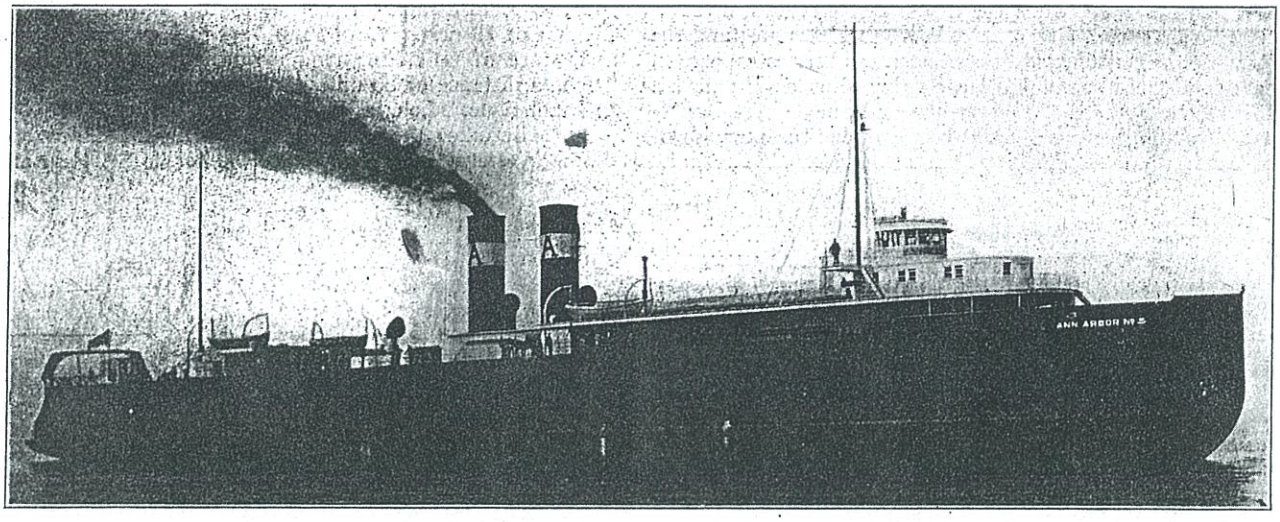
GRAND TRUNK WESTERN RAILWAY DIARY

IV

C. H. RIFF

Ferry

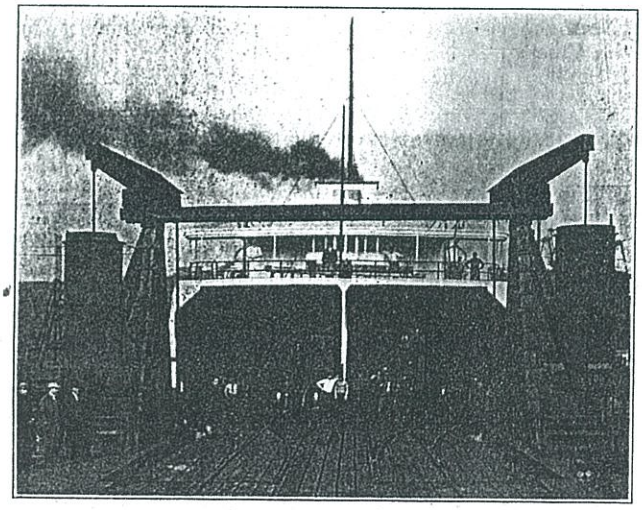


Ann Arbor Ferry No. 5, Largest in the World

Car Ferries Aid Transportation

Traffic between east and west avoids terminals and saves time by crossing Lake Michigan

CAR ferries transported 4,390,854 short tons of revenue freight, exclusive of the deadweight of cars, across Lake Michigan during 1924, or approximately 30 per cent of all the tonnage handled by all ships operating on this lake. This traffic was handled by 15 car ferries, seven of which were operated by the Pere



Rear View of a Car Ferry, Showing Track Layout

Marquette, five by the Ann Arbor and three by the Grand Trunk. The traffic consisted of 200,000 loaded and over 50,000 empty cars. The floating equipment of the three companies has a replacement value of over $10,000,000 and the docks, tracks and auxiliary land equipment a value of approximately $5,000,000.

The ferries have a capacity for handling 1,176 cars daily when the traffic is evenly distributed at all points. These boats are capable of carrying an average of 28 cars and of traveling 5,000 miles per month or better than 166 miles per day, which is equal to 1½ trips each 24 hours. Although the ferries are built primarily to handle freight they are also equipped to accommodate a limited number of passengers, transporting 13,749 passengers during 1924 in spite of the fact that no effort was made to solicit their patronage.

Traffic Handled in 1924

The traffic handled in 1924 aggregated 4,390,854 tons, of which 2,047,207 tons moved eastbound and 2,343,647 tons westbound. The Pere Marquette handled 1,345,191 tons westbound and 868,178 tons eastbound or a total of 2,213,369 tons. The Ann Arbor handled 853,550 tons eastbound and 651,453 tons westbound or a total of 1,505,003 tons. The Grand Trunk handled 347,003 tons westbound and 325,279 tons eastbound or a total of 672,282 tons.

The distribution of traffic between the car ferry ports, as reported to the district engineer in the United States Engineer's office at Milwaukee, Wis., shows that the port of Ludington, Mich., handled the greatest movement in 1924, having shipped 1,345,191 tons and received 868,178 tons. Milwaukee forwarded 770,840 tons and received 1,129,124 tons. Manitowoc, Wis., shipped 683,131 tons and received 770,840 tons. Frankfort, Mich., forwarded 651,453 tons and received 853,550 tons. Grand Haven, Mich., dispatched 347,003 tons and received 325,279 tons. Manistique, Mich., shipped 218,062 tons and received 99,927 tons. Menominee, Wis., sent 239,742 tons and received 188,103 tons. Kewaunee, Wis., shipped 199,918 tons and received 155,653 tons.

A careful calculation of the character of tonnage moved by car ferries is given in the table at the top of the following page.

Car ferries were first placed in operation on Lake

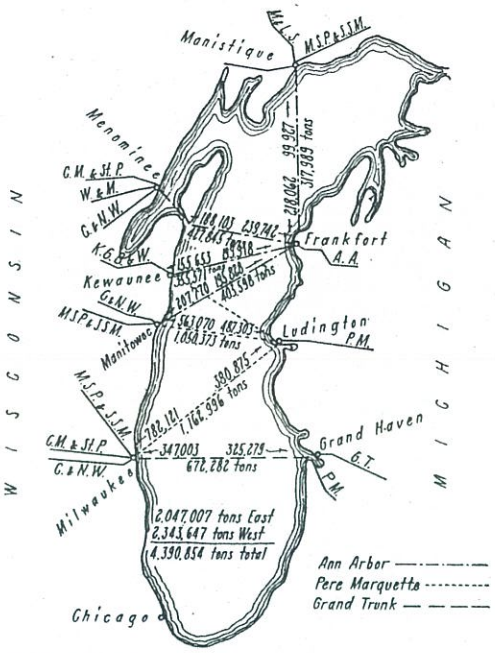
Michigan in 1888, when the Green Bay & Western established a line from Green Bay, Wis., to Kewaunee and the Ann Arbor constructed two wooden car ferries capable of carrying 18 cars and built car ferry slips at Frankfort, Mich. In 1889 the Ann Arbor and the Green Bay & Western jointly leased 1,000 box cars for the purpose of handling lumber and flour between Frankfort, Mich., and Kewaunee. In 1890 the Ann Arbor extended the scope of its operations and established service between Frankfort, Mich., and Menominee, Wis., and between Frankfort and Manitowoc, Wis.

Eastbound	Per cent	Westbound	Per cent
Grain and grain products	20	Coal, all kinds	60
Forest products	32	Iron and steel articles	15
Pig iron and iron ore	10	Automobiles and parts	10
Dairy products	5	Miscellaneous manufactured articles and merchandise	15
Miscellaneous manufactured goods and merchandise	28		
Paper	5		

The Flint & Pere Marquette established its first car ferry service in 1897, when it put into operation a steel car ferry called the "Pere Marquette," between Ludington, Mich., and Manitowoc, Wis. The Chicago & West Michigan and the Detroit, Grand Rapids & Western purchased a car ferry operating on Lake Erie, known as "Shenango No. 1," in 1898 and placed it in operation between Milwaukee, Wis., and Muskegon, Mich. In 1900 the Flint & Pere Marquette, the Chicago & West Michigan and the Detroit, Grand Rapids & Western were consolidated and ferry operations were transferred from Muskegon to Ludington. The Grand Trunk started car ferry operation between Milwaukee and Grand Haven, Mich., in 1906.

The service on these lines has been increased by the addition of new ferries from time to time until at the present time the Pere Marquette operates seven, the Ann Arbor five, and the Grand Trunk three. The Pere Marquette operates from Ludington, Mich., to Milwaukee, Wis., a distance of 100 miles; from Ludington to Manitowoc, Wis., a distance of 62 miles and from Ludington to Kewaunee, a distance of 63 miles. The Grand Trunk operates between Milwaukee, Wis., and Grand Haven, Mich., a distance of 85 miles. The Ann Arbor operates from Frankfort, Mich., to Manitowoc, Wis., a distance of 79 miles; from Frankfort to Kewaunee, Wis., a distance of 60 miles; from Frankfort to Menominee, Mich., a distance of 80 miles, and from Frankfort, Mich., to Manistique, Mich., a distance of 100 miles.

At Milwaukee the ferries connect with the Chicago & North Western, the Chicago, Milwaukee & St. Paul and the Minneapolis, St. Paul & Sault Ste. Marie. At Manitowoc they connect with the Chicago & North Western and the Minneapolis, St. Paul & Sault Ste. Marie. At Kewaunee they connect with the Kewaunee, Green Bay & Western. At Menominee they connect with the Chicago & North Western, the Chicago, Milwaukee & St. Paul and the Wisconsin & Michigan. At Manistique



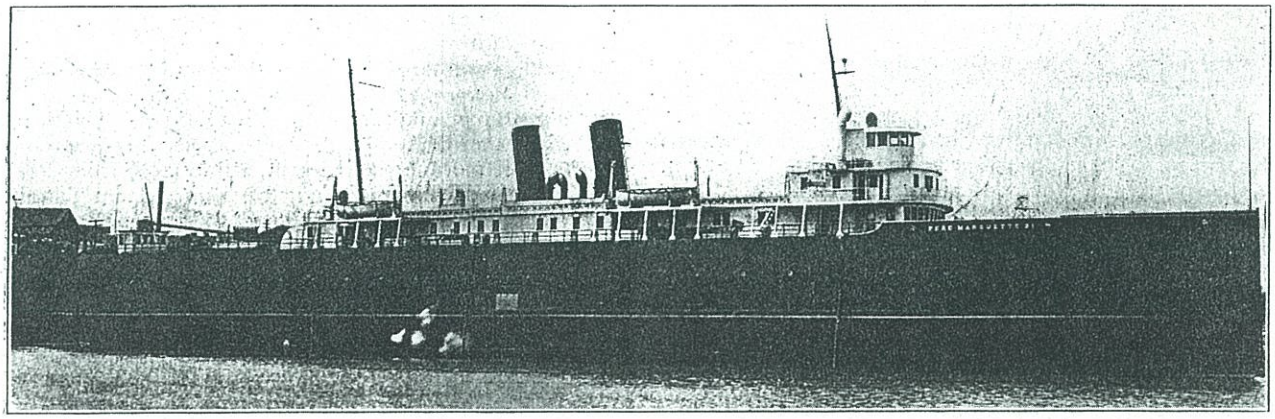
Eight Car Ferry Routes Cross Lake Michigan

COMPARISON OF TRAFFIC IN 1924, 1923, 1922 AND THE AVERAGE TRAFFIC FROM 1915 TO 1919, INCLUSIVE

Harbor		Freight: Short tons shipped	Freight: Short tons received	Total freight S. & R.	Passenger: In	Passenger: Out	Passenger: Total
Ludington, Mich.	1924	1,345,191	868,178	2,213,369	3,358	3,543	6,901
	1923	1,491,764	988,033	2,479,797	2,340	2,328	4,668
	1922	894,747	870,017	1,764,764	1,742	1,621	3,363
	1915–19	777,140	945,103	1,722,243	....	....	....
Milwaukee, Wis.	1924	706,154	1,129,124	1,835,278	2,322	2,162	4,484
	1923	784,267	1,335,338	2,119,605	2,460	2,096	4,556
	1922	751,049	828,381	1,579,430	2,256	2,579	4,835
	1915–19	883,378	529,797	1,213,175	....	....	....
Manitowoc, Wis.	1924	683,131	770,840	1,453,971	3,196	3,116	6,312
	1923	798,018	925,027	1,723,045	2,217	2,637	4,854
	1922	715,220	587,101	1,302,321	1,135	1,083	2,218
	1915–19	751,304	558,565	1,309,869	....	....	....
Frankfort, Mich.	1924	651,453	853,550	1,505,003	2,103	2,320	4,423
	1923	702,178	848,504	1,550,682	3,414	3,056	6,470
	1922	550,646	811,080	1,361,726	2,403	2,131	4,534
	1915–19	398,410	699,988	1,098,398	....	....	....
Grand Haven, Mich.	1924	347,003	325,279	672,282	1,217	1,208	2,425
	1923	512,101	338,661	850,762	1,337	1,471	2,808
	1922	302,283	324,167	626,450	1,199	1,152	2,351
	1915–19	201,242	352,602	526,844	....	....	....
Manistique, Mich.	1924	218,062	99,927	317,989	330	304	634
	1923	240,454	85,562	326,016	631	639	1,270
	1922	220,868	55,759	276,663	448	529	977
	1915–19	251,318	114,386	365,704	....	....	....
Menominee, Mich.	1924	239,742	188,103	427,845	1,085	1,038	2,123
	1923	201,676	209,203	410,879	1,413	1,647	3,060
	1922	191,598	168,254	359,852	980	1,081	2,061
	1915–19	171,841	96,820	268,661	....	....	....
Kewaunee, Wis.	1924	199,918	155,653	355,571	138	58	196
	1923	150,783	150,913	301,696	134	72	206
	1922	126,529	108,145	234,674	85	72	157
	1915–19	112,852	77,224	190,076	....	....	....

they connect with the Manistique & Lake Superior and the Minneapolis, St. Paul & Sault Ste. Marie.

The Ann Arbor and Pere Marquette have been particularly active in the development of the car ferry and its operation. To the Ann Arbor is accredited the construction of the largest car ferry in the world; the method of transferring loaded freight cars from one vessel to another in mid-lake; the lengthening of one of its ferries by inserting a section of 48 ft. in the center; the uniforming of its officers; the construction of wireless land stations, and the handling of tourist automobiles on the various routes across the lake. The Pere Marquette has developed methods for the expeditious loading and unloading of car ferries at the docks through a system of dispatching similar to that on a railway, which enables schedules to be maintained so that the steamers operate at a certain distance apart and each boat is always within a few hours of relief from a sister ship in case of mishap, the dispatching at terminus being done at first by telegraph and more recently by wireless.

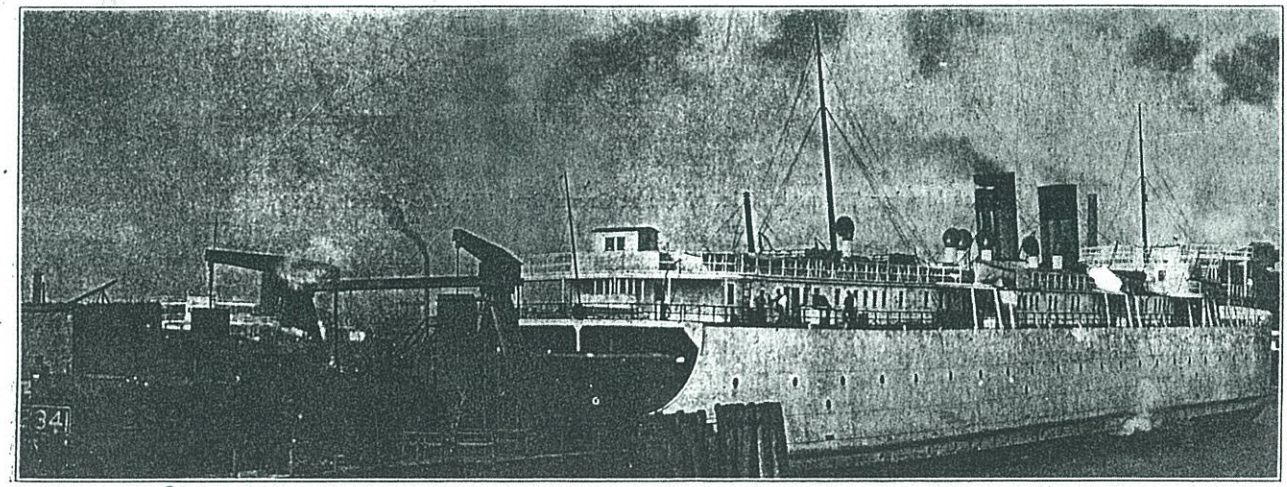


A Pere Marquette Ferry

Advantages Gained by Use of Ferries

Car ferries offer desirable service particularly for carload lots, because of their ability to handle traffic between points west and east of Lake Michigan with less damage on account of switching en route since such shipments avoid the large terminal yards at Chicago, and the interchange at intermediate points which occurs via the all-rail routes. In addition the car ferry routes avoid the congestion which prevails at times in the Chicago terminals. The value of car ferry service is reflected in the report of the United States Army engineers to Congress in March, 1924, in which it was recommended that an appropriation of approximately one million dollars be made for a new harbor at Frankfort, Mich., due to the growing importance of car ferry operation at that port, the tonnage having doubled since 1910.

An example of the advantages of car ferries is shown in the schedule for shipments from St. Paul, Minn., to Detroit, Mich. The shortest all-rail line from St. Paul, Minn., to Detroit, Mich., is 683 miles and freight normally requires 110 hours for movement. The shortest route from St. Paul to Detroit by way of Manitowoc and Ludington is 638 miles, requiring 91 hours and by way of Milwaukee and Grand Haven 613 miles, requiring 96 hours. The time saved is 19 or 14 hours respectively without taking into consideration further possible delays in terminals caused by interchange, classification and inspection.



Loading a Grand Trunk Car Ferry

The time required for cars to pass through the Chicago terminals varies from 12 hours to 96 hours. Such delays are greatly reduced by the use of car ferries since shipments to ferry ports avoid the large terminals.

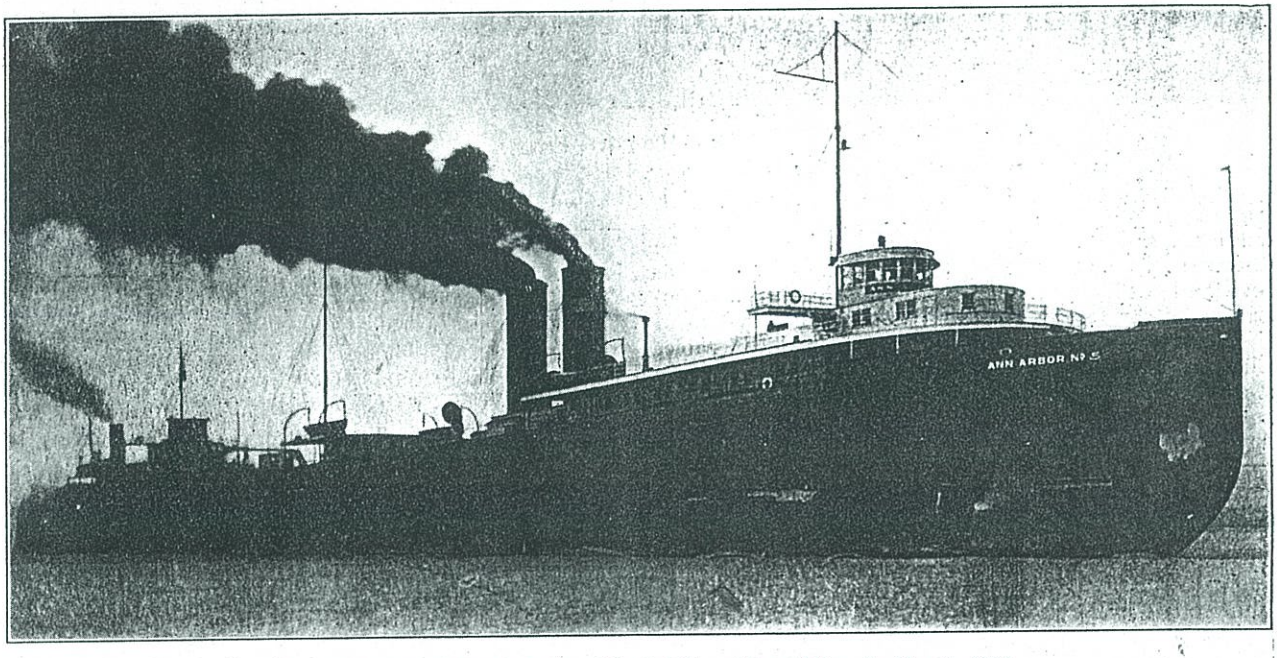
A comparison of distances from points in the North-

west to the East via the ferries and via rail through Chicago is as follows:

	Via car ferry	Via Chicago	Difference
Between Milwaukee and Detroit	275	357	82
Between Milwaukee and Buffalo	484	606	122
Between Milwaukee and Toledo	304	319	15
Between Green Bay and Toledo	373	431	58
Between Green Bay and Detroit	341	469	128
Between Green Bay and Buffalo	566	718	152
Between Twin Cities and Detroit	609	679	70
Between Twin Cities and Buffalo	818	928	110
Between Duluth and Detroit	630	737	107
Between Duluth and Buffalo	855	986	131

Operation of Ferries

Car ferries are operated on Lake Michigan according to schedule throughout the year except when interfered with by ice. The heaviest movement of traffic occurs during the winter months when other lake navigation is suspended. The Ann Arbor which operates across the northerly part of Lake Michigan maintained continuous winter operation successfully to and from the port of Menominee, Mich., during the winter of 1923-24, which involved a movement of 30 miles across Green Bay where ice ranged from 25 to 30 in. in thickness. This is an undertaking which it never before attempted and which it will continue.



Ferries Moving Through 32 in. of Ice at Green Bay, Wisc., in March, 1924

A car ferry costing in excess of $800,000 generally requires no greater expenditure per annum for maintenance than a modern freight locomotive costing from $50,000 to $70,000. The fuel consumption per mile of some of the ferries does not exceed that of a modern freight locomotive. The cost of moving 1,000 gross ton-miles is, therefore, less by car ferries than by rail, while the average miles per car per day via ferry are in excess of those made in rail movement throughout the country.

Typical of the schedules which are in effect, the Grand Trunk ferry leaves Milwaukee at 10 p.m., and arrives in Grand Haven at 5 o'clock the following morning, connecting with a through train which leaves at 8 a.m., and arrives in Durand at 5 p.m., where the train is broken up and connections made with east and westbound through trains. This affords fast freight service eastbound, giving fourth morning delivery in Boston, Mass., and Portland, Me., third morning delivery in New York and Montreal, Que., second morning delivery in Buffalo, N. Y., Toronto, Ont., Toledo, Ohio, and Detroit, Mich. Westbound, a train leaves Detroit at 6.15 p.m. and arrives in Grand Haven at 6 o'clock the following morning, connecting with a boat which leaves at 10 a.m. and arrives in Milwaukee at 5 p.m. the same day. Another through train leaves Detroit at 6.15 p.m. and arrives in Grand Haven at 6 o'clock the following morning, connecting with a boat which leaves at 10 a.m. and arrives in Milwaukee at 5 p.m. the same day. Another train leaves Durand at 12 noon with traffic from New York, Buffalo, Boston, Montreal, Toronto, and other eastern points, and arrives in Grand Haven at 8 p.m. connecting with a boat which leaves at 10 p.m. and arrives in Milwaukee at 5 o'clock the following morning. Westbound service from Boston effects fifth morning delivery in Milwaukee, from Portland, Me., and New York fourth morning, from Toronto third morning and from Toledo second morning.

The Pere Marquette maintains a regular daily through fast service between Suspension Bridge, N. Y., and Milwaukee, Wis., and Manitowoc. Westbound a train leaves Suspension Bridge at 11 a.m. and arrives in Ludington, Mich., at 5.30 the next morning and at Milwaukee and Manitowoc at 6 p.m. the third day, thereby requiring 54 hours elapsed time. Eastbound the train leaves Milwaukee and Manitowoc at 10 p.m., arrives at Ludington at 9.30 the following morning, and at Suspension Bridge at 3 o'clock the second morning. In addition to this service through boats and through trains handle a large volume of dead freight and local business between Michigan and the Northwest.

A fast freight service on the Ann Arbor leaves Toledo at 1 p.m. and arrives at Frankfort at 4 o'clock the following morning. A connecting ferry leaves Frankfort at 5 a.m. and arrives at Menominee at noon, requiring a total of 23 hours. Another ferry leaves Frankfort at 5 a.m. and arrives at Kewaunee at 10 a.m., requiring a total of 21 hours.

An idea of the time consumed in the operation of the ferry may be gained by the log of a Pere Marquette ferry moving between Ludington, Mich., and Manitowoc, Wis.,

picked at random. The ferry arrived at the north slip in the port of Ludington at 10.20 a.m. and lowered its apron at 10.40, at which time a switch engine arrived. The ferry was unloaded at 11.06 and was reloaded at 11.43. At 11.49 the apron was raised and at 11.56 a.m. the ship left the dock with 30 cars. The time consumed at Ludington was 1 hr. and 36 min. After 5 hr. and 16 min. of sailing the boat arrived at the pier at Manitowoc at 5.12 p.m. and lowered the apron at 5.25. Unloading started at 5.40 and was completed at 6 p.m. The ferry was reloaded at 6.32, the apron was raised at 6.38 and the vessel left the dock at 6.44 with 30 cars. The total time at Manitowoc was 1 hr. and 32 min.

The operation of ferries on the Grand Trunk necessitates an organization of 108 employees including the crews on the boats. Captain C. H. Nicholson, manager of the Canada Atlantic Transit Company and the Lake Michigan, Detroit River and Lake Ontario car ferries at Toronto, Ont., is in charge of the equipment. The division superintendent at Durand supervises the ferries between Milwaukee and Grand Haven and J. A. Clancey, superintendent of transportation, Detroit, Mich., supervises the loading of the ships and determines when the boats are to be run on an off schedule. W. L. Mercereau, superintendent of steamships of the Pere Marquette at Ludington, Mich., is in charge of all car ferry operations of that road. On the Ann Arbor R. H. Reynolds, marine superintendent, Frankfort, Mich., has charge of car ferries.

The departure time of ferries is transmitted to the point of destination by the local agent by wire on the Grand Trunk and by radio on the Pere Marquette and Ann Arbor. The car ferries on Lake Michigan operate under the three-watch system with a crew of 47 on standard boats which receives board and lodging free on the boat. The crew on each of the Grand Trunk boats consists of 52 men. The personnel of the Pere Marquette ferries consists of 46 officers and men.

Ferries are Strongly Constructed

The construction of the car ferries is such that it is possible to operate the vessels the year around and they encounter no serious difficulties except in the most severe weather. During the winter months the boats are somewhat hampered by ice but unless the weather is unusually severe the vessels are able to plow through the ice with little difficulty. In order to pass through ice formations several methods are used. One is to run the front of the boat onto the ice and allow the weight of the vessel to crush through. Another is to run the ship backward and allow the propeller to chop the ice. The only ice formation that renders impossible the operation of car ferries is fresh ice which piles up and packs to the bottom of the channel.

The ferries operating on Lake Michigan are steel ships with twin screws, driven by vertical triple expansion engines. The engines have cylinders with diameters of 22 in., 33 in. and 54 in., with 36 in. stroke, developing a total of 3,000 hp. at 92 r.p.m. Steam is supplied by four Scotch marine boilers equipped with forced draft at 185 lb. per square inch. The average speed of all boats is 13 miles per hour, with only three boilers in service, and one in reserve.

These ferries vary in length from 350 to 380 ft. and with a 56 ft. beam and a molded depth of 18 ft. 6 in. to 21 ft. 6 in. to the main deck which extends the full length of the vessel. The car deck is laid with four tracks with a capacity of approximately eight cars on each of the center tracks and seven on each of the wing tracks. After the freight cars are loaded there is room on the stern for 10 or more automobiles. All ferries have on the upper deck a cabin and staterooms furnishing modern accommodations for passengers.

The vessels are divided below the main decks into seven compartments by six water-tight bulkheads, so that in the event of any bottom injury the vessel will remain afloat with any one of the main compartments flooded. The life-saving equipment comprises four 22-ft. life boats and one 30-person life raft. All vessels are equipped with wireless apparatus for receiving and transmitting messages pertaining to the movement of the vessels, and the traffic of the company.

Cars Jacked Up Off Springs

The cars are secured against movement or rocking on trucks by jacks placed under the car sills. The jacks are fastened to rails which are securely riveted to the boat deck on each side of each track. Six jacks are used for each freight car, four at the corners and two at the centers of the side sills. After the six jacks are put under the car sills, the car bodies are jacked up off their springs.

To load, the ferry backs into a slip built especially for the purpose; a shore apron, which is balanced by weight, is lifted or lowered to meet the main deck of the ferry. Upon this bridge are four tracks which connect with the tracks on the ferry. The apron and the stern of the ferry, when in proper position, are securely clamped and the switching on or taking off of cars is done with ease.

Car ferry operation which was started on Lake Michigan has gradually developed until at present there are three lines on Lake Michigan, two on Lake Erie, one on Lake Ontario, several between Key West and Havana, between Germany and Sweden, between England and Holland, and on Lake Baikal, Russia. In 1903 the Russian government built duplicates of the Pere Marquette car ferries to operate across Lake Baikal during the winter months. Previous to this tracks were laid on the ice but during the freezing and breaking up periods traffic was interrupted.

Periodical Physical Examinations on the N. Y. C.

IN connection with the periodical examination—every year, every two years or every three years—of locomotive enginemen and others, for the detection of physical defects, the New York Central has issued a handbook for the guidance of officers and surgeons, setting forth the regulations and requirements which have been prescribed for this work.

(The testing of men for sight, color sense and hearing is not dealt with in this pamphlet.)

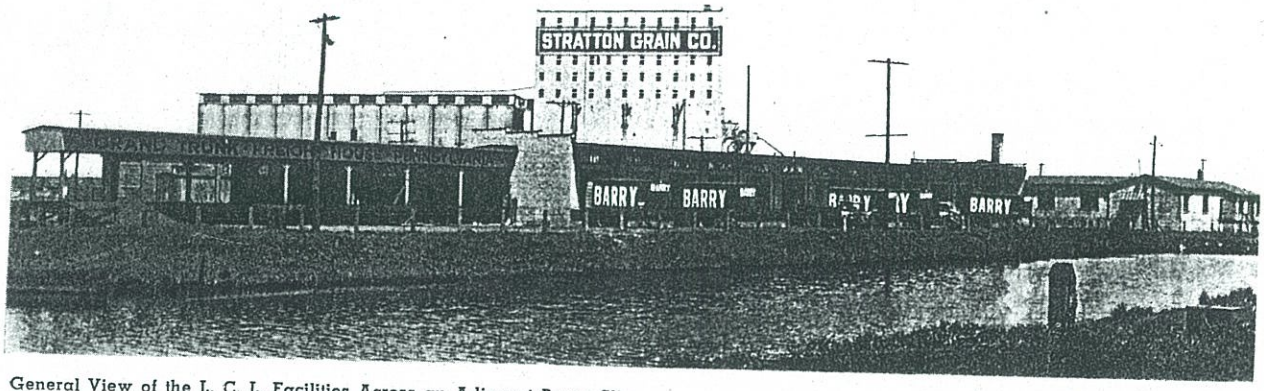
The surgeon makes out a report of each examination of which one copy is sent to the chief surgeon. This report is treated as confidential.

The same regulations have been issued by the general managers of the other roads in the New York Central system. These regulations, which went into effect on August 1, are substantially as follows:

Introduction

In the interest of employees and the public as well as the company, it is deemed best to arrange for a physical examination of certain classes of employees and for re-examinations periodically from time to time.

The purpose of these examinations is to ascertain as accurately as possible the physical condition of the employee. In this way, as has been demonstrated by the work of



General View of the L. C. L. Facilities Across an Adjacent Barge Slip

JUNE 24 1939

Grand Trunk Rebuilds Its L. C. L. Facilities at Milwaukee

Enlarges office and constructs new house and platform to take care of largely increased business

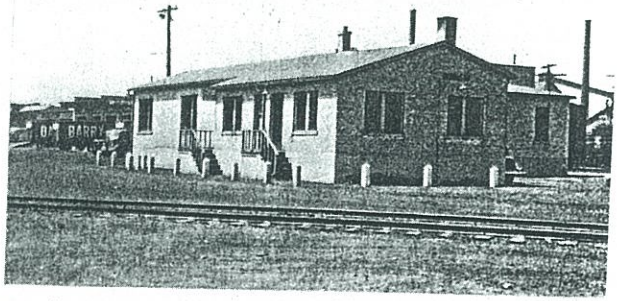
CONFRONTED with the need for larger l. c. l. freight-handling facilities at its station at Milwaukee, Wis., to which both it and the Pennsylvania ferry freight across Lake Michigan from Muskegon on the Michigan side, the Grand Trunk Western recently built a new freight office at Milwaukee, in conjunction with its old small office, and has replaced a former inadequate covered platform with a new freight house 406 ft. long by 32 ft. wide and a new covered platform 105 ft. long. The new building units are strictly utilitarian in character, of substantial construction, and are designed and located to meet the specific class of business handled at this point, which involves a large percentage of storedoor delivery.

Like the old facilities, the new layout is served by two house tracks on one side and a trucking driveway on the other, but in the new arrangement the track capacity is practically doubled and the driveway has been broadened to a minimum width of 70 ft., replacing a cramped driveway that was only 25 ft. wide for about half of its length.

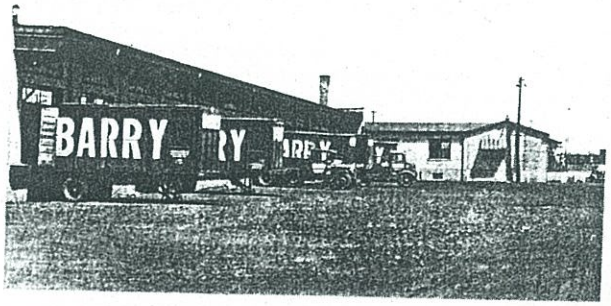
The road's freight facilities at Milwaukee, which are operated jointly with the Pennsylvania, are located on the water front of the Kinnickinnic river, adjacent to the ferry slips of both companies. This location not only minimizes switching between car ferries and the house, but the new arrangement, which provides office space within the enlarged freight house for both the freight agent and his staff and the superintendent of car ferries, permits the closest co-ordination between the local terminal and car ferry operations.

Former Facilities Inadequate

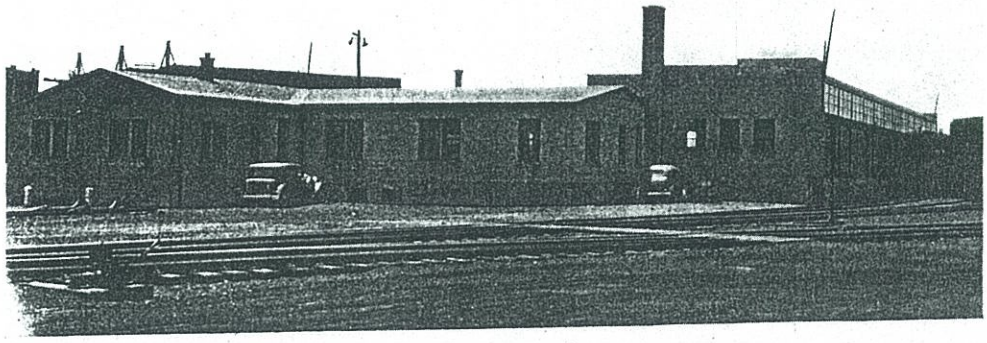
The old facilities at Milwaukee consisted of a one-story brick freight house 72 ft. long by 21 ft. wide, served on its west end by a shed-covered timber platform 165 ft. long by 15 ft. wide. The house proper afforded an office area of only 24 ft. by 30 ft., which was too small under existing conditions, and only approximately 800 sq. ft. of enclosed freight handling area, which was entirely inadequate to take care of the increased business being



This View Shows the Remodeled Old House in the Foreground with the Extensions Both Sides to the Rear



Looking Along the Driveway Side of the New Freight House, Showing the Enlarged Office in the Background



The Track Side of the New Facilities, Showing the Office Extension in the Center and the New Freight House to the Right

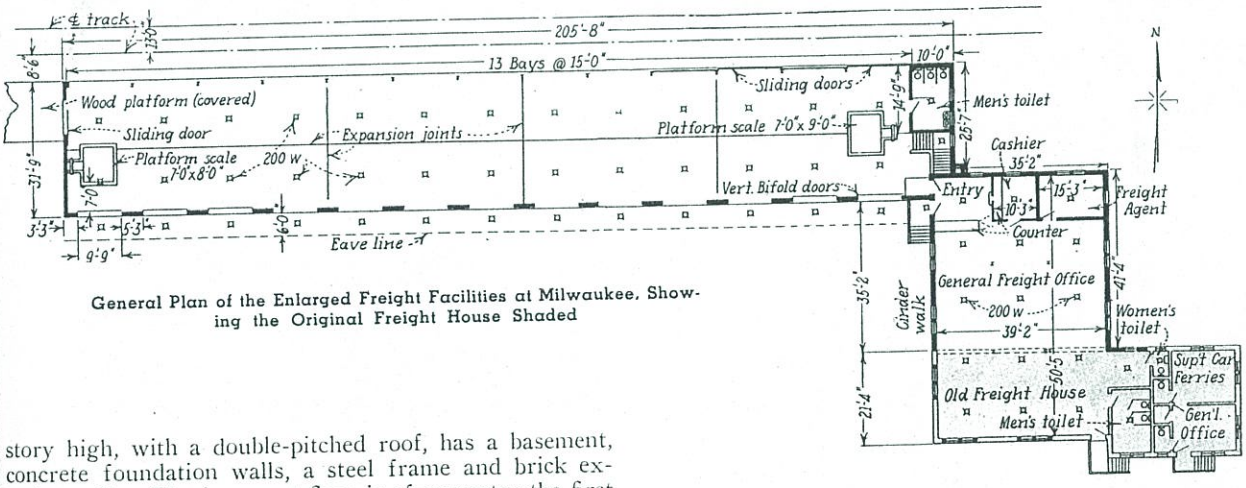
handled. In addition, these facilities afforded insufficient house track space, and were located too close to an adjacent slip to permit truck deliveries and collections without congestion.

In the enlarged facilities, which incorporate the old freight house, these difficulties have been overcome, the office area having been enlarged to 3,060 sq. ft., the freight house area to approximately 5,000 sq. ft., and the driveway area having been widened by removing the old freight platform and locating the new freight house about 50 ft. further back from the slip.

The Enlarged Office and Freight House

In enlarging the freight office area, the old freight house was completely remodeled for office purposes and was cut through on the rear into a new office extension 39 ft. long by 35 ft. wide. The extension, which is one-story high, with a double-pitched roof, has a basement, concrete foundation walls, a steel frame and brick exterior walls. The basement floor is of concrete; the first floor is $1\frac{3}{16}$-in. oak on $\frac{7}{8}$-in. diagonal sub-flooring; and the roof is of $1\frac{1}{4}$-in. dressed and matched sheathing protected by 85-lb. mineral-surface roll roofing. The entire interior of the new office area, walls and ceiling, has a plaster finish on an insulating plaster base, 1-in. board being used over the ceiling and $\frac{1}{2}$-in. board on the side walls, the latter being furred out 1 in. from the face of the brick. All window frames and sash as well as doors in this area are of wood.

The new arrangement provides a large general freight office, an agent's private office, a cashier's area and a customer's vestibule, together with toilet facilities and separate general and private office areas for the superintendent of car ferries. In addition, the basement provides space for a heating plant, a men's locker room, and file storage.



General Plan of the Enlarged Freight Facilities at Milwaukee, Showing the Original Freight House Shaded

The new freight house proper, which connects with the northwest corner of the new office area, extends in an east and west direction parallel with the former open platform, but 50 ft. to the north. This unit, which is 205 ft. 8 in. long by 31 ft. 9 in. wide, is served along its north side by two relocated house tracks, and along its south face by the driveway, permitting direct transfer across its floor between cars and trucks.

The building is one-story high, with concrete foundation walls and footings on timber piles, a concrete floor, 5-in. thick, with a hardened wearing surface, at car floor height, supported on a compacted sand fill between foundation walls, and a structural steel frame supporting a single-pitched roof sloping from the track side toward the trucking side and extending out six feet over the driveway area to afford protection to loading and unloading operations during inclement weather. The roof itself, which is supported on 18-in. by $7\frac{1}{2}$-in., 50-lb. I-beams on 15-ft. centers, consists of 4-in. by 12-in. timber purlins and 2-in. tongue and groove sheathing, covered with 5-ply, built-up roofing, fully flashed with copper flashing.

The wall on the trucking side of the building is of brick construction between a series of thirteen 9-ft. 9-in. door openings, each fitted with frame doors of the vertical bi-folding type. Above the doors, which have windows in their upper sections, the wall area is fitted with large areas of steel sash, which, in turn, are surmounted by a brick parapet and tile coping.

On the track side, the wall is a continuous succession of openings between the roof-supporting columns, which are fitted with solid wood-panel sliding doors arranged in an offset system which permits any part of the wall

Looking Through the Interior of the New Freight House, Showing Some of the Features of Construction

face to be opened to facilitate the loading and unloading of cars. Above the doors, the wall area consists of continuous steel sash, 54-in. deep, which, together with the windows on the trucking side, insure adequate daylighting, even on cloudy days. Artificial lighting throughout the freight house is provided by means of two 200-watt electric ceiling lights in each bay, along with one 100-watt light in each bay beneath the canopy on the trucking side, all of which are set in shallow-bowl enamel reflectors.

The entire freight house floor area is given over to freight handling, and is unobstructed except for two 5- and 6-ton platform scales, one at each end, and a small built-in men's toilet at the east end, together with a stairway down to the basement beneath the new office extension. No heat is provided through the freight house area.

The Covered Platform

The new covered platform, west of and adjoining the west end of the freight house, is designed to provide an increased car set-up at the house, and is used in the same manner as the house proper, primarily for cross trucking between cars and highway trucks on opposite sides. This platform, which is 15 ft. wide and 105 ft. long, is of frame construction throughout, and of more or less typical design, with timber deck bents, 3-in. by 12-in. plank flooring, and a double-pitched roof supported by two lines of timber posts. The shelter posts, which are spaced at 15-ft. intervals longitudinally along the platform, are located along the edge of the platform on the trucking side, but are set back 3 ft. on the track side to minimize interference with the handling of shipments to and from cars.

Like the house proper, the platform is equipped for adequate night illumination, being fitted with 100-watt roof lights at 15-ft. intervals, and in addition, with waterproof electric lighting outlets at each post on the track side to permit extension-cord lighting within cars. In addition to this direct lighting of the facilities, 1500-watt floodlights are mounted at each end of the freight-handling layout on the driveway side, to facilitate and increase the safety of night operations.

The enlarged facilities at Milwaukee were constructed under the direction of P. D. Fitzpatrick, until recently chief engineer of the Grand Trunk Western, and now general manager, and under the immediate supervision of A. N. Laird, bridge engineer.

The R. F. C.'s Cassius Clay Prescribes for Railroads

"Speaking plainly, the country is suffering from a surplus of transportation facilities. Partial relief can be afforded by the abandonment of mileage, and of whole lines, that have ceased to earn their own way. . . .

"Though the unions are regarded by the public as stubbornly opposed to consolidations, it may well be that the fears of labor can be more readily met, than the fears of some of the managements. . . .

"Permitting single companies, in interstate commerce, to engage in a general transportation business, on condition that they take out a federal charter, would both hasten the co-ordination . . . of competing methods of transportation, and, at the same time, simplify the problem of effective regulation. . . .

"The insurance companies and savings banks, which, with the endowed educational institutions and foundations, held (on the basis of 1936 figures) nearly 56 per cent of the funded debt of the railroads, up to now have been reluctant to assume the responsibilities of management. . . .

"Labor, also politically influential, is likewise inclined to put first immediate ends, because its leaders, who know what is wanted by the rank and file, are under compulsion to get it by pressure methods, at the risk of being displaced. . . .

"The railroads not only need more business—they need relief from archaic capital structures. . . . A simplification of capital structures, with an emphasis, in reorganization procedure, upon providing an adequate medium for necessary new financing, with a realistic revision of obsolete debt structures, would seem called for. . . .

"There is need for less competition between railroads, in order that the railroads can compete more effectively with their new rivals. . . .

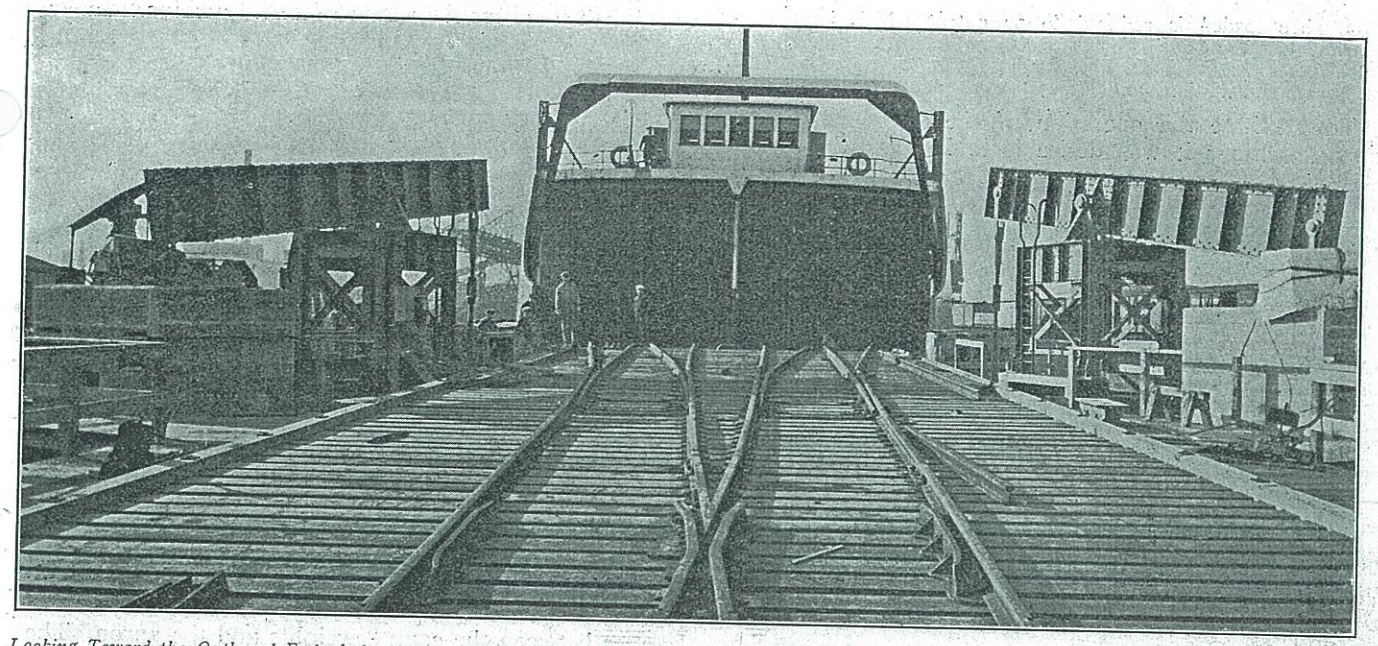
"To bring back business to the rails, there is need of more experimentation in the matter of rates. . . .

"Though our investment in highways, pipelines and improved waterways is now larger than the total capitalization of all the railroads, our transportation system, without the railroads, could not be made to bear anything like the whole volume of passenger and freight traffic without breaking down under the strain. . . .

"Government ownership of railroads is not a solution, unless we are prepared likewise for the eventual government ownership of competing forms of transportation. . . .

"There is an urgent need, if the railroads are to continue as the keystone of our prevailing price-and-profit system, that the ability of the railroads to finance themselves be restored. To do this, costs of operation must be lowered. . . ."

Excerpts from "What Shall We Do About the Railroads?", by Cassius M. Clay, Published by Ransdell, Inc., Washington, D. C.



Looking Toward the Outboard End of the Apron with the Stern of One of the Car Ferries in the Background—Note the Lever Girders and Counterweights at Each Side

Grand Trunk Western Builds Flexible Apron for Ferry Slip

Ingenious design adopted at Milwaukee permits warping of steel frame without injury

THE Grand Trunk Western has extended its facilities at Milwaukee, Wis., to provide for the handling of two additional car ferries to supplement its line of car ferries operating between Milwaukee and Grand Haven, Mich. The new ferries are somewhat larger than those now in service and are capable of handling more tonnage. To facilitate the handling of cars to and from the ferries at Milwaukee a new slip with a loading apron has been constructed adjacent to the present slip.

The older steel loading aprons in use at the various points on the system, where car ferries are operated, are adjustable for differences of elevation but are of rigid steel construction with timber decks. Considerable difficulty has been experienced in maintaining this type of apron due to the high stresses occasioned by the tilting of the ferries from side to side during the loading and unloading operations. At one point the main cross girder which carries the dead load of the outer end of the apron to the supporting counterweight beams was found to be badly buckled and a number of the rivets sheared. At the time this occurred it was believed that these conditions could be prevented by a more rigid and heavier cross girder construction to replace the damaged one, and repairs were made in this manner. However, after a period of seven years, it is evident that this design has not given a satisfactory solution.

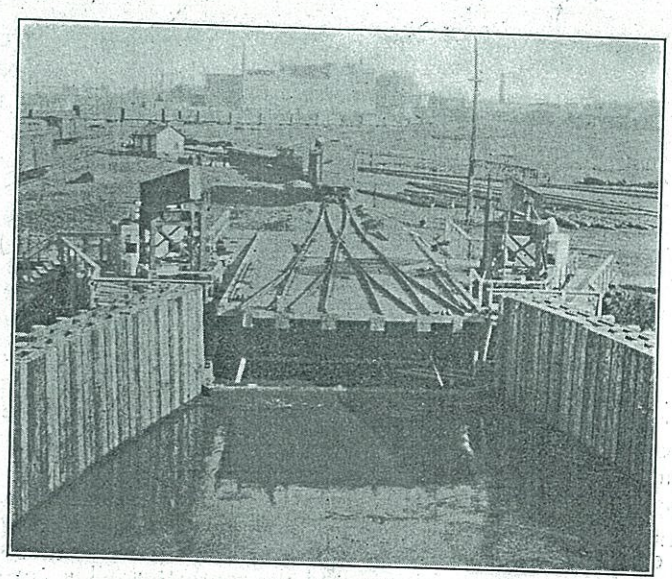
Adopt Flexible Design

The problem was then approached from a different viewpoint and it was decided to provide a structural steel apron with the usual type of timber deck, but which would be flexible and which would warp freely to conform to the position of the stern of the ferry during the loading and unloading operation. On investigating the conditions to be encountered it was found that:

1—There would be a difference in elevation between the position of the stern seat of the ferries, light and loaded, amounting to six feet.

2—There would be a tilting of the plane of the stern seat during the loading and unloading operation of about three degrees from the horizontal. This caused a difference of elevation of one foot between the two sides of the apron at the ferry end.

3—The elevation of the base of rail of the ferry above water

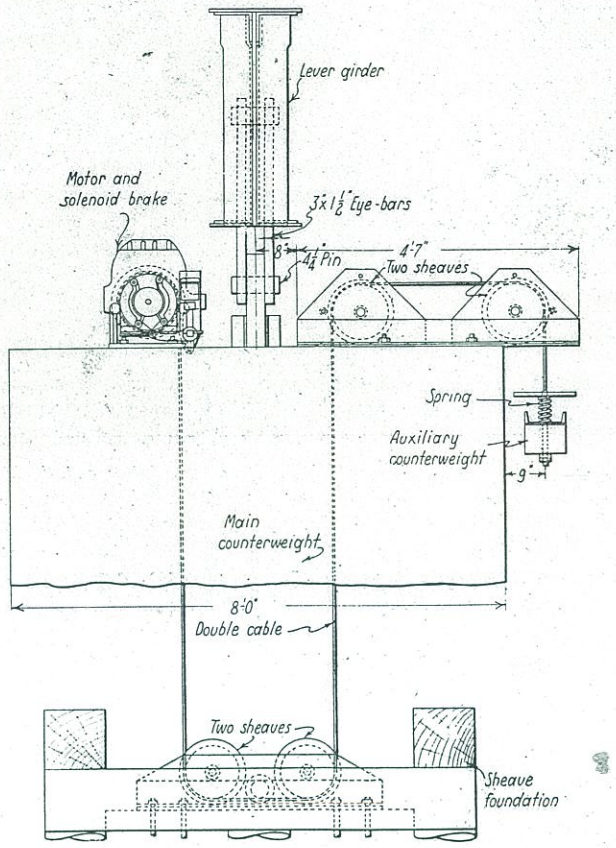


The Ferry Apron as Seen from the Slip

level when loaded is reduced to an extent which imposes a restriction on the depth of structural members of the steel apron.

4—There is a frequent variation in water level due to wind and weather conditions amounting to one foot.

To facilitate the operation of the apron in its extreme positions it was desirable to increase the length



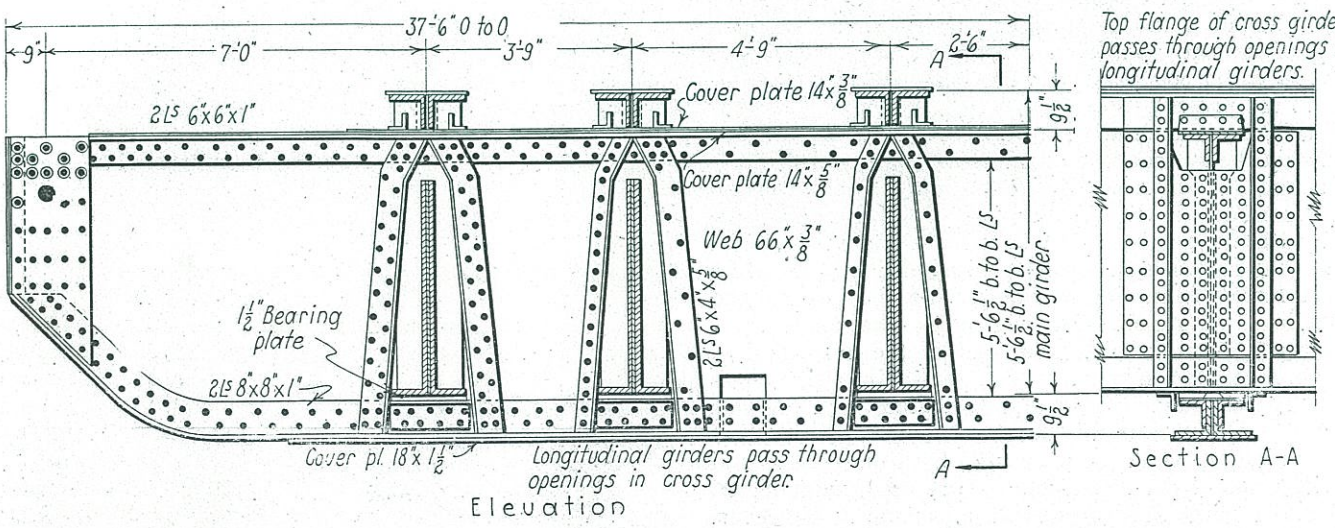
Arrangement of Main and Auxiliary Counterweights

over that of the older aprons, and 75 ft. was adopted as the overall length. The general arrangement consists of six longitudinal deck girders supported at the heel or shore end by large steel castings and phosphor bronze trunnion bearings, and at a point near the ferry end by a cross girder designed to support the dead load of the apron and connecting with a system of lever beams and counterweights to provide for the adjustment for elevation as indicated on one of the drawings. In order that the longitudinal girders might be free to move vertically with respect to each other with the ends resting on the stern of the ferry without introducing distortion stresses in the frame work, no cross frames were installed between longitudinal girders but top and bottom lateral systems were provided with pin connections to the girders, thereby maintaining the girder members parallel without restricting the vertical movement.

The cross girder was designed as a truss with solid web members, the upper chord passing through the openings in the main longitudinal girders while the bottom chord is provided with special bearing shoes to receive the load from the longitudinal girders. Stop blocks were provided to prevent an excessive movement of the cross girder, there being no rigid connection between this and the main girders.

Lever girders supported on steel towers erected on each side of the apron, as shown in one of the photographs, provide the means of transferring the load carried by the cross girder to concrete counterweights. Each of these counterweights is provided with holes to receive pieces of scrap rail as required to adjust the balance between the counterweights and the apron. The operation of the apron is controlled by a double set of standard single-drum electric hoists, each wound with double cable. These hoists are mounted directly on the counterweights and the cables are reeved over double sets of sheaves to a small tension counterweight with a spring shock absorber suspended at one side.

The hoists are wired for remote control at a point near the ferry end of the apron. The sequence in the operation of the apron is as follows: (1) When the apron is not in use it is held in a raised position by solenoid brakes built into the motor hoist; (2) when the ferry enters the slip the motor is reversed, which permits the apron to lower automatically until the end rests on the stern seat of the ferry; (3) the motor continues in reverse motion until a pre-determined amount of slack is provided in the cable. This is taken up by the auxiliary counterweight which maintains a normal tension and prevents the cables from jumping off the sheaves. A built-in limit switch automatically cuts off the current



Design of the Coast Girder

when the right amount of slack has been paid out. The apron rests on the stern of the ferry as the ferry tilts without straining any portion of the structure or mechanism. A connection is maintained between the ferry and the apron by means of a special latch which con-