# MINNESOTA INTERMODAL REGIONAL TERMINAL PROJECT

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## ABSTRACT

A growing portion of the commodities produced and consumed in the Twin Cities region is transported via containers that are interchanged directly among railways, trucks, and steamship lines. This is known as intermodal freight transportation. Efficient freight transportation is a key element enabling businesses to maintain their competitiveness in a global economy.

Growth in the use of truck-rail intermodal freight services in the Twin Cities region is being threatened by capacity limits and locations of current facilities. The growing scale of intermodal freight handling requires a higher level of cooperation between the public and private sectors as these services work to combine both the efficiencies of public highways and private railway networks.

A public-private partnership was formed to ensure that decisions for future investments in intermodal facilities and services are timely and focused on serving the entire Twin Cities region. This partnership consists of the region's planning and transportation agencies, the Metropolitan Council and the Minnesota Department of Transportation (MN DOT), as well as railroad intermodal freight service providers to the region, Burlington Northern and the CP Rail System. The partnership may expand as the process to identify regional intermodal terminal needs moves forward.

In 1994 the partnership studied future terminal capacity needs and identified the principal terminal alternatives to serve the intermodal industry. The results of this study will form the basis for further action to address identified terminal capacity needs.

## GROWTH OF INTERMODAL IN TWIN CITIES AREA

In the Twin Cities in the 1960s, boxcar traffic shifted to trucks, and the railroads responded by introducing trailer-on-flat-car (TOFC) service to recapture some of the lost traffic. A number of railroads offered piggyback service in Minnesota. In the 1970s, TOFC continued to grow with several loading ramps located throughout the state. Burlington Northern, SOO Line, Milwaukee Rairoad, and C&NW provided intermodal service. Milwaukee Railroad offered the first dedicated intermodal train service to Chicago, the Sprint Train.

Following the national trend, intermodal traffic increased significantly in the 1980s. A major milestone was reached in 1984 when Burlington Northern began operating its highly successful double-stack trains in the corridor to the Pacific Northwest ports of Seattle and Portland. The deregulation of the rail industry in the early 1980s greatly facilitated intermodal cooperation among the railroads.

In 1991 intermodal shipments accounted for 16 percent of all railcar loads originating, terminating, or passing through Minnesota. This was almost a three-fold increase in the amount of intermodal traffic handled by traffic major carriers in 1980. This reflected the national trend. Nationally, intermodal has experienced growth from 3 million units shipped in 1982 to about 7 million units shipped in 1992.

## MINNESOTA INTERMODAL RAILROAD TERMINAL STUDY GROUP

Continued growth in intermodal traffic levels will result in future capacity constraints at the Burlington Northern Midway Hub facility in St. Paul. The growth in operations over the years to around-the-clock, 7-day-a-week operations and the increase in truck traffic to the facilities has created noise levels that are unacceptable to the adjacent neighborhood. Burlington Northern announced its intention to find a new site but abandoned an initial effort to relocate to another site west of the present facility due to limitations with the new site.

Subsequent conversations initiated by Burlington Northern with the Metropolitan Council and MN DOT about the need to explore the feasibility of a regional solution to the terminal capacity problem led to the formation of the Minnesota Intermodal Railroad Terminal Study (MIRTS) group. The CP Rail System was invited to participate as the operator of the Minneapolis Intermodal Terminal, the other Twin Cities terminal.

To ensure that decisions for future investments in intermodal facilities and services are timely, coordinated, and focused on serving the entire Twin Cities region, this public-private partnership was an essential first step in a complex decision-making process. The members of the partnership may expand as the process to address regional intermodal terminal needs moves forward.

## NEED FOR THE STUDY

This effort is important to Minnesota and the Twin City region because a growing portion of the commodities produced and consumed in the region are transported by intermodal service. Efficient freight transportation is essential to help Minnesota businesses maintain their competitiveness in a global economy. Terminal capacity limits threaten the growth of intermodal service in the Twin Cities.

## FOCUS GROUP

The first step in the development of the study was to hold a focus group session with 26 representatives from shippers, drayage companies, ramp operators, intermodal marketing companies, truck companies, brokers, warehousing companies, and equipment suppliers. The advice provided by the group is a major factor affecting the growth of Twin Cities' intermodal service. The group assessed of the Twin Cities' position in intermodalism from three perspectives. The first was the local and regional forces affecting service. Optimism was expressed that intermodal service would increase due to the entry of major trucking companies such as J.B. Hunt and Schneider Trucking. A robust Twin Cities economy that is growing at a faster rate than the national economy is another significant factor. This level of economic activity is likely to cause intermodal service to increase at a similar rate.

The second perspective involves forces at a North American level, such as passage of North American Free Trade Agreement (NAFTA) and the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). The group indicated that the trucking industry was experiencing constraints in its growth, which should benefit intermodal growth if the rail industry continues to improve its service and fully utilizes its capacity.

Finally, on the international level, the focus group noted that Minnesota is the 15th largest exporting state and is the corporate headquarters of many Fortune 500 companies. The exporting of products has been made easier by the introduction of paperless processing, logistical improvements, and access to the Burlington Northern's major route to Seattle and the route's linkages by steamship lines to Pacific Rim countries. The participants identified the constraints at terminal facilities and supported a study of the Twin Cities terminal needs and the public sector's involvement in that effort.

## INTERMODAL TERMINAL STUDY GOALS

The MIRTS group proceeded to commission a study to assess the need for more intermodal terminal capacity. The goals of the study are to: (A) forecast the level of growth in intermodal service in the region; (B) quantify the capacity limits of existing facilities; (C) identify the need for a new facility and interim solutions to address capacity deficiencies; (D) propose site criteria for a new facility; and (E) identify the how the public will benefit from investments that need to be made.

The study involves an analysis of existing facilities to determine their capacities and recommendation of interim solutions to increase these capacities. The study also forecasts the growth of intermodal traffic in the Twin Cities region through the development of predicted scenarios and data from responses to a survey of freight shippers. The study provides an analysis of the need for new facilities, capacity requirements, and timing for the additional capacity.

The MIRTS group also has engaged in other planning and communication activities, including informing the community about the needs and issues surrounding the intermodal terminals; assessing land availability in the Twin Cities area; researching potential local economic benefits of intermodal terminal facilities; and identifying terminal facilities development models that may be applicable when implementing a regional terminal project. The culmination of these efforts will be a final report and recommendations for further action to each of the four participating agencies.

## INTERMODAL TERMINALS IN THE TWIN CITIES

In 1974 Burlington Northern opened its Midway Hub Center in St. Paul. The facility is midway between the downtown areas of Minneapolis and St. Paul. It is located on approximately 50 acres of land along the railroad's main-line track. The sight was previously used as a boxcar cleaning yard. The central location, on railroad property vacant at that time, made the site ideal. Growth in TOFC service, the introduction and growth of double-stack service, and more frequent trains turned this terminal into a 24-hour-a-day, 7 day-a-week facility that is approaching its capacity limits. Growth in business in 1994 over the same period in 1993 was

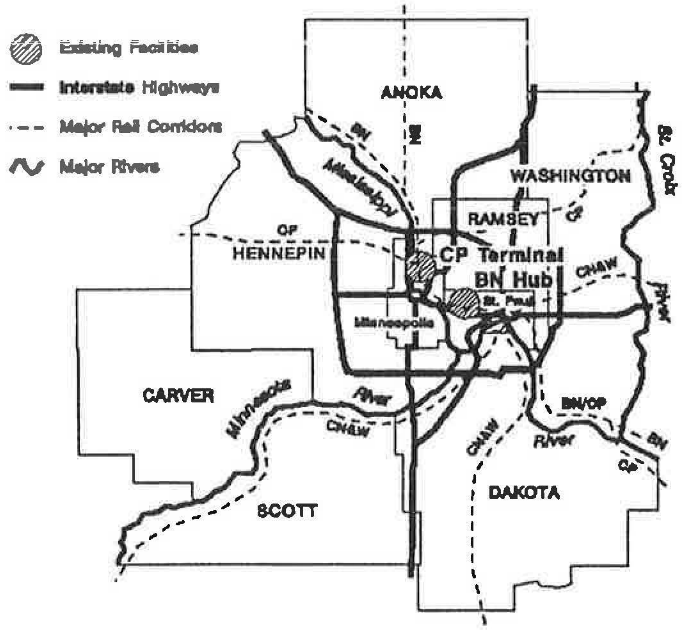


FIGURE 1 Twin Cities intermodal terminal locations.

approximately 14 percent and included new records for daily and monthly volumes. The nearest freeway is approximately .5 mi via city streets.

The increase in levels of operation at the hub has increased noise and traffic which has led to discontent in the adjacent neighborhood. This residential neighborhood is located on a hill directly overlooking the facility and adjacent to the hub entrance. The elevation difference and the inability to relocate hub access make it difficult to reduce noise levels.

The SOO Line Railroad established the CP Rail System Minneapolis Intermodal Terminal in 1990 in northeastern Minneapolis on portions of an existing rail equipment-repair facility and storage yard. The terminal is the second busiest in the CP Rail System. The terminal occupies approximately 70 acres, 26 of which are used for ramping and container-trailer storage operations. The remaining acres are leased to an operator of a container depot for steamship lines. The CP Rail System considers this leased space available for terminal expansion. In addition to the CP Rail System operation, there is a container depot and a warehousing operation. Adjacent to the intermodal facilities, the CP Rail System continues to service and repair locomotives. The terminal's adjacent land uses are easier on neighbors than those of the Burlington Northern hub. A golf course is located north of the site, and a cemetery is on the south side. The railyard's west side hosts industrial uses, and its east and south sides host commercial and residential uses.

## TERMINAL ANALYSIS METHODOLOGY

A railroad intermodal terminal is a complex facility that operates as an integral component of a larger railroad intermodal system. A terminal's performance is based on interactions among various terminal subsystems in the dynamic environment created by the railroad's intermodal system. Terminal elements include space available for parking intermodal equipment (trailers, containers, and chassis) and for placing rail equipment. Terminal productivity also is strongly influenced by its layout operating strategy, and demand.

A model containing these elements was used to estimate the capacity of each of the Twin Cities terminals as currently designed, equipped, and operated. For the purposes of the analysis, capacity was defined as constrained "optimal capacity"—that is, the volume at which railroad profit is maximized, or alternatively, the volume at which the railroad's unit cost is minimized, subject to meeting a reliability standard. This standard is the volume at which the facility is operating most efficiently.

The model focuses on facility analysis which involves evaluating each terminal component in terms of its independent characteristics or capacity as well as its interrelationships with all other components. In the analysis, external railroad functions supporting the intermodal terminal are considered fixed parameters. Capacity of three major functions performed within a terminal are evaluated. These functions are track capacity, lift capacity, and storage capacity.

1. *Track capacity* is determined not only by the layout of the terminal and length of the tracks but also by the frequency with which the railroad switches flatcars on and off terminal tracks. Track capacity, which increases as the number of switches increases during the day, depends on available lift capacity during the time between switches.

2. *Lift capacity* is determined by the time available to unload and load flatcars; the type, number, and mix of machines assigned to load and unload intermodal equipment; and the rate at which such equipment is delivered to and removed from trackside. The latter depends on the mix of units that require storage, size, and location of storage areas, and distribution of individual trailers and containers being handled among storage sites.

3. *Storage capacity* is determined by the size of dedicated storage areas for containers, trailers, and chassis. Storage capacity is a dynamic, complex function that is affected by how a facility is operated and by the diverse space needs of intermodal equipment on terminal property.

The Burlington Northern Midway Hub Center and the CP Rail System Minneapolis Intermodal Terminal were found to have adequate track and lift capacities to operate at a high-level of efficiency. Adequate storage for trailers, containers, and chassis, however, is becoming a problem at these facilities. The configuration of the sites limits the extension of deramping and ramping tracks to reduce the number of switchings.

## TERMINAL CAPACITY PRELIMINARY FINDINGS

At this time, the final report recommendations are not completed. The following is a summary of preliminary findings from the analysis of terminal capacity portion of the study.

### Burlington Northern Midway Hub Center

Opportunities for capital improvements to the Midway Hub Center may be limited to the extension of lead tracks, paving, and lighting. Any improvements to the facility, other than operations, requires city approval and neighborhood support because of the site's restrictive land-use zoning. The capacity analysis noted sufficient track and lift-equipment capacities. The lack of additional storage for trailers and chassis will become critical in the short-term. In 1994 a change in ramping operations that allows containers to be stored on chassis only increased the demand for storage space. Recommendations for operational changes such as modifying dwell-time procedures to increase storage capacity are anticipated. However, meeting customer service needs will make implementing some of the recommendations difficult. Once the forecast for future capacity and demand is completed, Burlington Northern will determine the cost-effectiveness of any interim capital improvements at the hub to increase capacity and abate noise. Preliminary findings indicate that the hub may not meet long-term capacity needs.

### CP Rail System Minneapolis Intermodal Terminal

Unlike the Burlington Northern hub, which cannot be expanded, the CP Rail System terminal can be expanded. The rail system plans to do this by using land that is currently leased to the operator of a container depot. The analysis concluded that the current operation has adequate track and lift-equipment capacities, but will require additional storage capacity for trailers and containers.

## INTERIM MEASURES

A recommendation on interim measures to provide additional capacity at both terminals is pending until future intermodal growth is forecast and a decision is made about the best way to address long-term capacity deficiencies. Until a long-term solution can be implemented, interim measures are considered strategically important to allow the regional intermodal service to grow. The following measures are expected to be recommended in the final report:

- Additional parking for loaded trailers;
- Longer ramping and deramping tracks to increase efficiency and contribute to the mitigation of noise; and
- Modification to current terminal operation procedures.

Further analysis will be required by Burlington Northern and the CP Rail System to determine if the recommended measures are cost-effective. A commitment by the cities and the railroads to negotiate measures to mitigate noise and other local impacts is essential to obtain neighborhood support for improvements to the terminals.

## GROWTH SCENARIOS

To establish a reasonable projection of intermodal growth in the Twin Cities, the MIRTS group concluded that projections based solely on national trends are inadequate. Further, the dynamic and rapid changes in the intermodal industry limits the use of trends as a reliable base on which to prepare forecasts.

The forecast approach selected by the group was to develop expert-based scenarios that represent four levels of intermodal growth. The initial development of the scenarios was based on a telephone survey of shippers in the region and interviews with major shippers. Final adjustments were made by applying factors used by the Minnesota Department of Revenue to forecast state economic growth. The four scenarios developed are as follows:

1. *High Growth.* This scenario projects the amount of intermodal traffic that could be served if all local constraints are removed, including terminal capacity constraints, and drayage issues are resolved. This scenario also assumes that national rail system constraints are removed, needed system improvements are made, and new markets are developed.
2. *Medium Growth.* This scenario assumes that terminal and drayage needs are met but that national system needs are addressed beyond what is currently in progress.
3. *Low Growth.* This scenario assumes that there is no increased economic activity, no national system needs are addressed beyond what is currently in progress, and that local issues are unresolved.
4. *Most Likely.* By evaluating the other three scenarios, the most likely scenario will be developed. This will be the experts' best estimate of what is most likely to occur.

Before the development of scenarios, critical factors to be applied to each scenario were reviewed by the MIRTS group. The "most likely" scenario will be used in the selection of the best option that addresses terminal capacity deficiencies.

Figure 2 illustrates one of the applications of the growth scenarios in the study. Projected annual lifts will be compared with available combined terminal capacities that currently exist (line B) and with additional capacities resulting from interim or short-term improvements (line A).

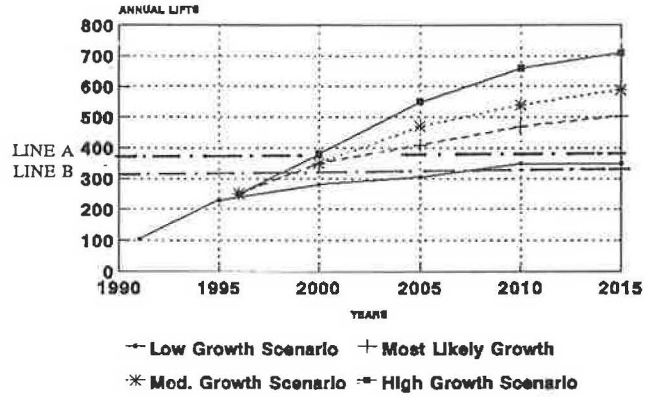


FIGURE 2 Comparison of intermodal forecast scenarios with existing terminal capacities — an illustrative chart.

The growth scenarios were prepared from 1992 data. Adjustments were made to the forecast factors for the major traffic that exists or is anticipated to develop during the forecast period. The corridors included were the Pacific Northwest, California, Texas-Mexico, Montreal, Northeast, and Southeast. Constraints on future intermodal growth considered in the projections included the current effects of equipment shortages, unbalanced corridors in relation to inbound and outbound freight flows, railroad national marketing strategies, and railroad system constraints.

For the shippers' survey, 80 shipping firms were contacted and 55 companies were extensively interviewed by telephone. Following are highlights of the responses that are being assessed:

- Intermodal movements account for 8 percent of the Twin Cities' truckload-size freight movements.
- Most respondents are manufacturers that ship from and receive at their plants. The Twin Cities area ships more than it receives.
- Sixty percent of intermodal users are in the Twin Cities metro area, and many are located in the southwest part of the area.
- The average distance to a terminal is 43 to 47 mi.
- Forty percent of intermodal users use both Twin Cities terminals.
- Forty percent said their freight volume increased from 1993 to 1994.
- Intermodal growth is expected to be 7 percent per year during the next 3 to 5 years.

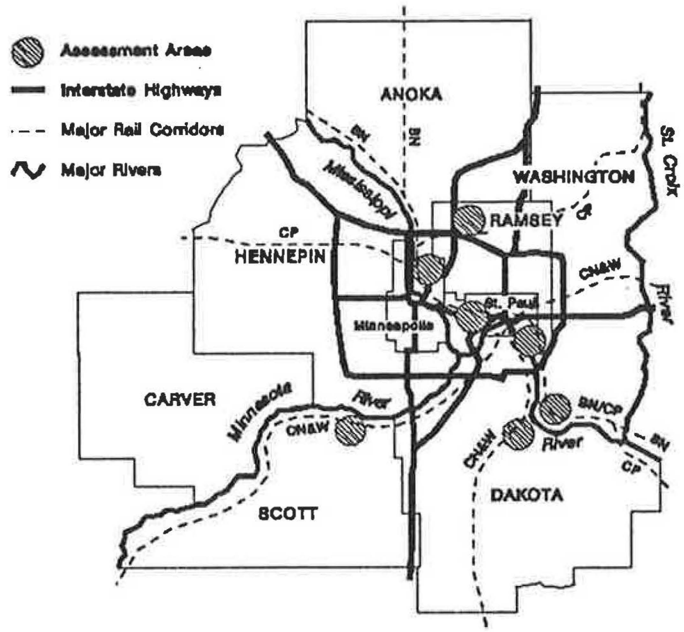


FIGURE 3 Areas assessed for available land to site a terminal facility.

- Intermodal traffic would increase if a new terminal that provided better service were built.
- Respondents said that of the regions they do business with the Midwest region will grow the most.
- Illinois is the top origin of domestic intermodal shipments and California is the top destination.
- Japan, Canada, Europe, and Mexico are the region's main international trading partners.
- The most needed improvements are reduced transit time, reduced intermediate terminal time (Chicago), more trailers and containers, improved reliability, and reduced cost of rail.

## THE DECISION MAKING PROCESS

Study recommendations will be used by the MIRTS group to decide whether to continue to address the regional terminal capacity deficiencies identified in the study. Burlington Northern is expected to continue to focus on its immediate and long-term terminal needs. The CP Rail System also will focus on whether a proposed new terminal facility will serve its long-term needs. The Metropolitan Council will evaluate the potential for a new terminal to increase the economic vitality of the region, address the land-use issues surrounding both the existing facilities and any proposed facility, and address the potential needs for transportation and sewer services for a terminal facility located in available areas on the urban fringe. MN DOT will look at the required investment in highway facilities and the likelihood that an intermodal terminal will support the objectives of a state intermodal management plan—comparable to ISTEA—being prepared.

There are others interested in the outcome of this study, such as the cities of Minneapolis and St. Paul, potential investors in a facility, and users of intermodal service. Other railroads serving the Twin Cities that do not provide intermodal service have expressed an interest in pursuing new service opportunities a new facility could provide.

Trucking companies offering intermodal service as well as major users of intermodal service may be interested in constructing terminal or warehouse facilities on or near the terminal. Certain communities may have an interest in the location of the facility as part of an economic development strategy, depending on their evaluation of the compatibility of a terminal facility with available industrial sites. Ancillary industrial development adjacent to a new terminal facility could provide an inducement for a community to accept the facility and provide a buffer for the impacts of the facility such as noise and increased truck traffic.

The MIRTS group plans to release study findings by February 1995. If the study recommendations are adopted, the next phase will require further collaborations and partnerships to support the implementation of interim measures, select a site for a new terminal facility, establish a means to fund the project, and construct and operate the facility.

### Site-Selection Criteria

The scope of the study does not include specific site-selection activity. It does, however, include the establishment of site criteria. The MIRTS group assessed the availability of potential sites large enough to accommodate a multiuse intermodal facility. The preliminary criteria applied to this assessment included the need for the facility to be accessible to intermodal shippers, the railroads' main lines, the Interstate highway system, and available regional services.

### Neighborhood Involvement

An integral part of the study communication activities was to meet with representatives of the neighborhood association that represents the community next to the Burlington Northern Midway Hub Center. Association members offered their perspectives about how the terminal will affect their neighborhood and provided advice on sites for a new facility whose conditions mitigate the impacts of the existing facility. Their suggestions, which are documented as an appendix to the study, are summarized as follows:

- Locate the new facility away from concentrated residential use and nighttime noise-sensitive areas.
- Construct the facility with tracks long enough to avoid the need to split trains, which causes additional noise and reduces operational efficiency.
- Locate the facility close to freeways to minimize the impact of local truck traffic on commercial and residential areas.
- To the extent possible, locate the facility on level terrain to reduce excessive engine noise and shifting of trucks. Also, try to surround the facility with hills or berms, which will act as sound barriers.
- Encourage the host community to establish noise standards, including impulse noise standards, and have a neutral party conduct ongoing monitoring.

## INFORMED-CONSENT APPROACH

It has become clear to public works agencies such as MN DOT that major public facilities cannot be developed without the acceptance of the community in which the facility is to be built. The MIRTS group adopted an informed-consent approach, which MN DOT uses for its transportation development efforts. This approach reduces the amount of future conflicts and develops a broader constituency for a project.

The objective of the approach is not only to reach consensus, but to ensure that all stakeholders have an equal opportunity to participate in the decision making process. It was clear at the outset that the MIRTS process, to be successful, not only must consider the development of a terminal, but also must commit to a decision-making process that will result in communities understanding the need for such a project and the project's benefits and the communities supporting, or at least not opposing, its implementation.

## COMMUNITY BENEFITS

Community benefits from public facility development have been difficult to quantify. Wherever a terminal is planned, the community must be willing to accept and support its development and to benefit from its presence. A national review of intermodal projects suggests that communities can anticipate the following from such projects:

1. An improved job base. A terminal will support existing business growth and provide some direct job growth.
2. Improved tax base. Real estate taxes from a terminal and/or lease revenues may flow into community coffers. Economic development spurred by a terminal facility can increase tax revenues from new and expanding businesses.
3. Improved industrial land use. A terminal development can be beneficial if it can attract and consolidate industrial land uses. It also can facilitate the development of underused industrial land through the redevelopment of polluted sites.
4. An improved transportation system. A terminal's location may require transportation improvements to the highway and railroad systems. These improvements could attract other industrial development not related to a terminal operation.

## ORGANIZATIONAL STRATEGIES

One question that will arise early concerns how a group of public and private interests should organize to develop a terminal facility. In examining other developments, four basic approaches emerge (with many variations):

1. Third-party developer. A flexible approach is the third-party developer approach. A project can be developed through a company that delivers a turnkey project for a contractor to operate.

2. Private developer. A private-industry approach is for a developer or one of the railroads functioning as the developer to own and operate the facility.

3. Industrial park development. This option is to seek a willing community and to construct the terminal as part of an industrial park project.

4. Public commission development. This approach requires the use of a public commission, commonly used to operate airport and seaport facilities, to develop and/or operate the terminal facility. The MIRTS group will use this analysis to develop recommendations concerning the best approach for public and private interests to organize to develop a terminal facility.

## OUTCOMES

### Determine Future Terminal Capacity Needs

This study will result in a clear understanding of future capacity needs and provide a process to address these needs.

### Identify Ways to Extend Capacity

Until a long-term solution can be implemented to correct future deficiencies in terminal capacity, interim measures will ensure that short-term capacity needs are addressed.

### Forge a Strategy to Address Future Intermodal Terminal Needs

The potential to accelerate the development of needed intermodal facilities can increase the efficiencies of the region's transportation system and create an economic advantage.

### Implement ISTEA Goals

ISTEA states, "The National Intermodal Transportation System must be the centerpiece of a national investment commitment to create the new wealth of the Nation for 21st Century." The MIRTS project is at the heart of this goal.

### Complete Commodity Flow Study

The Metropolitan Council for several years has worked on the Commodity Flow Study, which is a priority for MN DOT as part of its management of the State Transportation Plan. The MIRTS project has contributed to the intermodal study design of the MN DOT Intermodal Management Plan.

### Develop Public-Private Understanding

The study recommendations, the working relationship the study fostered between public and private sectors, and public and business community involvement will contribute to an increased awareness of the regional terminal capacity issue and the development of a shared vision for a solution.