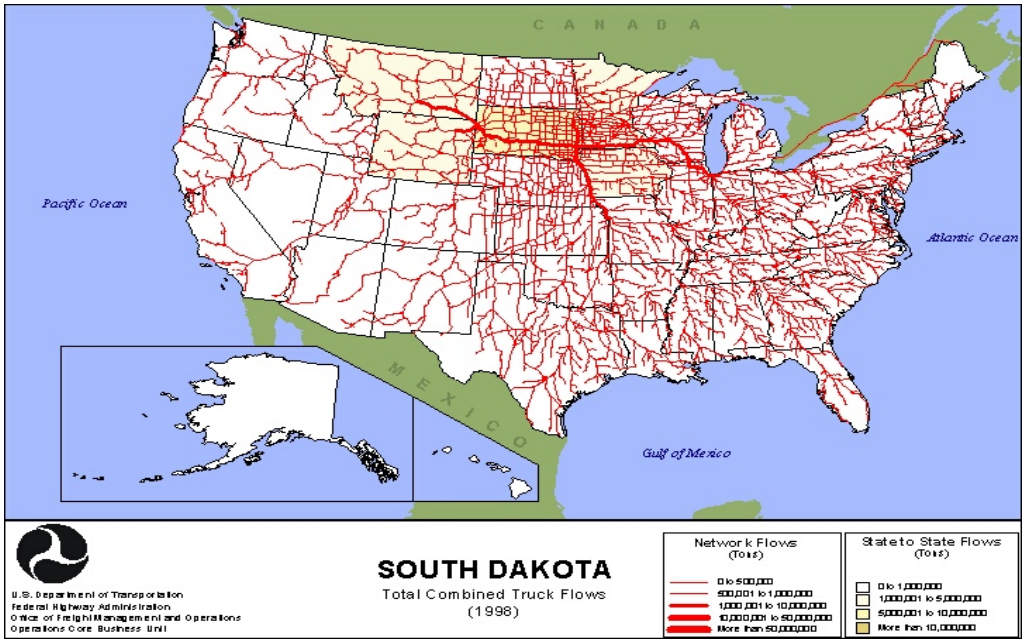

Figure 40 Freight Flows to, from, within South Dakota by Truck in 1998 (tons). (Source: FHWA Freight Management and Operations)

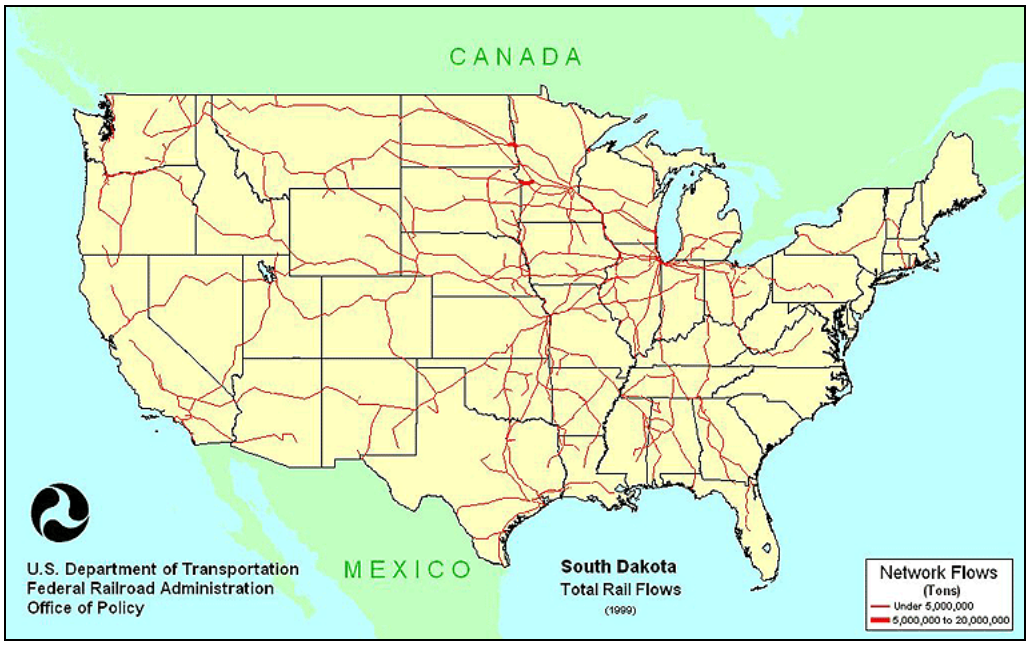

Figure 41 Freight Flows to, from, within South Dakota by Rail in 1998 (tons). (Source: FHWA Freight Management and Operations)

Minnesota

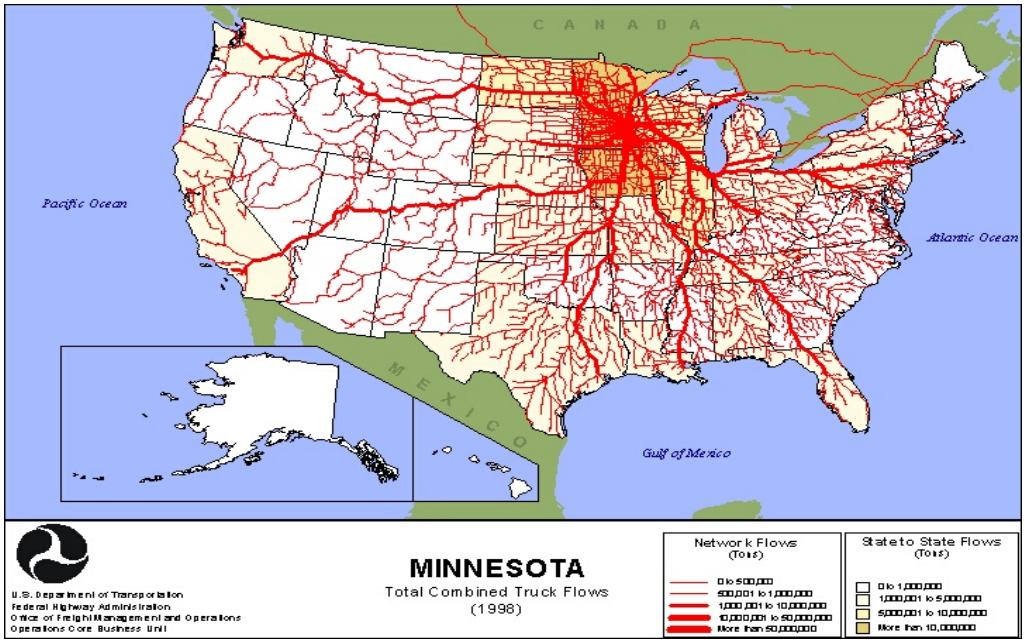

Figure 42 Freight Flows to, from, within Minnesota by Truck in 1998 (tons). (Source: FHWA Freight Management and Operations)

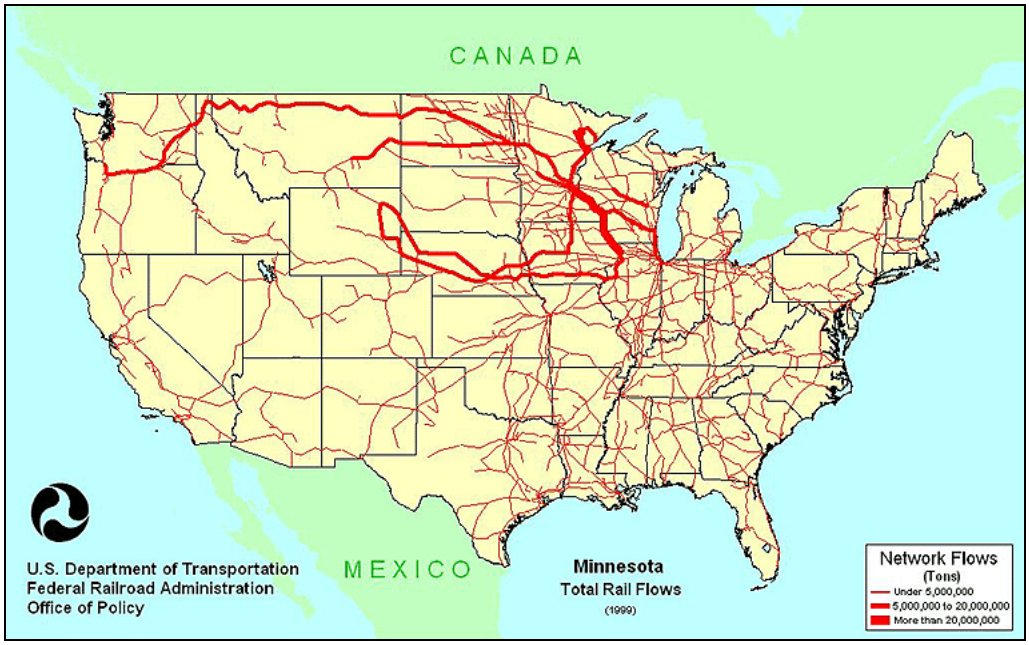

Figure 43 Freight Flows to, from, within Minnesota by Rail in 1998 (tons). (Source: FHWA Freight Management and Operations)

APPENDIX 3
Trade Centers

The study used trade centers to identify major economic development locations. The Center for Urban and Regional Affairs (CURA) built a model ranking regional trade centers (an eight-level hierarchy) from metropolitan areas to hamlets. The model used population and the number and types of business establishments in an area. Level 0 shows the largest population and business establishments. The four level trade centers (levels 0 to 3) cover 90 percent of the states' population and 95 percent of the states' employment. The CURA defined interregional trade centers in seven states (Minnesota, Iowa, Montana, Nebraska, North Dakota, South Dakota, and Wisconsin).

This study adopted the trade centers to include key development areas and transportation needs. The study used three level trade centers (levels 0 to 2) defined by the CURA. This captured major places with high supply and demand for freight shipments. For example, North Dakota has eight trade centers defined by this method: Fargo, Bismarck, Mandan, Jamestown, Dickinson, Grand Forks, Williston, and Minot. Figure 44 shows trade centers (levels 0-2) and survey area.

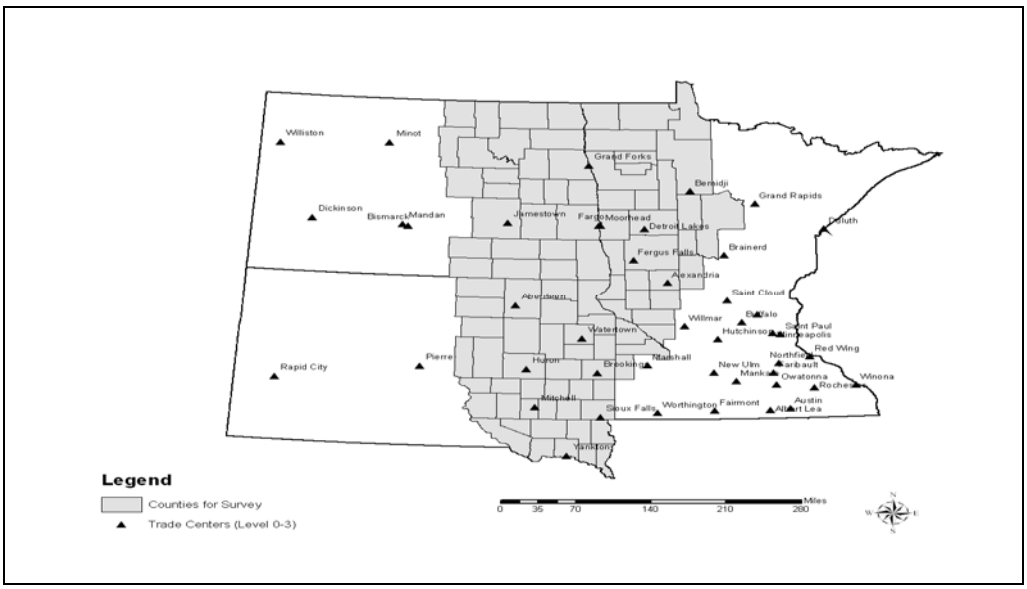

Figure 44 Survey Area and Trade Centers (Level 0-2)
(Source: BTS, ESRI Data & Maps, and Minnesota DOT)

Population

Population is an important factor for transportation demand. Large population generates high demand and supply of freight. Figure 45 shows county population in study area. As shown in the figure, the Fargo/Moorhead area has high population density. Cass vounty in North Dakota has 118,405 of county population and Clay county in Minnesota has 51,717 of county population in 1999. Combined population from the two counties creates large inbound and outbound freight volumes and therefore increases the need of an efficient freight terminal.

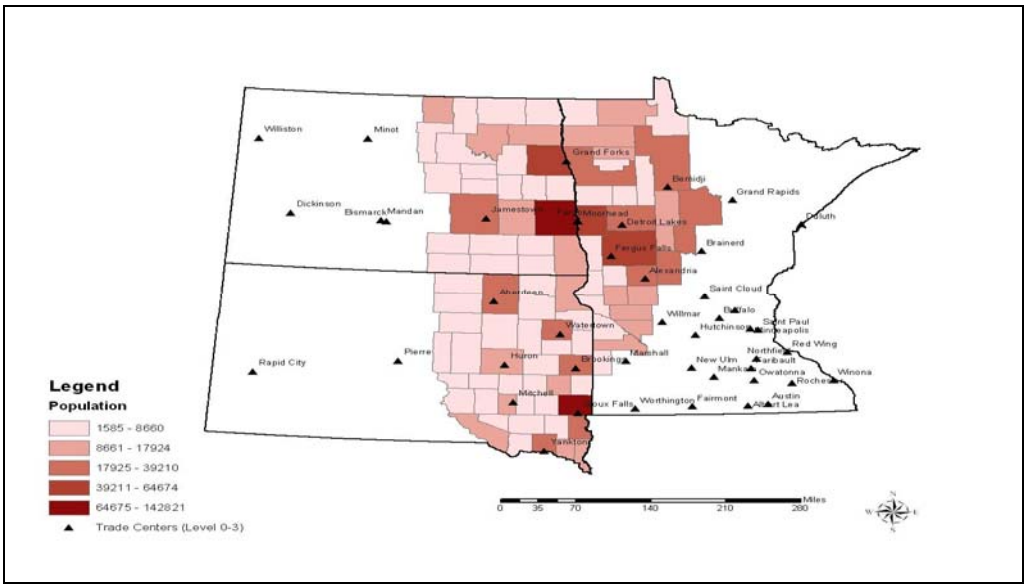

Figure 45 Survey Area and County Population in 1999.
(Source: BTS, US Census Bureau, ESRI Data & Maps, and Minnesota DOT)

Highway System

This study included major transportation networks (interstate, US highway, and Canada principal highway) with trade centers. This can show routes with high inbound and outbound freight truck volume. The study used Place Names and National Highway Planning Network ArcGIS data from 2003 National Transportation Atlas Data Shapefile Download Center, Bureau of Transportation Statistics. Not surprisingly, these networks link to most trade centers.

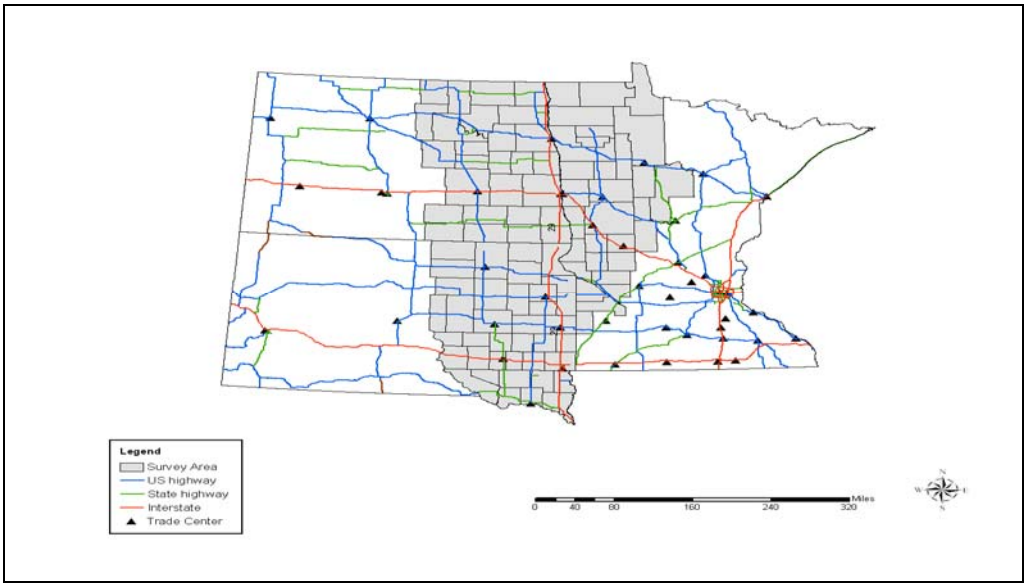

Figure 46 Survey Area and National Highway System (Interstate, US Highway, & State Highway)
(Source: BTS, ESRI Data & Maps, and Minnesota DOT)

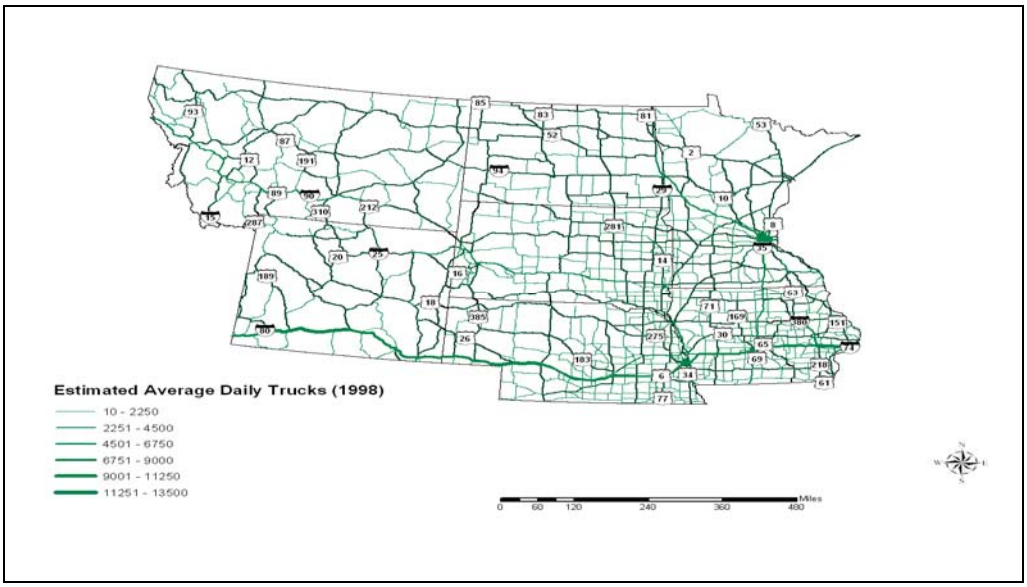

Figure 47 Estimated 1998 Average Daily Trucks in the Seven States. (Source: FAF Highway Capacity Network Files, FHA)

Railroad

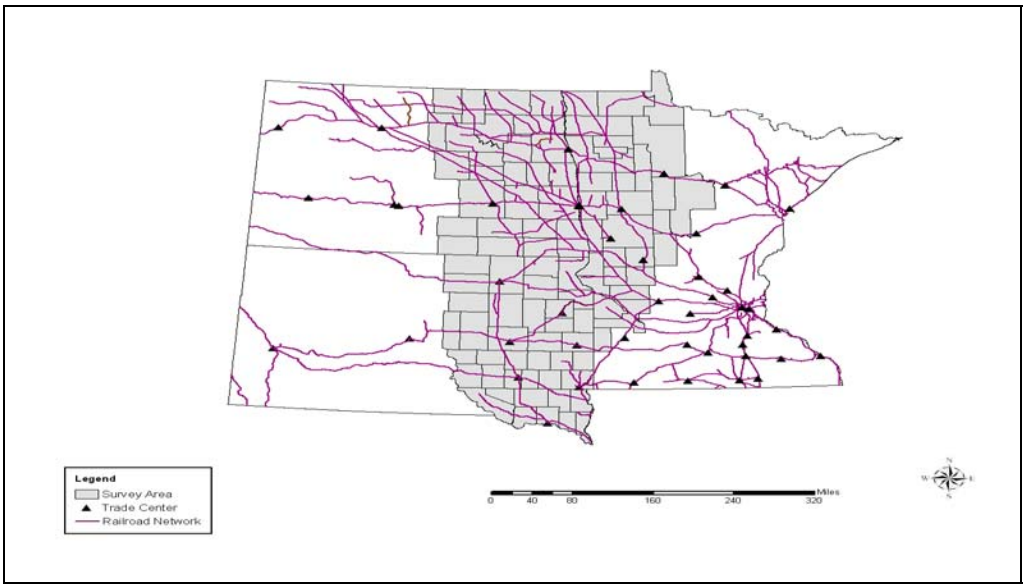

Figure 48 Survey Area and Rail Road Network. (Source: Mapping Center, BTS)

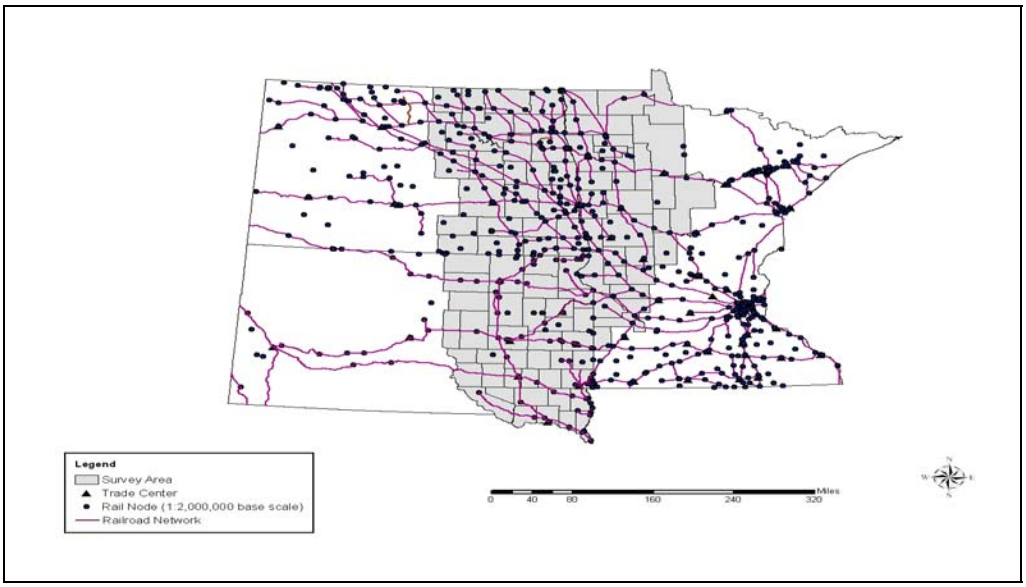

Figure 49 Survey Area and Rail Road Network and Nodes (1:2,000,000 base scale). (Source: Mapping Center, BTS)

APPENDIX 4
Demographics and Growth

Table 14 Socio-Economic Factors Associated with Transportation in Three States

	North Dakota	South Dakota	Minnesota
Land area, 2000 (square miles)	68,976	75,885	79,610
Population, 2000	642,200	754,844	4,919,479
Persons per square mile, 2000	9.3	9.9	61.8
Private nonfarm establishments with paid employees, 2001	20,206	24,032	140,968
Private nonfarm employment, 2001	257,335	310,035	2,418,159
Manufacturers shipments, 1997 ($1000)	5,115,890	12,305,468	76,244,894
Retail sales, 1997 ($1000)	6,702,134	11,707,133	48,097,982
Retail sales per capita, 1997	$10,457	$16,018	$10,260
Federal funds and grants, 2002 ($1000)	6,436,570	6,314,756	27,055,700

(Source: State & County QuickFacts, US Census Bureau)

Table 15 Estimated Freight Shipments from/to/within Three States in 1998, 2010, and 2020

	Estimated Tons (millions)			Estimated Dollars (billions)		
Year	**1998**	**2010**	**2020**	**1998**	**2010**	**2020**
Highway						
North Dakota	74	99	120	61	113	182
South Dakota	55	76	90	34	60	91
Minnesota	283	421	538	194	381	645
Rail						
North Dakota	12	15	18	2	2	3
South Dakota	40	56	71	10	19	31
Minnesota	149	184	210	25	39	58

(Source: State Profiles, Freight Analysis Framework, US Federal Highway Administration)

APPENDIX 5
Rail Yard Photos and Diagrams

Figure 50 Rail Yard Arial Imagery in Fargo, ND. (Source: Terraserver-Usa.com).

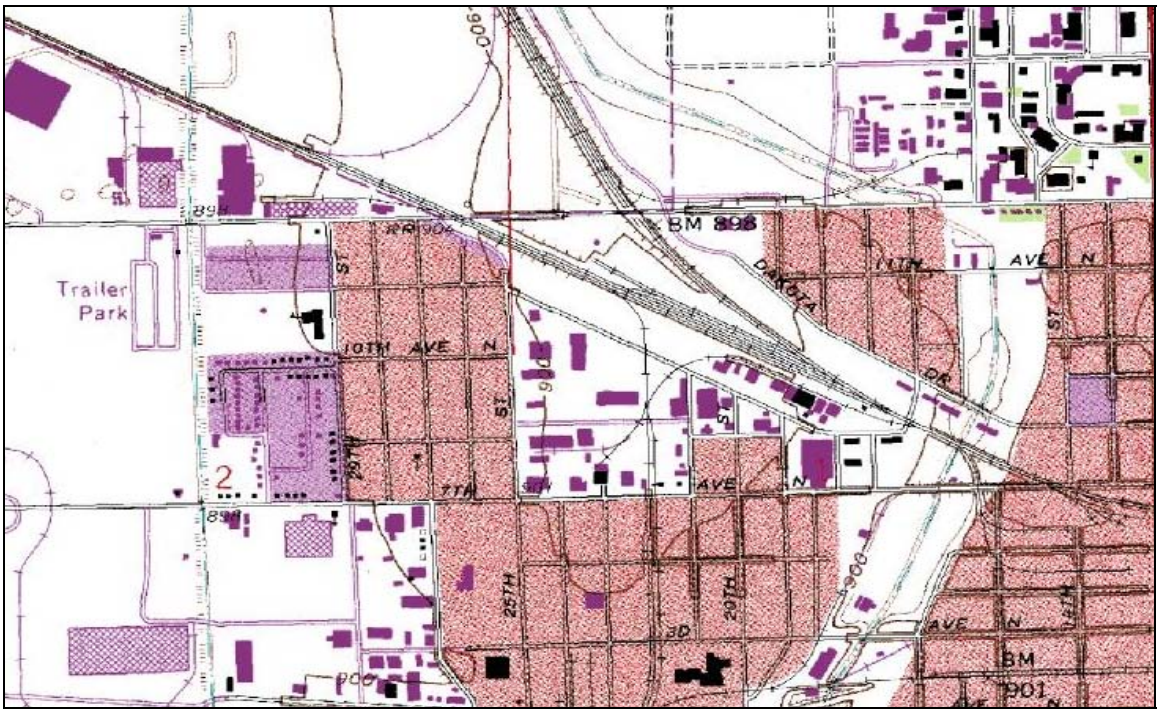

Figure 51 Rail Yard Topographic Map in Fargo, ND. (Source: Terraserver-Usa.com).

Figure 52 Rail Yard Arial Imagery in Grand Forks, ND. (Source: Terraserver-usa.com).

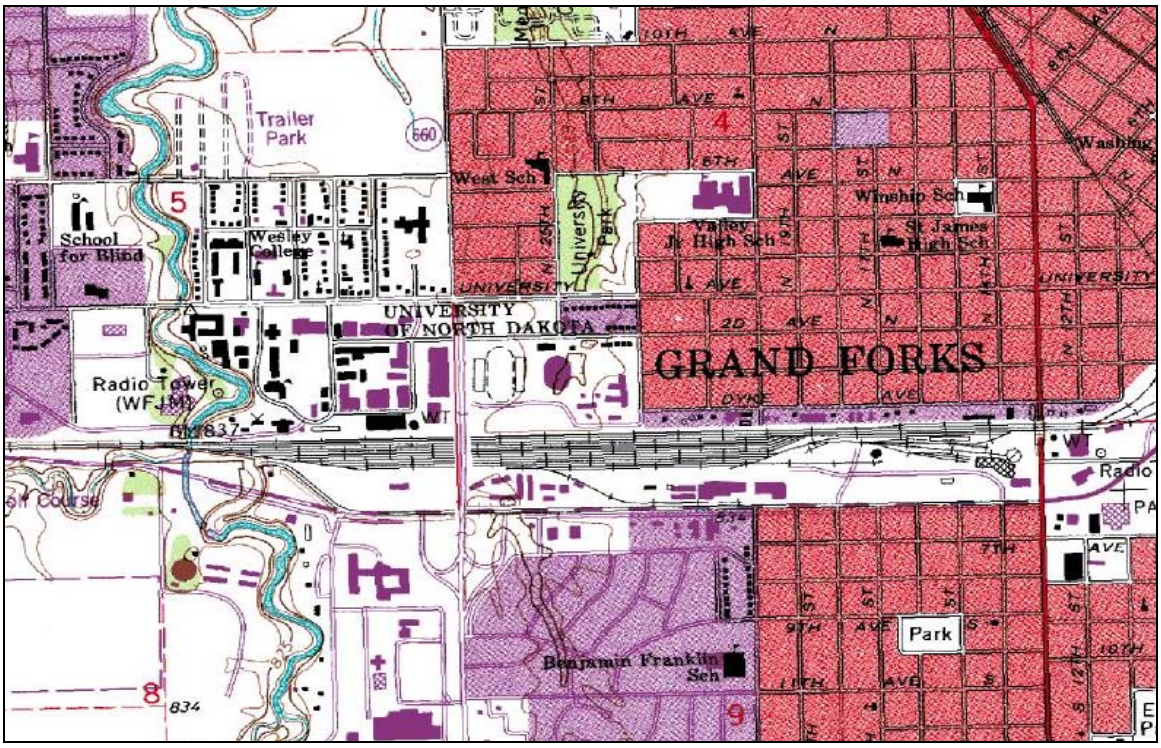

Figure 53 Rail Yard Topographic Map in Grand Forks, ND. (Source: Terraserver-Usa.com).

Figure 54 Rail Yard Arial Imagery in Jamestown, ND. (Source: Terraserver-Usa.com).

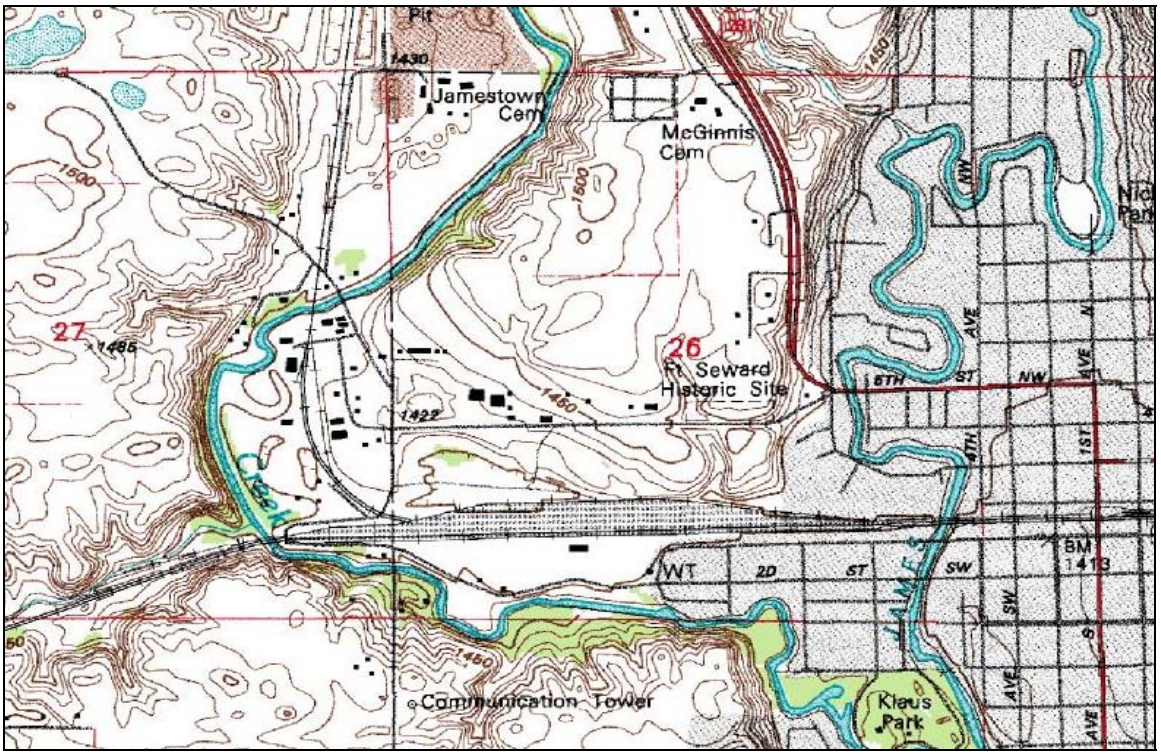

Figure 55 Rail Yard Topographic Map in Jamestown, ND. (Source: Terraserver-Usa.com).

Figure 56 Rail Yard Arial Imagery in Aberdeen, SD. (Source: Terraserver-Usa.com).

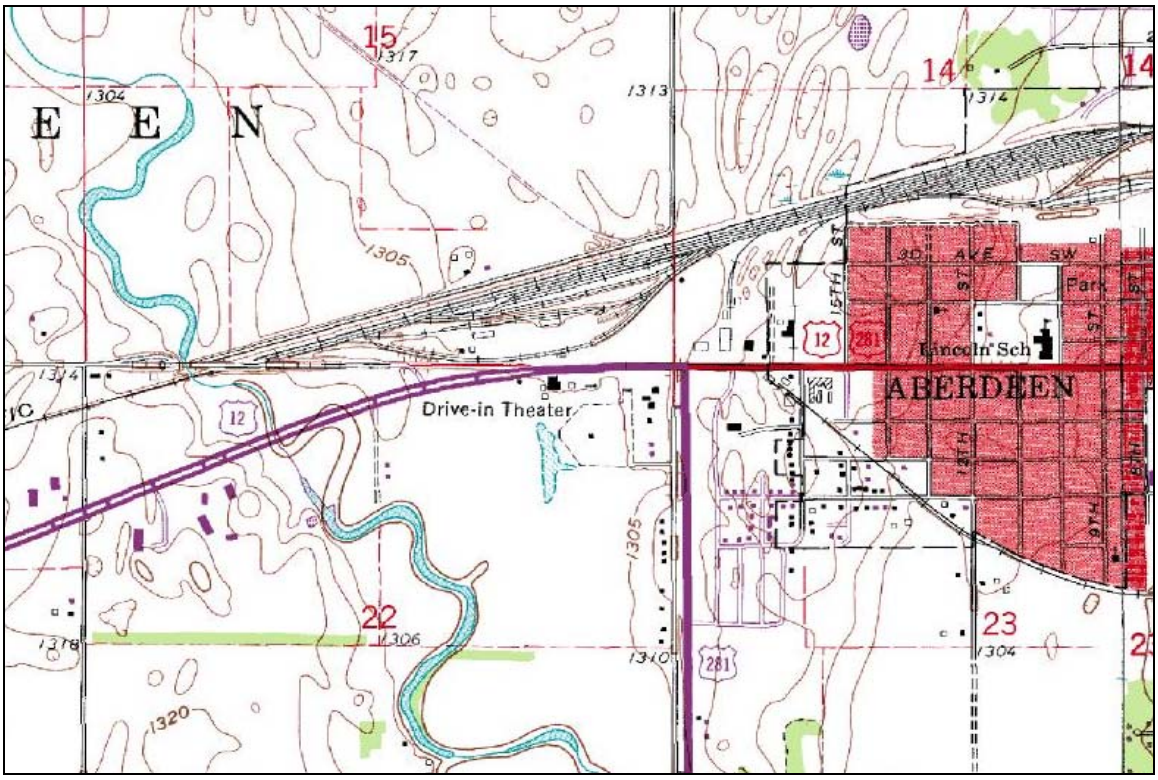

Figure 57 Rail Yard Topographic Map in Aberdeen, SD. (Source: Terraserver-Usa.com).

Figure 58 Rail Yard Arial Imagery in Huron, SD. (Source: Terraserver-Usa.com).

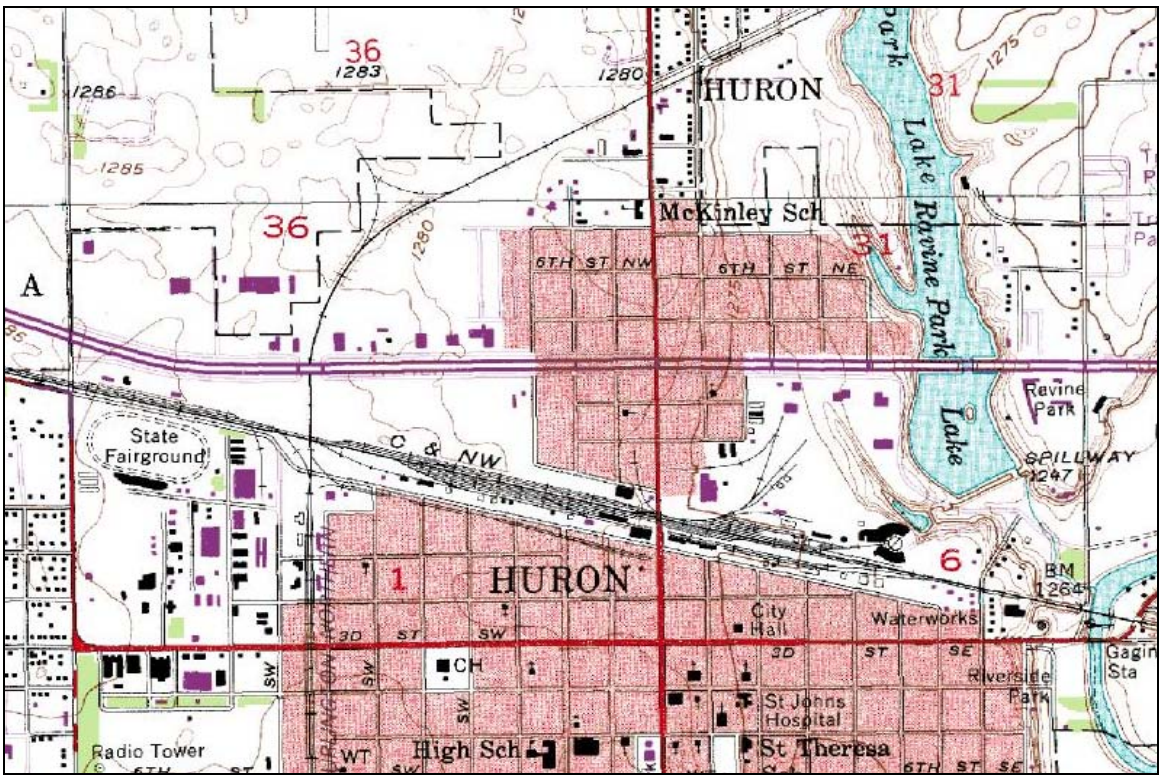

Figure 59 Rail Yard Topographic Map in Huron, SD. (Source: Terraserver-Usa.com).

Figure 60 Rail Yard Arial Imagery in Mitchell, SD. (Source: Terraserver-Usa.com).

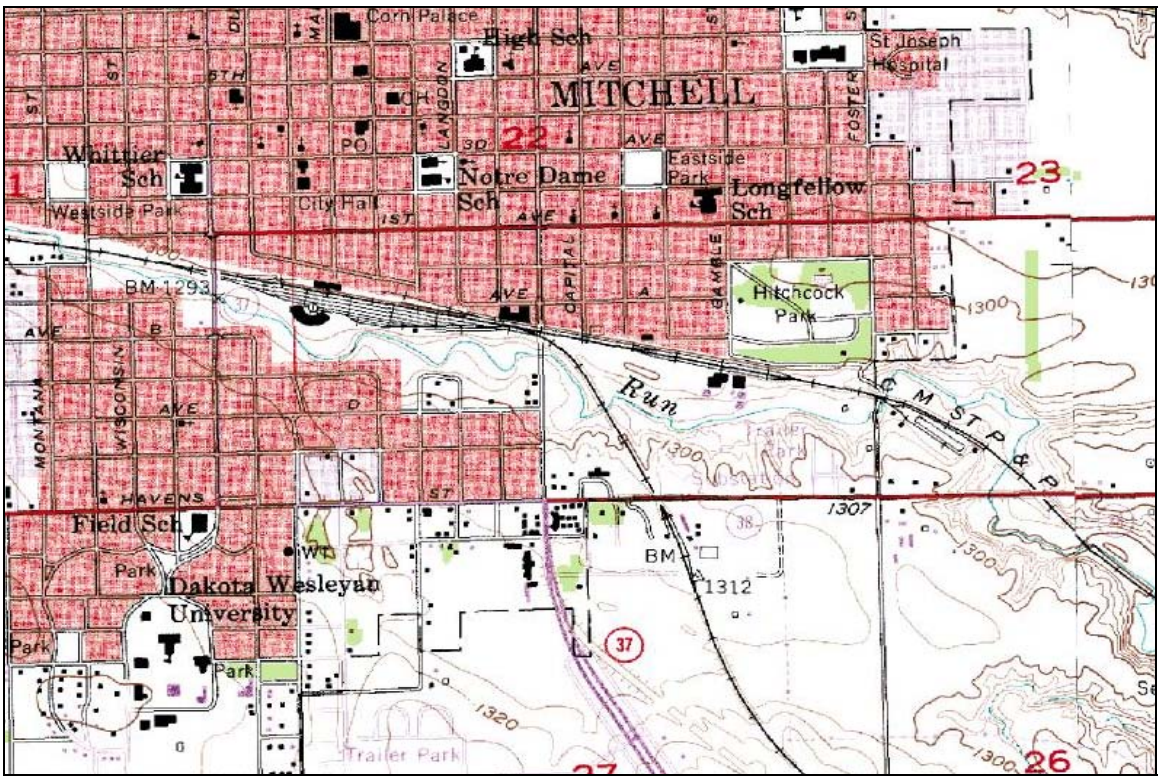

Figure 61 Rail Yard Topographic Map in Mitchell, SD. (Source: Terraserver-Usa.com).

Figure 62 Rail Yard Arial Imagery in Watertown, SD. (Source: Terraserver-Usa.com).

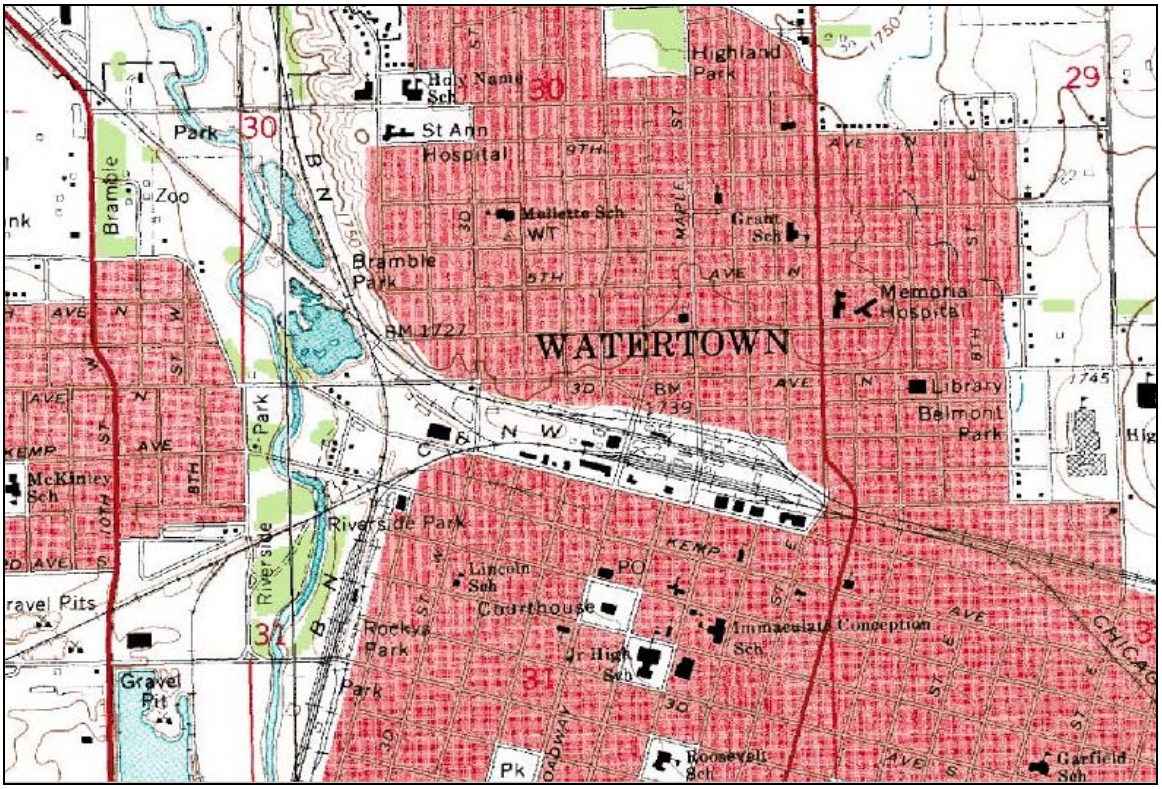

Figure 63 Rail Yard Topographic Map in Watertown, SD. (Source: Terraserver-Usa.com).

Figure 64 Rail Yard Arial Imagery in Brookings, SD. (Source: Terraserver-Usa.com).

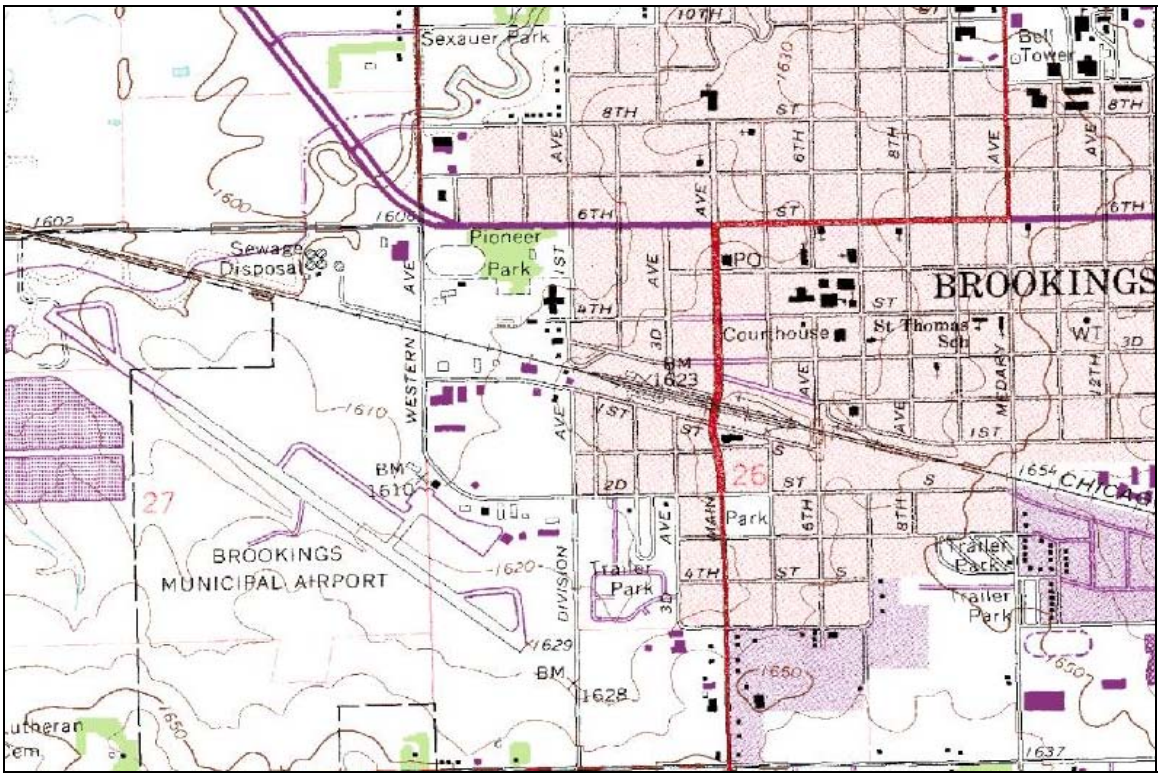

Figure 65 Rail Yard Topographic Map in Brookings, SD. (Source: Terraserver-Usa.com).

Figure 66 Rail Yard Arial Imagery in Sioux Falls, SD. (Source: Terraserver-Usa.com).

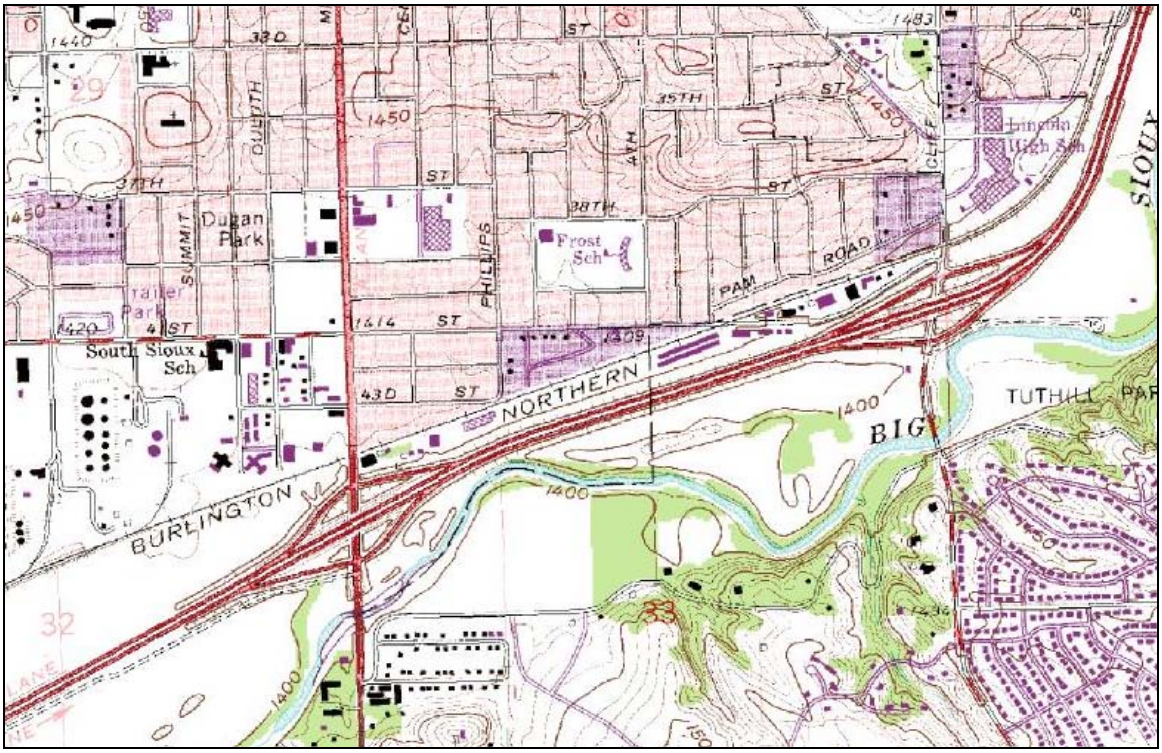

Figure 67 Rail Yard Topographic Map in Sioux Falls, SD. (Source: Terraserver-Usa.com).

Figure 68 Rail Yard Arial Imagery in Yankton, SD. (Source: Terraserver-Usa.com).

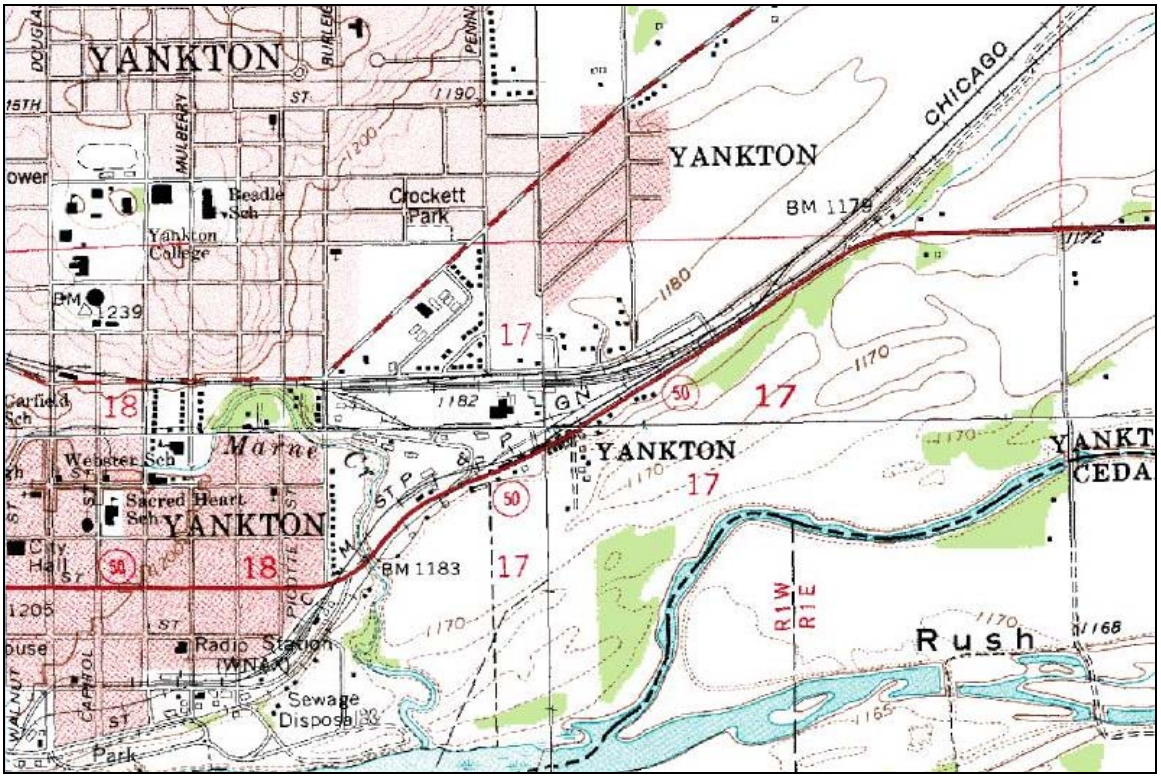

Figure 69 Rail Yard Topographic Map in Yankton, SD. (Source: Terraserver-Usa.com).

Figure 70 Rail Yard Arial Imagery in Dilworth, MN. (Source: Terraserver-Usa.com).

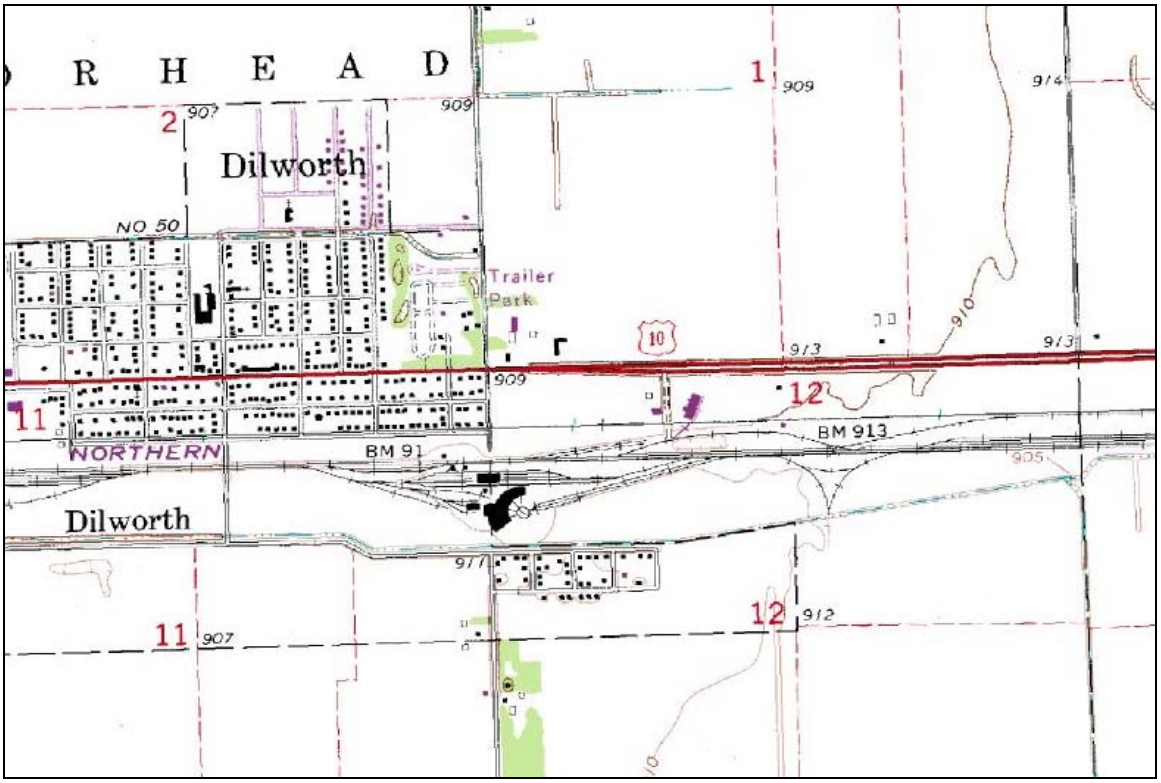

Figure 71 Rail Yard Topographic Map in Dilworth, MN. (Source: Terraserver-Usa.com).

Figure 72 Rail Yard Arial Imagery in St. Paul, MN. (Source: Terraserver-Usa.com).

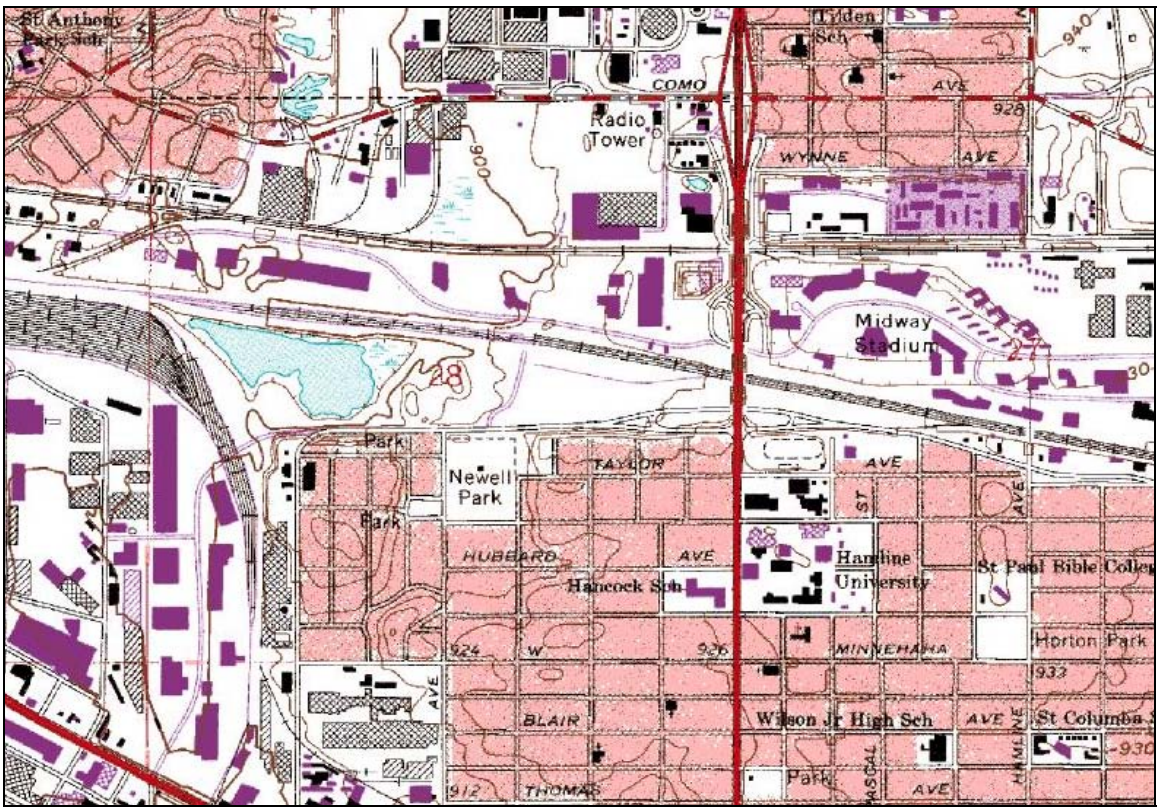

Figure 73 Rail Yard Topographic Map in St. Paul, MN. (Source: Terraserver-Usa.com).

Figure 74 Rail Yard Arial Imagery in Minneapolis, MN. (Source: Terraserver-Usa.com).

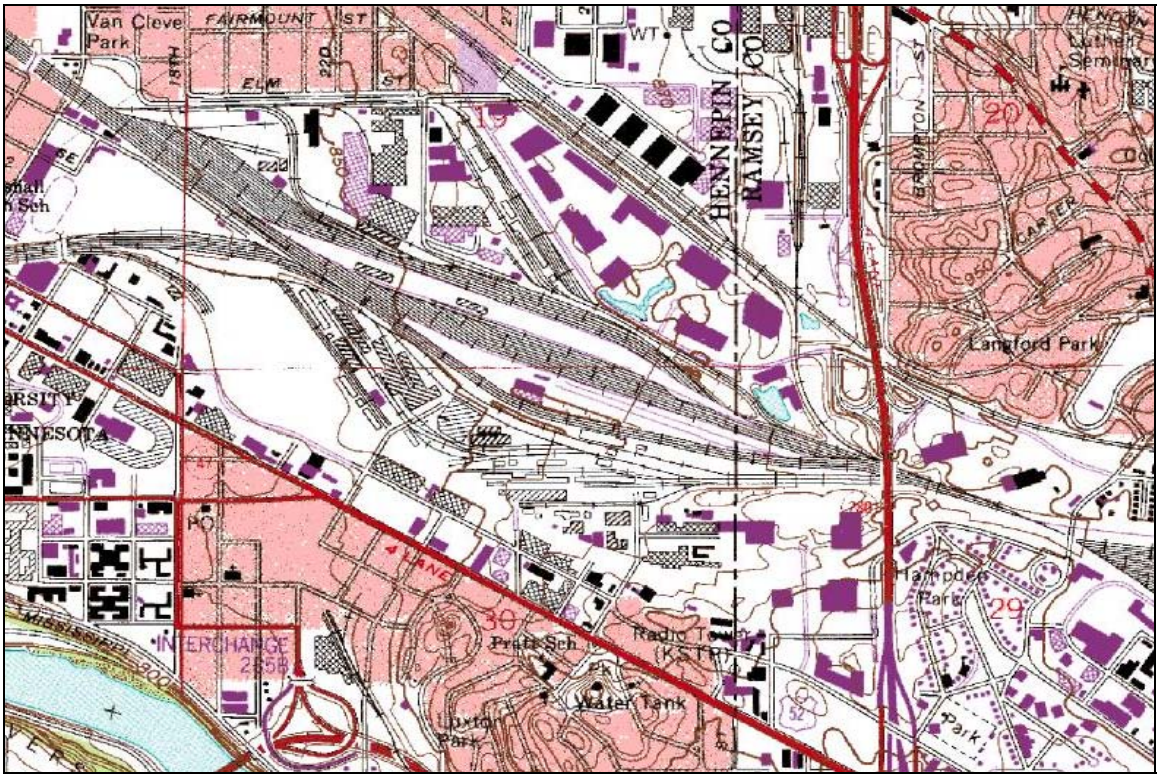

Figure 75 Rail Yard Topographic Map in Minneapolis, MN. (Source: Terraserver-Usa.com).

Figure 76 Rail Yard Arial Imagery in Bemidji, MN. (Source: Terraserver-Usa.com).

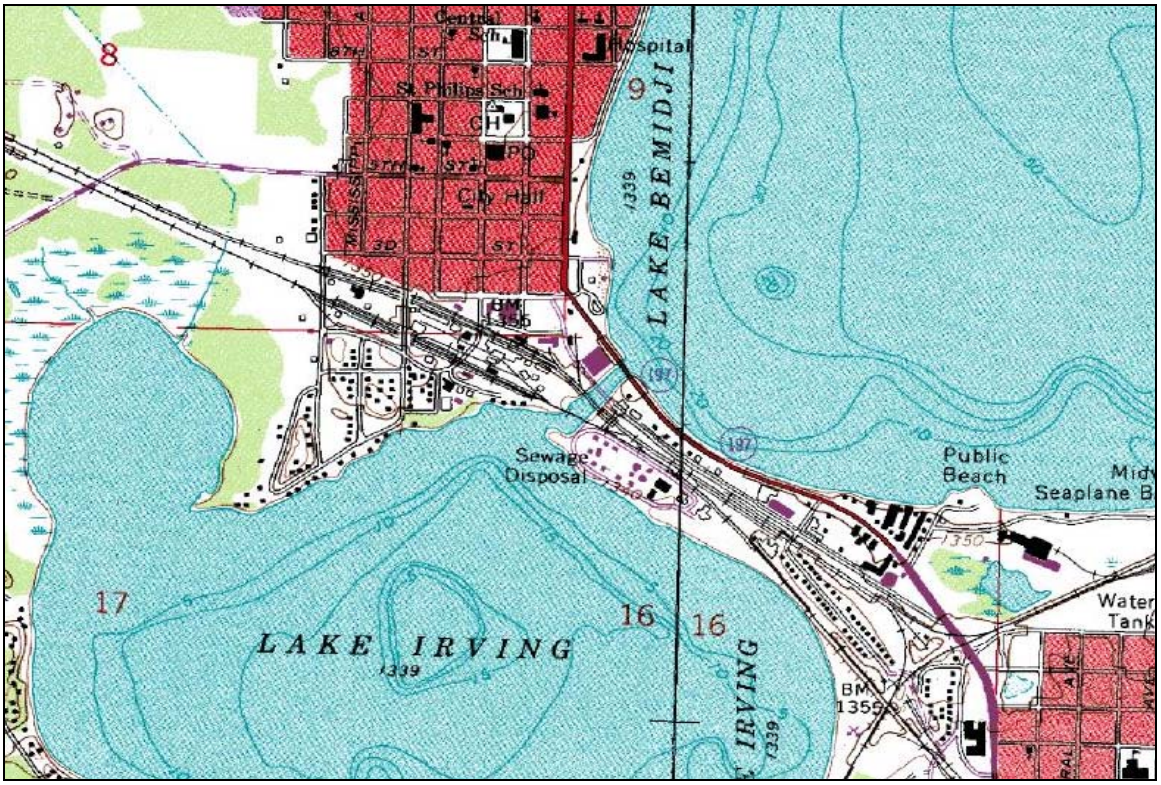

Figure 77 Rail Yard Topographic Map in Bemidji, MN. (Source: Terraserver-Usa.com).

Figure 78 Rail Yard Arial Imagery in Detroit Lakes, MN. (Source: Terraserver-Usa.com).

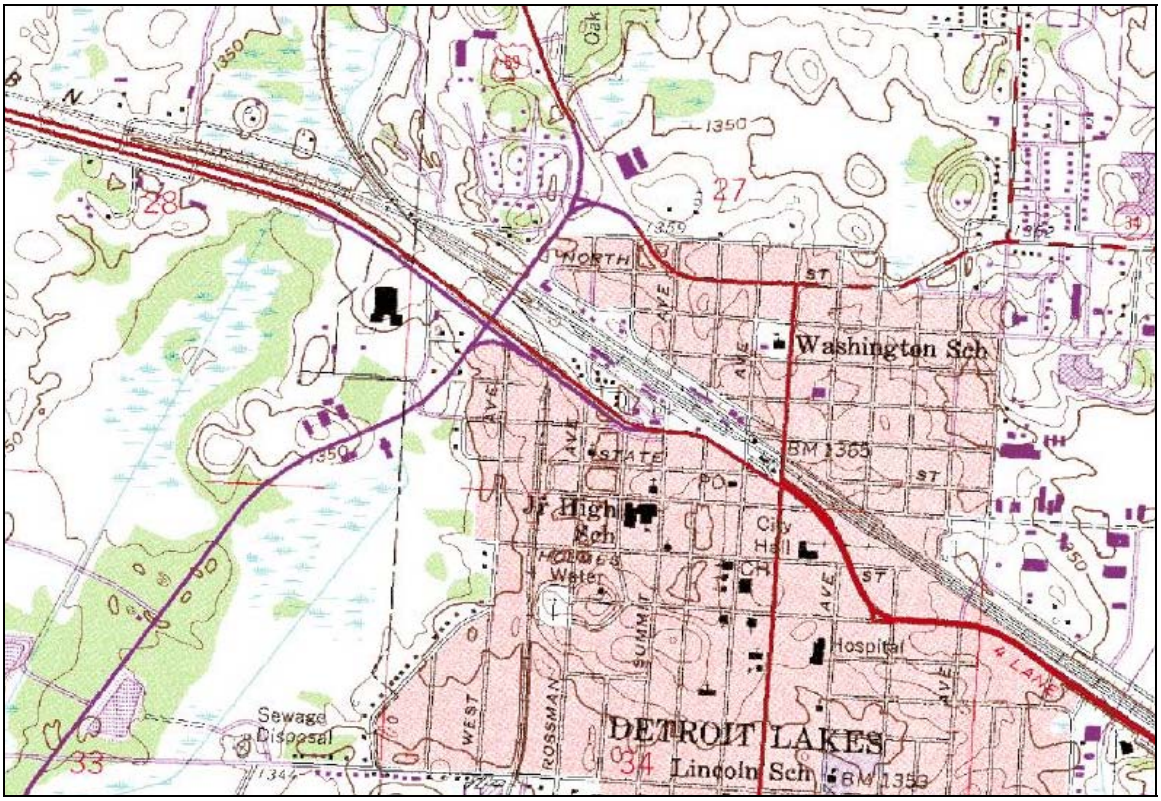

Figure 79 Rail Yard Topographic Map in Detroit Lakes, MN. (Source: Terraserver-Usa.com).

Figure 80 Rail Yard Arial Imagery in Alexandria, MN. (Source: Terraserver-Usa.com).

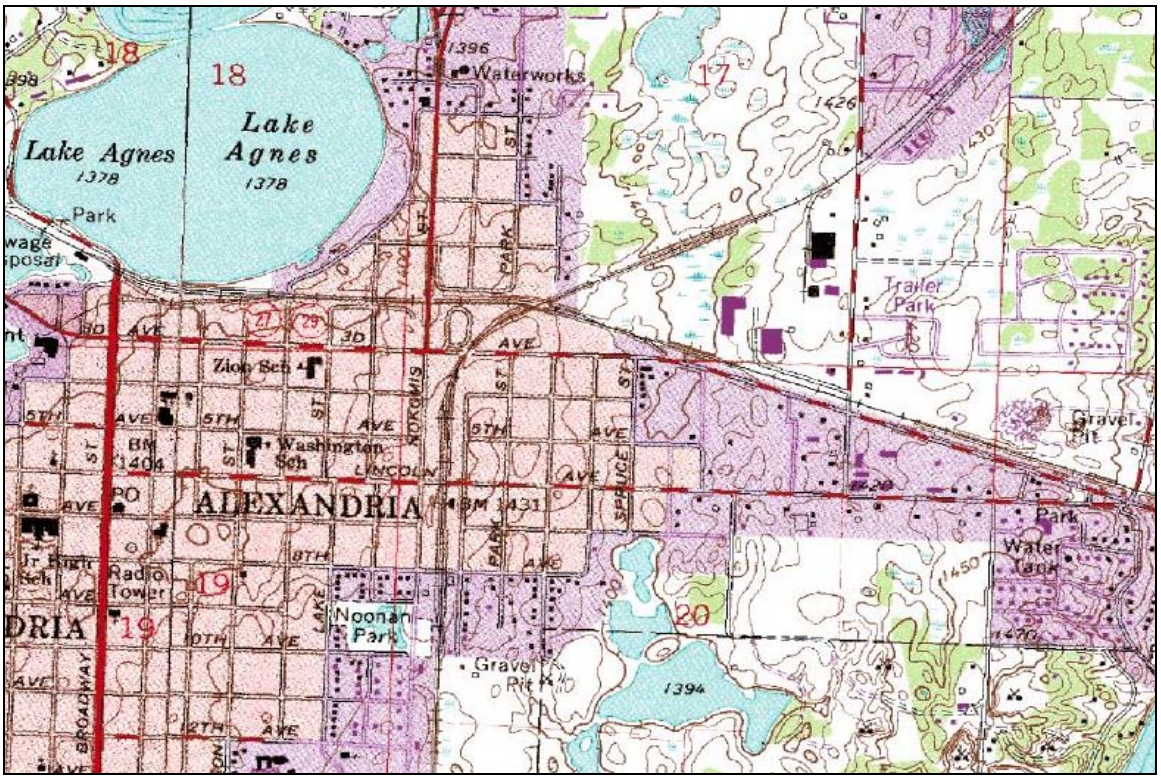

Figure 81 Rail Yard Topographic Map in Alexandria, MN. (Source: Terraserver-Usa.com).

Figure 82 Rail Yard Arial Imagery in Fergus Falls, MN. (Source: Terraserver-Usa.com).

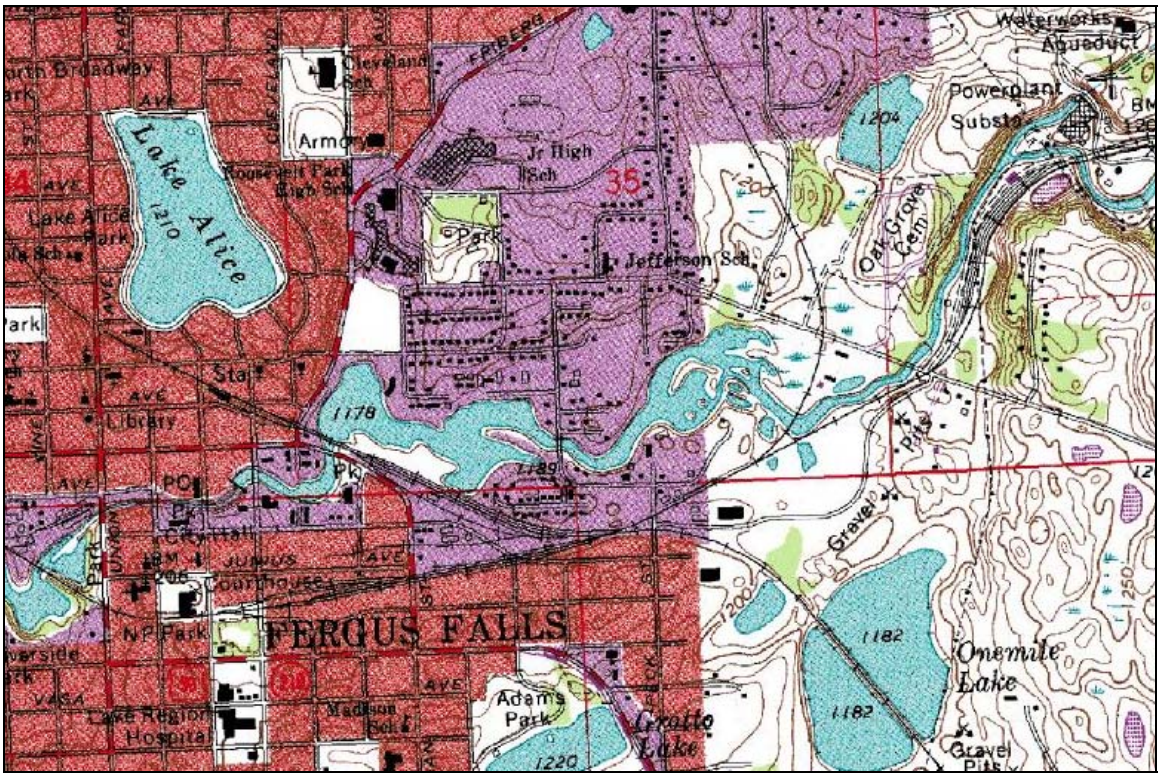

Figure 83 Rail Yard Topographic Map in Fergus Falls, MN. (Source: Terraserver-Usa.com).