Twin Cities Area

BARGE FLEETING

Ports and Waterways
Section

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Twin Cities Area Barge Fleeting

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Barge Fleeting

Introduction

Pool 2, the portion of the Mississippi River impounded by Lock and Dam 2 at Hastings, and the upper pool in Minneapolis are considered to be the Twin Cities harbor. It and the navigable segment of the Minnesota River house the majority of the river terminals in Minnesota.

Pool 2 is also the section of the upper river where the physical characteristics of the river change from a fairly wide channel to a narrow winding one. With that physical change the river becomes more difficult to navigate and the configuration of barge tows must be changed. That in turn causes the need for fleeting. Fleeting needs are also influenced by the distribution and operational designs of the river terminals.

The larger towboats which push tows (groups) of up to fifteen barges on intercity runs are called line haul boats. The smaller towboats which move individual barges from place to place in Pool 2 and the upper harbor in Minneapolis are called harbor boats. Harbor boats have a primary function of moving barges between fleeting spots and terminals. They also move loaded and empty barges between terminals. Figures 1 and 2 show typical line haul and harbor towboats.

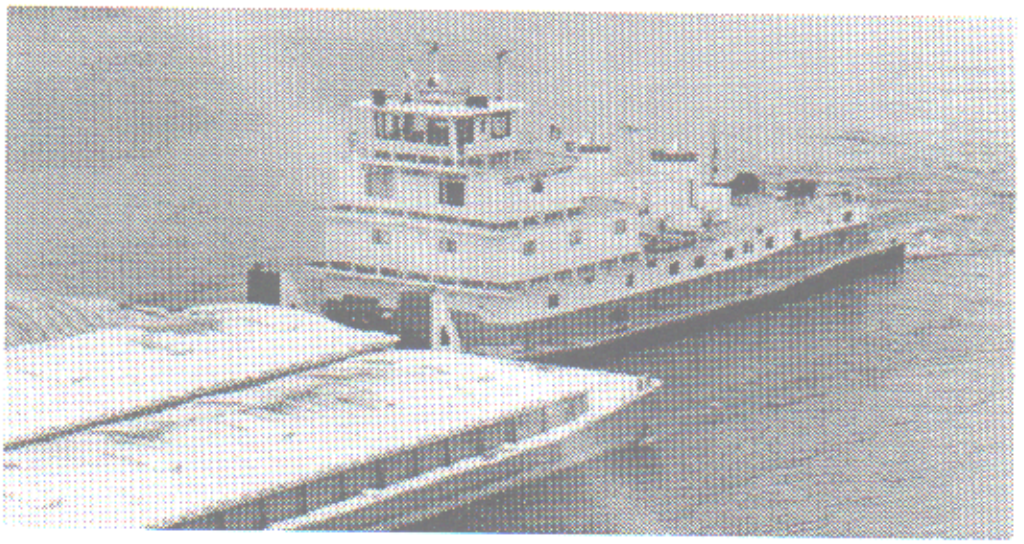


Figure 1 - Line Hall Towboat

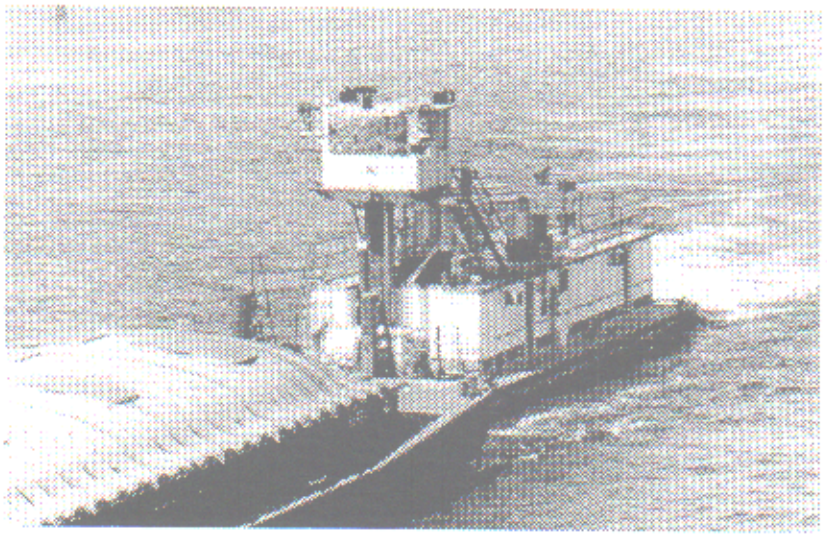


Figure 2 - Harbor Towboat

Line haul boats are too large and difficult to maneuver to take their fifteen barge tows directly to the terminals. Also, the barges in a tow are normally not destined for the same terminal. Further, the individual terminals seldom have room at their docks for more than three or four barges. Those reasons and the previously mentioned river character change are the reasons fleeting areas (barge parking lots) are necessary.

Fleeting Areas

Fleeting areas, or fleets, operate in the same manner as do rail marshalling/switching yards. Upbound tows are put into fleets and are disassembled for transfer of the individual barges to their final destination. The process is reversed for downbound tows. The loaded barges are moved to the fleets from the terminals to be assembled into tows and to wait for a line haul boat.

Other activities that occur in the fleets are vessel inspection and minor hull and hatch repair. Major repairs are done in the harbor's ship repair facilities.

There are special intermediate or secondary fleeting areas in the harbor in addition to the major fleets where tows are disassembled and rebuilt. Approximately 30 percent of the northbound barges are carrying cargo. This number varies throughout the season. During the early part of the season, for example, a major share of the incoming barges are loaded with fertilizer. Most of the cargo leaving the St. Paul harbor is grain. Before grain can be loaded in a barge which carried inbound cargo, of any kind, the barge must be cleaned. Secondary fleets are where the barges are stored after they leave a cleaning (or repair) facility and before they are called to a terminal for loading. Liquid cargo barges are also cleaned between unloading and loading. Figures 3 and 4 show typical primary and intermediate fleets.

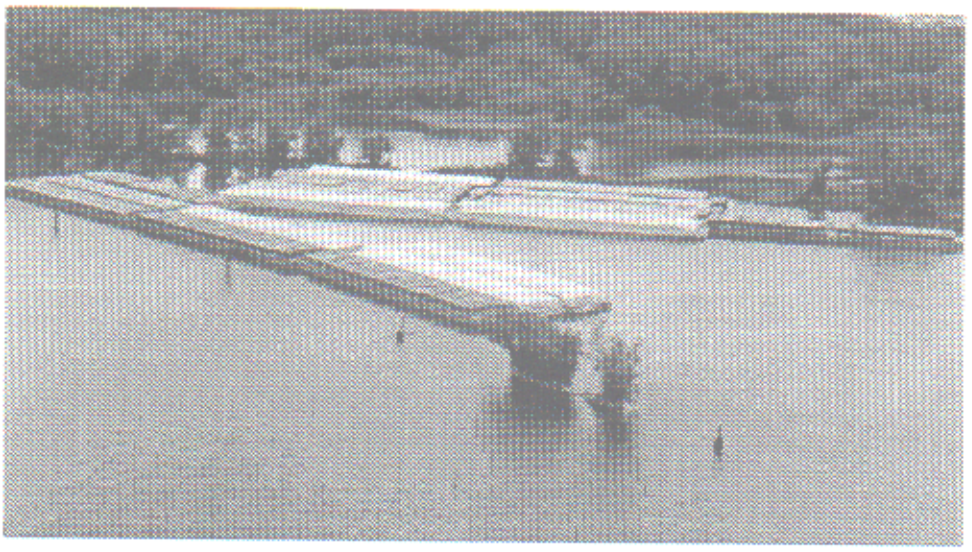


Figure 3 - Typical Primary Fleet

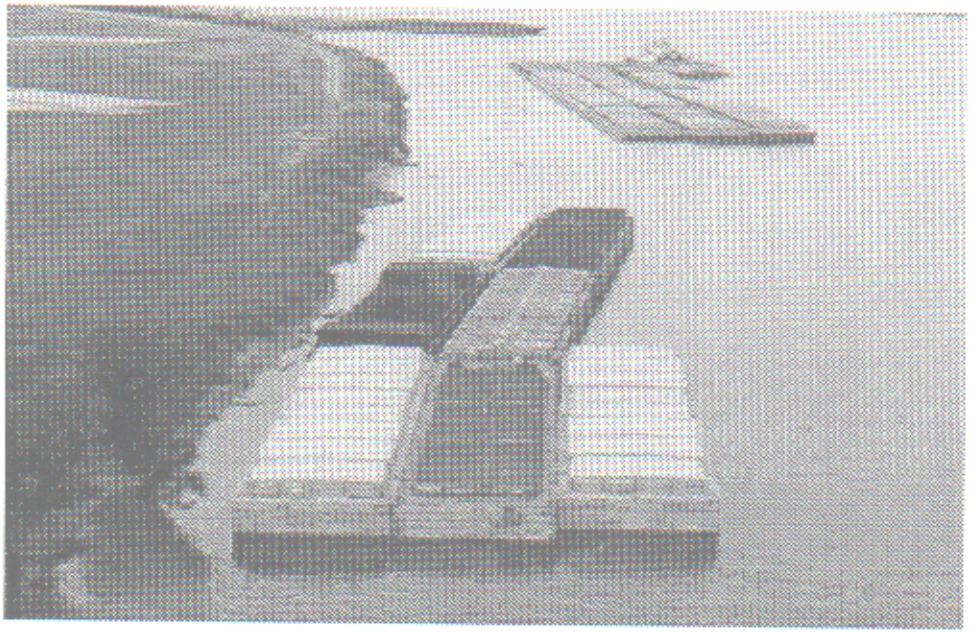


Figure 4 - Typical Secondary Fleet

The normal pattern of a barge through fleeting and harbor movements would be fairly close to this scenario.

- *a 15 barge tow arrives at a primary fleet,*
- *a loaded barge is taken from the fleet by a harbor boat for unloading at a terminal,*
- *the barge is taken to a cleaning station,*
- *from the cleaning station it is taken to an intermediate fleet to wait for transfer to a loading terminal,*
- *it is taken to the terminal and loaded,*
- *it goes back to a primary fleet (if it is loaded on the Minnesota River it will stop at an intermediate fleet first),*
- *it is moved out of the harbor as part of a 15 barge downbound tow.*

The total trip takes about two weeks.

If the harbor had upbound and downbound fleets for each of the towing companies which serve the area, there would be at least twice as many fleeting areas as there are. Because space for fleeting areas is limited by water depth, existing development and a horde of regulations it is not possible to develop that many fleets. To respond to need and accommodate all companies, the harbor is managed by sharing space.

Location and Construction of Fleets

Primary fleets are usually located in the lower portion of the harbor. Secondary fleets are closer to terminal concentrations, usually in the middle or the upper end of the harbor.

The most important factor in site selection is adequate water depth. Dredging a new area is difficult because of the need to dispose of bottom material in an environmentally acceptable way and because of the many government restrictions on such dredging. The next factor in importance is, are the riparian rights to the shoreline available? Next in line is the existence of zoning for the area which will allow fleeting.

With suitable depth, zoning, and a leasing agreement in place there are two other functions which must occur before a site can be used. Applications for permits must be made to the Corps of Engineers and to the Minnesota Department of Natural Resources (DNR). The Corps determines whether or not the fleet is clear of infringement on the navigation channel. The Corps also announces to the public that a permit application has been made. If a public hearing is asked for, the Corps conducts it. The DNR's permit review involves a determination that the proposed fleet will not create unacceptable environmental impacts.

There are two basic methods of fleet construction used in the St. Paul Harbor. Both involve the use of mooring cables to which the barges are tied. The difference between the two is the method of anchoring the mooring cables.

In the first method moorings which are steel pipes 16 inches in diameter and 40 feet long are driven into the shoreline and the mooring cables are attached. Moorings are spaced every two hundred feet, the length of a barge.

The second method is the use of what is called a deadman. A hole is dug into the shoreline and a large timber or railroad tie is placed in the hole. The mooring cable is attached to the deadman. Deadmen cannot be used where the shoreline cannot be disturbed such as rip-rapped banks, dikes, or levees.

Primary fleeting sites and their approaches must have enough water depth to accommodate the nine foot drafts of loaded barges and line haul towboats. Some intermediate fleeting sites require only enough water depth to accommodate harbor boats which draw approximately six feet of water. Empty barges in the intermediate fleets draw about two feet of water. Intermediate fleets for loaded barges require the same water depth as do primary fleets.

Most fleeting areas are on relatively straight shorelines which reduces the need for dirt removal for squaring off the site. If either dredging for depth or earth removal is needed, additional environmental review and permits are required. Either operation will add considerably to project cost and construction time.

Fleeting Studies

Over the years there have been many studies of fleeting on every segment of the 22,000 mile long national shallow draft navigation system. Since 1980, four studies directed specifically to fleeting in the Twin Cities Area have been completed.

In 1981, the Metropolitan Council prepared a document called "Barge Fleeting Study" for the Minnesota Environmental Quality Board. The objective of this study was "evaluate the present projections for future commercial navigation and identify the need for barge fleeting sites in the Twin Cities Metropolitan Area". The study identified all the existing barge fleeting sites and attempted to physically identify potential fleeting sites throughout the metropolitan area.

Also in 1981, two graduate students wrote a paper in preparation for their Master's degree entitled "Barge Fleeting in the Twin Cities Metropolitan Area: A Study in Intergovernmental Relation, Planning and Implementation." Their purpose was to examine the institutional framework surrounding the barge fleeting permit process.

In 1983, the Metropolitan Council prepared for the Environmental Quality Board a study called "Potential Barge Fleeting Impacts on Parks and Open-Space Lands and Activities." This study looked at air, noise, aesthetics, safety and water quality issues. The study stated "Negative fleeting impacts can be avoided or reduced by avoiding park development near fleets, controlling recreational development, providing screening, and limiting or excluding fleeting from a site. By incorporating fleeting into a park's activities, fleeting may have a positive impact."

Also in 1983, the Metropolitan Council, the Minnesota Department of Natural Resources and the Minnesota Environmental Quality Board prepared the "Barge Fleeting Report". The purposes of this report were to ". . . clarify the institutional framework and legal rights that may effect the development and use of the river, and the compatibility between commercial navigation and recreational uses of the river and adjacent parks."

Many of these studies predicted negative influences on the public's enjoyment of the river from expansion of the area's barge fleeting facilities. Concern for possible increases in noise and possible visual impacts were often cited. Since barges and towboats have been an integral part of the total river scene from the first settlement of the area negative visual impact can easily be dismissed. To help resolve the perceived noise question the Minnesota Department of Transportation's Office of Environmental Affairs surveyed noise levels at several fleeting sites in the harbor. Their findings were:

- *In most cases, excluding isolated intermediate fleets, fleet operation noises did not exceed background noise.*
- *It was necessary to get within 100 yards of a fleet to experience noise above acceptable levels.*
- *Noise volumes above standards were sporadic and short lived.*
- *Because fleet operations occur only periodically and for short times there is no significant noise impact.*

Fleeting Capacity

There are two types of capacity for fleeting sites, the design capacity and the practical capacity.

Design capacity is essentially multiples of a barge's dimensions 35 feet by 200 feet. Most of the fleets in the harbor are three barges wide to avoid interference with the navigation channel. Assuming that width, a fifteen barge fleet would have a design length of 1,000 feet (5-200 foot lengths). That is not, however, the practical capacity of the fleet. The practical capacity of a primary fleet is 2/3 of its design capacity. There must be room in the fleet to maneuver so that an individual barge can be taken from the fleet. A corollary would be an auto parking ramp filled to capacity with all of the aisles and entrances also filled. Practical capacity includes a means to get the cars out of the ramp. The practical capacity of an intermediate fleet is a greater percentage of its design capacity because the numbers of barges involved are smaller.

TABLE 1

FLEET CAPACITIES 1992

RIVER MILE *	PRIMARY FLEET	DESIGN CAPACITY	PRACTICAL CAPACITY
	MISSISSIPPI RIVER		
840.2 L	HIGH BRIDGE	21	15
839.1 R	ROBERT STREET	15	9
838.5 L	MIDAMERICA	30	21
838.4 R	TWIN CITY FLEET	36	27
838 L	WARNER ROAD	63	44
837.7 R	HANGER FLEET	15	9
837 R	AIRPORT FLEET	60	45
836.4 R	DAKOTA FLEET	21	12
835.6 L	BELTLINE FLEET	27	18
835.1 L	VALLEY LINE	30	24
834.6 R	CONCORD STREET	15	9
834.3 L	KAPOSIA FLEET	39	24
834 R	SO. ST. PAUL	15	9
834 L	PACKING HOUSE	39	24
833.8 L	NORTH STAR	36	24
833.6 L	RED ROCK FLEET	27	15
833.3 R	PIGSEYE WEST	54	39
	TOTALS	543	368
	SECONDARY FLEETS		
	MINNESOTA RIVER		
13.7 L	CREDIT RIVER FLEET	20	16
A3.5 L	CARGILL LOAD	20	16
13.2 R	CARGILL EMPTY	28	24
11.5 R	KRAEMER	9	6
11 R	PEAVEY	8	5
	MISSISSIPPI RIVER		
843.5 R	RIVER MOUTH	16	12
841 L	OMAHA FLEET	8	6
840.9 L	NSP PLANT	16	12
840 L	HARVEST STATES	8	6
836 R	SOUTHPORT	15	10
833.3 L	PIGSEYE EAST	9	6
833.2 L	NORTH STAR STEEL	21	15
	TOTALS	178	135

* The small numbers (13.7 etc.), are miles up stream on the Minnesota River from its confluence with the Mississippi river. The letter "L" or "R" refer to the left or right side of the river facing down river. The large numbers (841 etc.) refer to mileage north of the confluence of the Mississippi and Ohio Rivers.

SEE NEXT PAGE

Fleet Capacities 2003
St. Paul and Savage Harbors

River Mile	Primary Fleet	Design Cap.	Practical Cap.	Notes:
840.5 R	Water Street	15	9	X- MN Harbor Service
840.2 L	High Bridge	21	15	
839.1 R	Robert Street	15	9	
838.4 R	Twin City Fleet	36	27	
838.7 L	Mid America	24	12	
838 L	Warner Road	63	44	
837.7 R	Hanger Fleet	12	9	
837 R	Airport Fleet	45	24	
836.4 R	Dakota Fleet	21	12	
835.6 L	Beltline	27	18	
835.1 L	Valley Line	30	24	
834.6 R	Concord Street	15	9	
834.3 L	Kaposia	39	24	
834 R	S. St. Paul	15	9	
834 L	Packing House	0	0	Fleet not used, out of service
833.8 L	North Star	0	0	Fleet not used, out of service
833.6 L	Red Rock	27	15	
833.3 R	Pigseye West	54	39	
Sub Totals		459	299	
Secondary Fleets				
MN River				
14.0 R	Continental Grain	6	4	
13.7 L	Credit River	22	16	
13.5 L	Cargill Load	20	14	
13.2 R	Cargill MT	28	22	
11.5 R	Kramer	9	6	
11.0 R	Peavey/US Salt	8	6	
Miss River				
843.5 R	River Mouth	0	0	Fleet not used, out of service
841 L	Omaha	12	6	
840.9 L	NSP	0	0	Fleet not used, out of service
840.0 L	Harvest States #1	8	4	
836.0 R	Southport	15	10	
833.3 L	Pigseye East	0	0	Now Hawkins Terminal #3
833.2L	North Star Steel	18	9	
Sub Totals		146	97	
Grand Total		605	396	

Existing Fleets

Currently there are 29 fleets in the harbor, 17 are primary fleets and 12 are intermediate fleets. Total practical capacity of the primary fleets is 353 barges. Total capacity for the intermediate fleets is 150. Primary fleets range in size from 9 to 45 barge spaces, intermediate fleets from 6 to 24. Map 1 shows the locations of the existing fleets in the harbor. Table 1 describes their design and practical capacities. Map 1 also shows the locations of the terminals in the harbor. Close proximity of fleets to terminals is essential for the greatest efficiency. Between 1980 and 1992 the number of fleets increased by six, two of them were intermediate fleets. Even though the number of fleets increased the average size declined by 15%. The average size dropped because certain portions of larger fleets were lost to other land uses and physical changes in the river's configuration. This change in average size causes certain operational difficulties.

Possible Fleet Sites

At the request of the Mississippi River Coordinating Commission (MRCC) towing industry representatives identified possible new fleeting sites. They are shown on Map 2. These proposed sites were identified based on:

- *U.S. Coast Guard and Corps of Engineers navigation safety requirements,*
- *Minimal need for dredging,*
- *Reuse of former fleets lost to rezoning, changes in adjacent land use, etc.*
- *Favorable municipal regulation.*

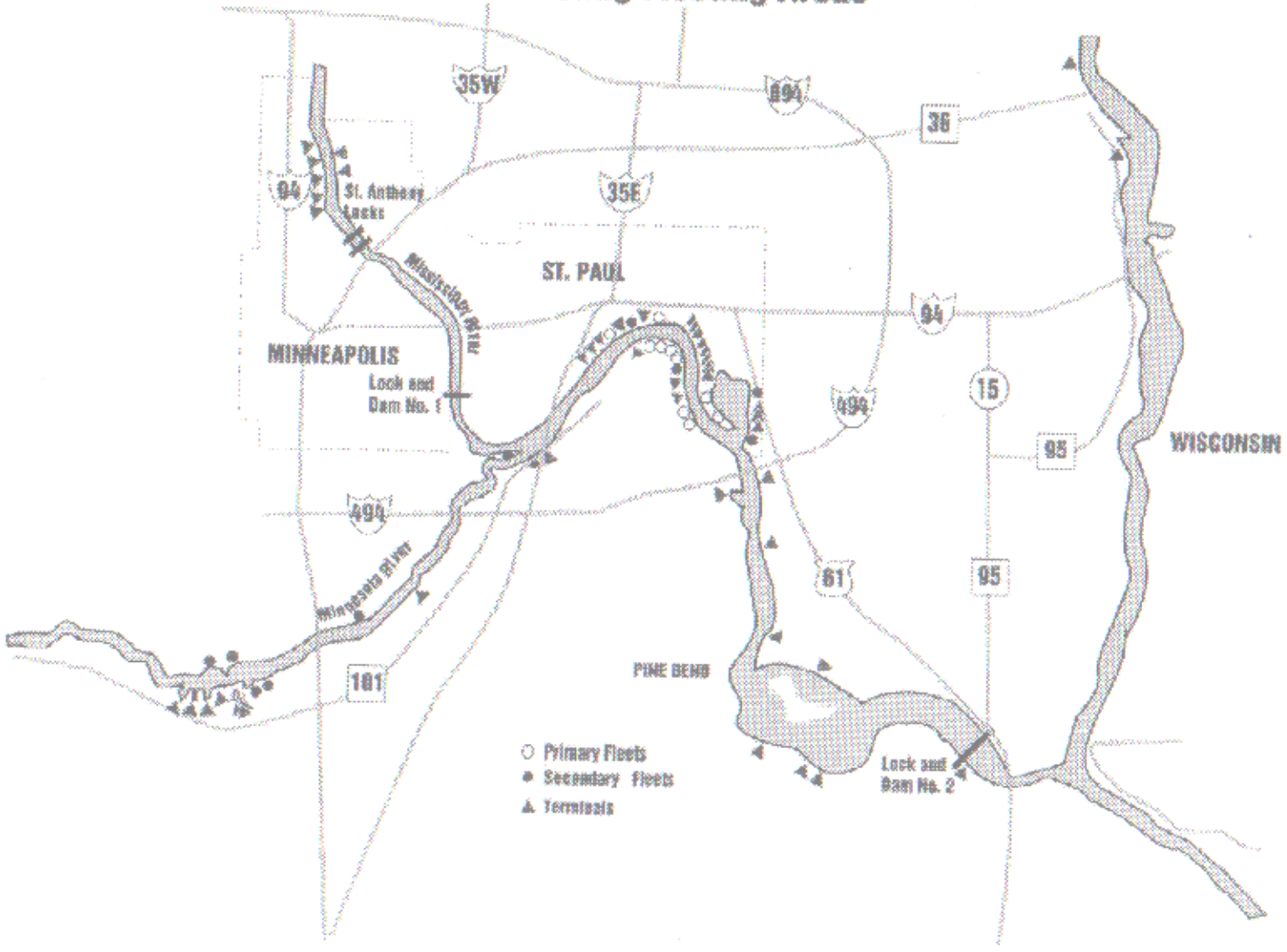
Not all of these identified sites have strong potential for development. Some are adjacent to park land which has been a deterrent. In view of the Metropolitan Council-Environmental Quality Board 1983 study findings that *"By incorporating fleeting into a park's activities, fleeting may have a positive impact."*; perhaps there is cause to review regulations on this issue.

The potential sites identified for the MRCC do not necessarily include all of the possibilities in the harbor. They are, however, the most probable sites for future development.

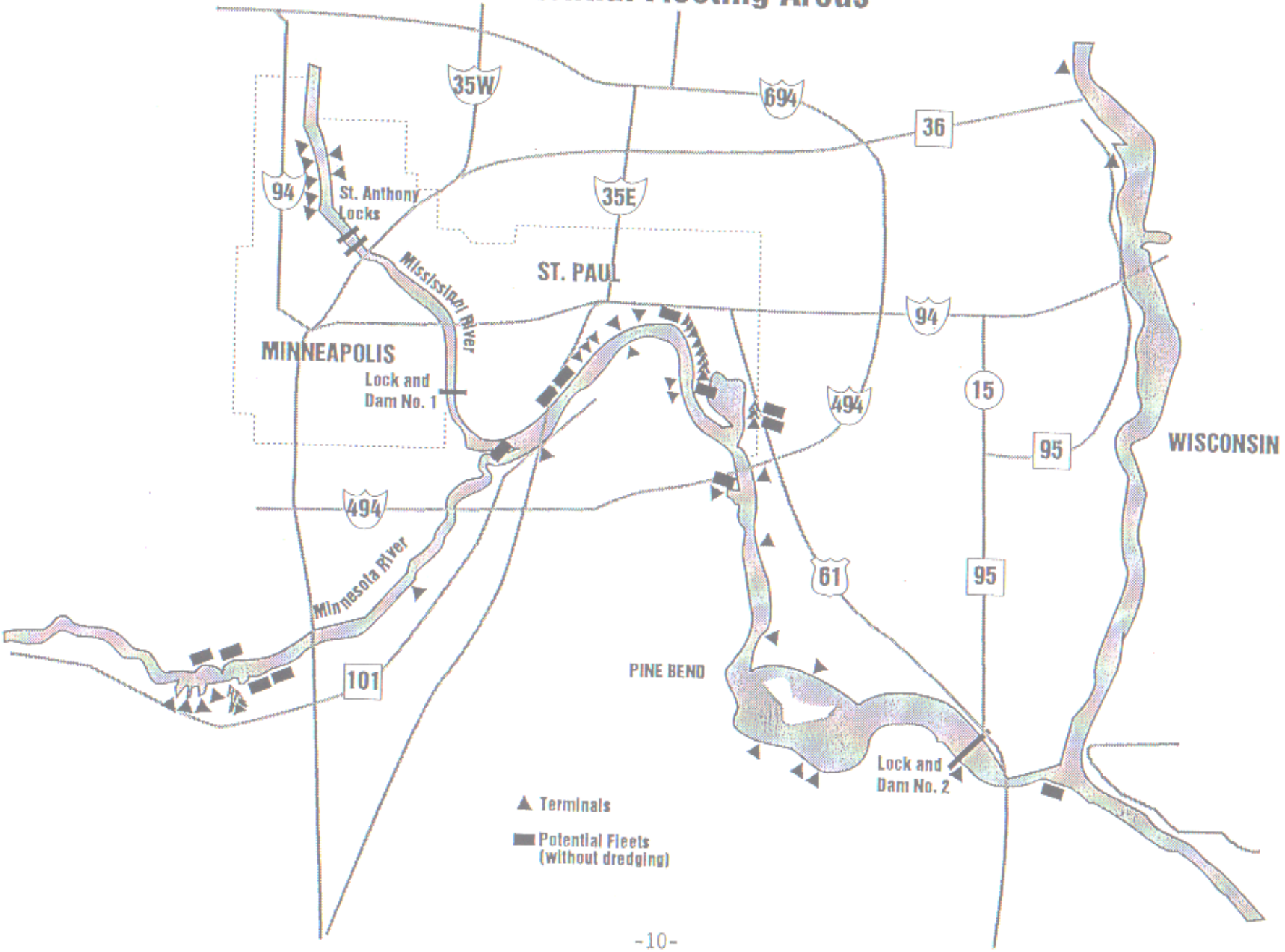
Growth In Use

Use of the fleets generally reflects the relative strength of the agricultural market. Grain exports make up nearly 90% of the downbound cargo from the harbor. For the last twenty-five years grain shipments from harbor terminals have averaged 7% of the annual total of national grain exports.

Map 1
Existing Fleeting Areas



Map 2
Potential Fleeting Areas



Planners and government administrators must take that need into consideration when making land use planning and zoning decisions. They must recognize the importance of the barge and towing industry to the economy of the state and region. The impacts of the towing industry's services extend well beyond the banks of the river. The agricultural community as far away as central South Dakota, electricity producers throughout the area, and users of petroleum products all rely on it for safe economical transportation. The fact that barge movements are the most environmentally friendly mode of transportation must also be weighed in their decision making processes.

In 1983 and 1984 over 19 million and 20 million tons respectively, were moved into, in, and out of harbor. Grain volumes were 13.2 and 10.1 million tons for the two years. In both of the years there were periods when fleets were at capacity and barges had to be parked alongside of the fleets. There also were brief periods during those two seasons when space was available. Fleets are much like railroad switching yards appearing to not be fully used on occasion yet stretched to their limits most of the time.

Future fleeting growth needs will be directly related to growth in waterborne cargo volumes. In the last decade four studies have been made of riverine traffic. Their projections of cargo growth range from 2.5% to 3.4% a year through the first ten years of the next century. Using even the most conservative of those estimates there is a need for growth in fleeting space in the near future. In 1987 the Metropolitan Council, the St. Paul District of the Corps of Engineers, and the Minnesota Department of Transportation commissioned a study of the economic impacts of barge traffic on the Twin Cities area. That study, done by the firm of Temple, Barker, and Sloane, using an even more conservative approach than previous studies, predicts a definite need for growth in fleeting capacity in the mid 1990's.

Conclusion

Locating suitable sites for fleets is difficult. There are any number of physical, regulatory, and environmental problems to resolve before an area can be used. Added to those concerns are public perceptions of negative impacts which need response.

The current fleeting system will probably be big enough to handle near term increases in cargo volume. There is certain to be a need for expansion of fleeting capacity before the turn of the century.

Minnesota Department of Transportation
Ports and Waterways Section
M. William Newstrand, Director
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