MANITOWOC BEACH LAND USE AND UTILITY STUDY
TOWN OF TWO RIVERS, WI

MAR 1978

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INFORMATION
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MANITOWOC BEACH LAND USE AND UTILITY STUDY

Town of Two Rivers, Wisconsin

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MANITOWOC BEACH CITIZEN'S COMMITTEE

Engineering Consultant: Brey, Stuewe and Braun
Planning Consultant: Gary L. Peterson & Associates

March, 1978

Financial assistance for the preparation of this report has been provided through the Wisconsin Coastal Management Program by the Coastal Zone Management Act of 1972, administered by the federal office of Coastal Zone Management, National Oceanic and Atmospheric Administration.

Wisconsin Coastal Zone Management Program
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List of Officials

Town Officers

Ray Taddy, Town Chairman
James Englebert, Supervisor
Henry Meyer, Supervisor
Roger Tess, Assessor
Janet Haws, Clerk

Manitowoc Beach Citizen's Committee

Executive Committee

Oliver Larsen, Co-chairman
Nils Becker, Co-chairman
Jerry Jerikowic
Bill Peterson
Harold Barbeau
Lawrence Mason
Ernest Swoboda
Don Welnetz, Secretary

Members

Paul VanZon
Marvin Ruelle
Don Mahlberg
Dan Kaderabek
Lesli Peterson
J.E. Urbanek
Gordon Radandt, Sr.
Jacob Schlotthauer
Rosemary Wrobel
James Danforth
Emma Schlotthauer
Clara Meyer
Walter Klein
A.A. Mir
Willard Erdman
Ollie Larsen
Leroy Reindl
Mary Royer
Mrs. Wilbert Koch
Eleanore Mir
Norman Luebke
Peter Bartel
Harold Homeyer
Mrs. Norman Luebke
Mrs. Lawrence Vanne
Bernard Brouchoud
John R. Jaehnig
Wilbert H. Koch

County Planning Staff

Jerry Kirchner, Director
David M. Sprehn, Senior Planner

Engineering Consultant

Brey, Steuwe and Braun

Planning Consultant

Gary L. Peterson and Associates

DESCRIPTION OF THE AREA

The Manitowoc Beach Study Area begins at a point that is at the center of the Chicago and Northwestern Railroad right-of-way and Town Line Road, otherwise known as Woodland Drive. From that point the boundary goes south on the center line of Woodland Drive which corresponds to the boundary line of sections 9 and 10 and sections 5 and 16 crossing Memorial Drive and intersecting Lake Michigan, a distance of about 2,050 feet. Then the boundary goes in a northeasterly direction along the Lake Shore of Lake Michigan to the Two Rivers city limits which corresponds with the eastern line of section 10, a distance of approximately 6,150 feet. Then the boundary goes north along the City of Two Rivers city limits which is also the center line of both Lohman Road and the eastern boundary of section 10 to a point that is the center line of the Chicago and Northwestern Railroad right-of-way, a distance of about 750 feet. Then the boundary goes in a southwesternly direction along the center of the Chicago and Northwestern right-of-way to the point of beginning, a distance of about 5,600 feet.

LAND USE

Survey and Analysis

A land use survey was conducted of the Manitowoc Beach area in November, 1977. This survey was to determine how the land is used. On some occasions the land use boundaries correspond to property boundaries, but in other instances they do not. The results of this survey are shown on Table 1 and on Map 1.

As Table 1 indicates, close to 2/3 of the developed land is in residential use. Most of this is in single family houses with only a few mobile homes. The Erdman Automobile Dealership accounts for most of the retail space and is a significant land use occupying more than 10% of the developed land. It is interesting to note that only about 20% of the area is occupied by streets, which is a low percentage. Normally an area developed in urban uses would be about 30% streets. This indicates that the residential and commercial uses which exist make efficient use of the streets. In the case of Manitowoc Beach this efficiency reflects the small lot problem, but has the advantage that small lots are the most economical to serve with public utilities. These small lots have partially created the water and sewer problems which themselves do not show up on the land use survey. However, these problems are well documented elsewhere.

Table 1

EXISTING LAND USE
(Excluding Lakeshore Land)

	Acres	Percent Developed	Percent Vacant
Single Family Residential	30.84	60.8	24.4
Mobile Home Residential	1.13	2.3	.8
Wholesale and Storage	.57	1.1	.4
Retail Store	8.45	16.7	6.5
Streets	9.70	19.1	7.5
Total Developed Land	50.69	100.0	39.6
Vacant Land	77.35		60.4
Total Land	128.04		100.0

Density - 128 units on 31.97 acres = 4 units per acre.

Source: Consultant Survey - November, 1977

The land use survey focused on the area north of Woodland Drive, south of the Two Rivers city limits, and between Chicago and Northwestern Railroad tracks and Memorial Drive. Within this area 60% of the land is still vacant which indicates that there is much area for future development of a yet undetermined type.

The Existing Land Use Map, Map 1, shows that there are three large vacant areas. One is at each end of the area and the third is between West and East Streets and backs up to the railroad tracks. In addition, there are scattered vacant parcels through out. The commercial properties all front on Memorial Drive while the wholesale business is on West Street at the railroad tracks. The residential property is mostly located on the numerous dead end streets from West Street to the east.

EXISTING LAND USE
Manitowoc Beach

Planning consultant:
Gary L. Peterson & Associates

Source: Consultant Survey
November 1977

Financial assistance for the preparation of this map has been provided through the Wisconsin Coastal Management Program by the Coastal Zone Management Act of 1972, administered by the federal office of Coastal Zone Management, National Oceanic and Atmospheric Administration.

Density

The density of housing units as shown on Table 1 is four units per acre. This calculates to an average of less than 11,000 square feet per lot. For an area that is unsewered this is exceedingly small, but for an area that is considering installing public utilities it is an efficient average lot size. As indicated from the term 'average', some of these lots would be larger while others are smaller. Some of the smaller lots although efficient to be provided with utilities, may be too small to provide the privacy and other living space normally associated with a single residential unit.

Types of Commercial Uses

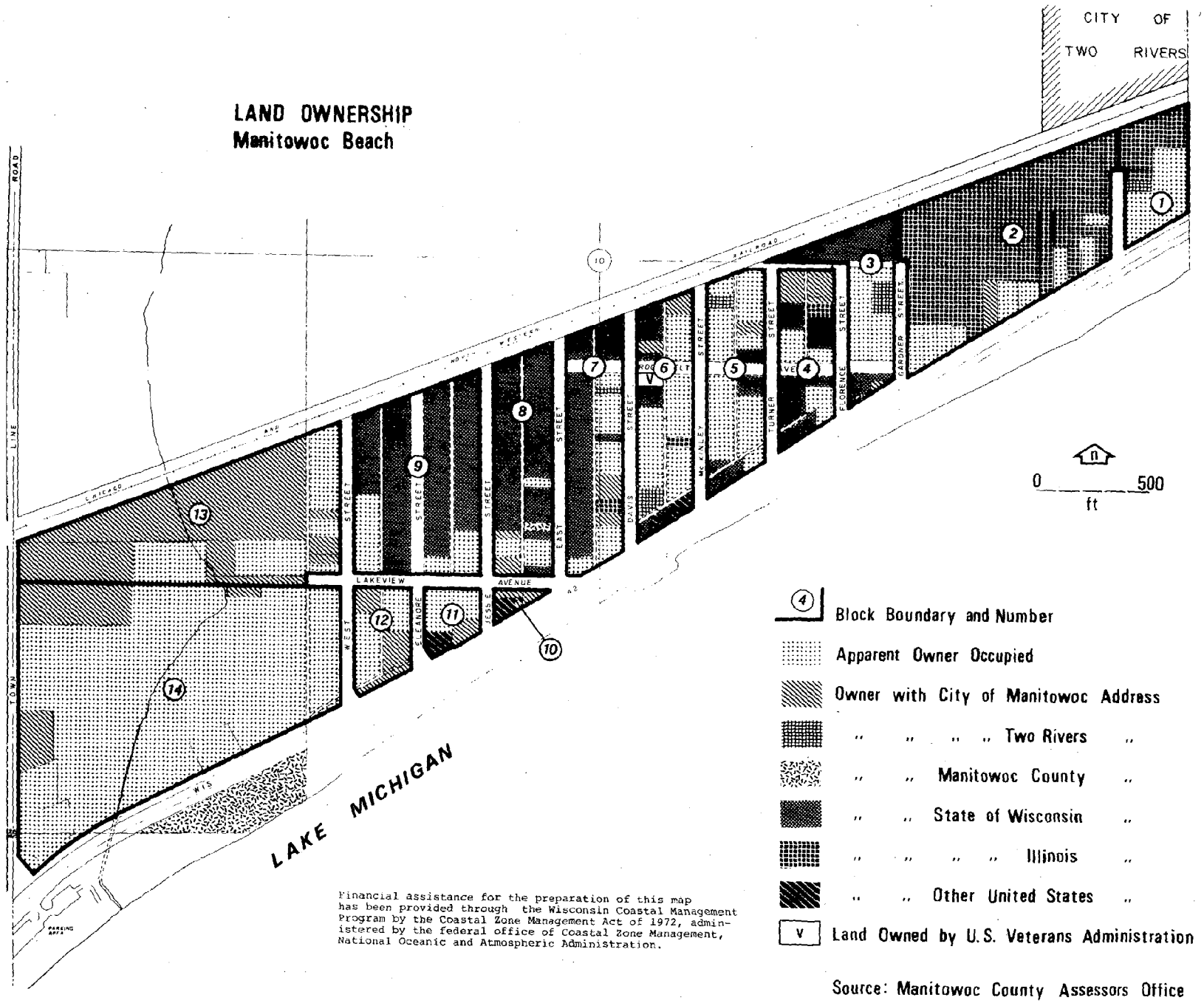
Presently there are four commercial uses within the Manitowoc Beach area. These include the Erdman Auto Dealership, and three taverns: Lenny's, Cedar Lodge and the Beach Club. The auto dealer takes up more than 7 of the 8½ acres that are utilized for retail land use. It is important to note that there are only four retail land uses and only two types retail land use. It is worth noting that there are no retail stores, such as a grocery store or a dry goods store, and there are no restaurants or service stations.

The land which contains the billboards would for the purposes of this survey not be considered as commercial land use and the beer distributor is considered wholesale-industry rather than a retail use.

PROPERTY OWNERSHIP

Property ownership records as provided by the County Assessor's Office were reviewed for the address of the property owner. Map 2 indicates the location of these property owners. The area of most single family residential units, principally along West Street, Lake View Avenue, Davis Street, McKinley Street, Turner Street, Florence Street and Lohman Street, show land that is apparently owned by the occupant. Erdman Motors and some of the residential parcels along Memorial Drive also are shown as being owner occupied. Within this same area scattered parcels are shown to be owned by a person or persons with an address in either Manitowoc or Two Rivers. It is assumed that these are renter occupied dwellings. Several large parcels of land on Woodland Drive and adjacent to the Chicago and Northwestern Railroad tracks have an owner with an address of Manitowoc. Another large parcel located in the northeast corner of the project is owned by an estate with an address in Illinois. A third large area generally located east of West Street, north of Lake View Avenue and east of East Street, is owned principally by a person with an address in the Milwaukee area. These three large

LAND OWNERSHIP
Manitowoc Beach



Financial assistance for the preparation of this map has been provided through the Wisconsin Coastal Management Program by the Coastal Zone Management Act of 1972, administered by the federal office of Coastal Zone Management, National Oceanic and Atmospheric Administration.

- (4) Block Boundary and Number
- Apparent Owner Occupied
- Owner with City of Manitowoc Address
- " " " " Two Rivers "
- " " Manitowoc County "
- " " State of Wisconsin "
- " " " " Illinois "
- " " Other United States "
- V Land Owned by U.S. Veterans Administration

Source: Manitowoc County Assessors Office

vacant parcels constitute most of the 77 acres of vacant land within the project area and therefore are being controlled by absentee ownership. There are also four parcels along Memorial Drive which are owned by people with addresses in other areas of the country.

BUILDING CONDITIONS

A survey was conducted of each housing unit in the Manitowoc Beach area. Based on an exterior survey four elements of each house were observed, these included: the foundation; the exterior walls; the roof; and the windows and porches, as one unit. These four elements were graded as follows: satisfactory; with problems, which meant some repair was needed; and, unsatisfactory, which meant major repairs or a condition beyond repair was observed. Each unit was then summarized into a final category as follows:

Standard - All four elements rated as satisfactory;

Dilapidated - The unit had from one to four elements listed as a problem;

Deteriorated - The unit had one element rated as unsatisfactory;

Substandard - The unit had two or more elements as unsatisfactory or it was abandon.

This information was then summarized in Table 2 by blocks, block boundaries are shown on Map 2.

As indicated on Table 2, 51 of the 128 units were listed as standard, although they may have interior elements that would not generally meet accepted codes. Sixty two of the 128 units are definitely in need of some type of rehabilitation and at least 15 units may require demolition and/or removal.

SOIL SUITABILITY AND DEPTH TO GROUND WATER

The U.S. Department of Agriculture has conducted soil surveys for much of the United States. The primary reason for collecting this information is for agricultural purposes, but information gathered can be used for providing guidelines on suitability of urban type developments on land. These suitabilities are of a general nature and for any specific siting an on-site soil analysis is required, but in general terms these suitabilities are an indication of what will be found. The area occupied by most of the houses in Manitowoc Beach, is of a Tedrow Soil, which is a somewhat poorly drained, sandy soil. The frontage along Memorial Drive north of Turner Street is located on a Oakville Soil, which is a

Table 2

BUILDING CONDITIONS

Block Number	Total	Standard	Dilapidated	Deteriorated	Substandard
1	13	3	4	1	5
2	5	3	2	0	0
3	6	2	3	1	0
4	6	1	3	2	0
5	14	7	3	2	2
6	14	5	3	3	3
7	10	3	4	2	1
8	7	3	1	1	2
9	8	4	4	0	0
10	3	0	3	0	0
11	6	3	3	0	0
12	12	5	4	3	0
13	11	4	3	2	2
14	13	8	5	0	0
	128	51	45	17	15*

*13 of these are uninhabitated and/or abandon.

Standard - Exterior Satisfactory; May need interior Rehabilitation.

Dilapidated - In need of Rehabilitation.

Deteriorated - In need of significant Rehabilitation or possibly Clearance.

Substandard - In need of Clearance.

Source: Survey Conducted by Gary L. Peterson, November 1977

well to moderately well drained sandy soil. The area between West Street and the north project limits, which is generally heavily wooded, is located on a Gramby Soil, which is a sandy soil described as poorly and very poorly drained with rapid permeability. A large wooded area along Woodland Drive is on a Keowns Soil, which is a poorly drained loamy soil. The area generally occupied by Erdman Motors is a Manawa Soil, which is a somewhat poorly drained soil.

The following is a summary of the soil suitability and depth to ground water:

Soil Series	Depth to Water Table	Septic Tank	Dwellings with Basements	Dwellings without Basements
Tedrow	1-3 ft.	severe	severe	moderate
Oakville	3 ft. & more	moderate	moderate	slight
Gramby	0-1 ft.	very severe	very severe	severe
Keowns	0-1 ft.	very severe	very severe	severe
Manawa	1-3 ft.	very severe	severe	severe

PROBLEM IDENTIFICATION

As Identified by Beach Citizens	Consultant Comments
(Problems are identified in order of importance as identified by Manitowoc Beach Citizens.)	
1. Lack of well water that is drinkable.	The major objective of our program is to correct this situation.
2. Lack of sanitary sewer system in that private disposal systems do not work the way they should or do not exist.	Another major reason for working on this program.
3. Need for housing rehabilitation	The Community Development Program is well designed to help in meeting this need.
4. Uninhabited houses and mobile homes.	The Town Board has initiated action to assist with this plus the Community Development Program can assist in the funding of this effort along with the establishment of the Community Development Authority.
5. Storm water does not drain properly.	Apparently exists in only a portion of the area, but the problem can be pretty well eliminated with a storm sewer system.
6. Lack of governmental action.	Apparently it is a combination of lack of citizen political involvement and governmental units not oriented to resolving the type of problems found in the area.
7. Animal pests.	Clearing of vacated structures should assist in that, plus animal control ordinance and enforcement and a program to rid the area of other undesir-undesirable animals.
8. Lack of law enforcement.	A combination of alert citizen recording, committee-police involvement and police enforcement.
9. Area lacks a focus.*	To become a viable, healthy neighborhood, an area such as this needs a public or semi-public area or structure to serve as a point of identification. In the case of Manitowoc Beach this could be a park, water tower, etc.

*This problem was identified by the Consultant.

10.	No street lights on Memorial Dr.	An item that should be discussed with the State Highway Division, Town Board, Utility District and Community Development Program.
11.	More than a "fair share" of low and moderate income residents.	An important element of consideration in preparing policies in both what is done and how.
12.	Vacant sub-standard lots.	A utility program might eliminate there sub-standardness, eliminate the fact that they are vacant or the Community Development Program can be utilized to eliminate the problem.
13.	Lots are too small in many cases to permit adequate residential living.	The Community Development Program along with the Community Development Authority can eliminate some of these problems.
14.	Lack of a park.	The Community Development Program, LAWCON Program and the Town or Community Development Authority can eliminate this problem.
15.	Poison Ivy on vacant land.	The Committee should work with the Town Board and the Town Attorney in eliminating this problem.
16.	Too many traffic signs on Memorial Drive.	Probably a Bureau of Public Roads requirement but the Committee could contact the State Highway Division and talk to them about this.
17.	Social problems.*	An element that the Committee could work on as a Community project. The first element would be to specifically identify what these problems are.
18.	Need for increased fire protection.	A problem the Committee could work on with the Fire Department and possibly utilize Community Development Program if financial assistance is needed.
19.	Low value of real estate.	If the other problems are resolved the market place will eliminate this problem.
20.	Lots do not conform to the Zoning Ordinance.	Either rearrange the lots with the use of the Community Development Program, change the Zoning Ordinance or be satisfied to live with non-conforming lots.
21.	Lack of planning on vacant land.	A problem that this planning program is intended to resolve.

*This problem was identified by the Consultant.

22.	Trash on all lots.	Possibly this could be eliminated through Committee and neighborhood actions or if an ordinance is required the Committee approach the Town or County to pass and enforce.
23.	Traffic on local streets.	Most streets are well designed to eliminate all but local traffic, while "hot rodding" is a traffic enforcement problem or a passing fad.
24.	Memorial Drive and Town roads are not plowed properly.	The Committee can communicate with the Town and County to eliminate any problem that may exist.
25.	Fire-arms being discharged in a residential area.	A matter of education, law enforcement, or animal pest elimination.
26.	Small homes.*	The Community Development Program, housing programs and/or private housing market can eliminate the problem.
27.	Tax delinquent land.	The Town or the Committee through a Community Development Authority should pick up the land and hold for public use or private resale.
28.	No street lights in area.	If it is deemed desirable a Town or Community Development Program should acquire street lights.
29.	Streets are not located within the designated right-of-way.	Any driving area that is not located within the publically owned right-of-way should be so located while it may not be necessary to locate driving lanes within the center of the right-of-way.
30.	Lack of street signs on north side of Memorial Drive.	The Committee in its official capacity should approach the State Highway Division requesting the signs.
31.	Trash on vacant lots.	A Community project could possibly eliminate some of the problem while an ordinance with enforcement at the Town or County level could eliminate most of the rest.
32.	Absentee ownership.	A result of the low value of real estate and can, if deemed undesirable, be eliminated by acquisition by the Town or a Community Development Authority.
33.	Memorial Drive traffic.	A regulated State Trunk Highway from which some traffic will probably be eliminated when the Interstate Highway is completed.

*This problem was identified by the Consultant.

34.	Off-the-road vehicles on private property.	This appears to be a trespassing problem which if necessary to eliminate would require fences
35.	Truck traffic on West Street.*	Possibly could be rerouted on a new street or the uses could be bought out by the Community Development Authority.
36.	Lack of sidewalks.*	This may not be a problem.
37.	Urban area with Town government.*	If the other problems are resolved this may not necessarily be a problem.
38.	Area has not been annexed.*	Again, this may not be a problem.

*This problem was identified by the Consultant.

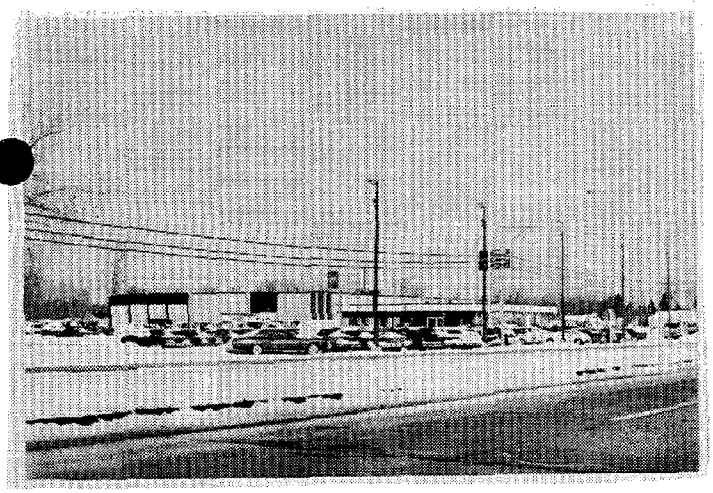
POTENTIALS IDENTIFIED BY MANITOWOC BEACH CITIZEN'S COMMITTEE

As Identified by Beach Citizens	Consultant Comments
(These potentials were identified by the Manitowoc Beach Citizen's Committee as reasons why they lived in the area. The potentials are shown in order of importance as designated by the Committee.)	
1. Good location - close to two cities and their place of employment.	Without question a very advantageous element of Manitowoc Beach is its general location between the two cities. For this reason the Mall and Erdman Motors have located where they have.
2. Privacy.	Certainly a result of a number of things including having the woodland dunes on one side and Lake Michigan on the other, most streets are dead end, no sidewalks, no street lights and in some areas a reasonable space between dwellings and in other areas vegetation separating dwellings.
3. Living on the Lake.	Currently a strong incentive and would be admired by a certain segment of our population.
4. Was a low tax area.	This is a direct reflection of the low real estate value, which is a result of all the other problems in the area.
5. The natural beauty and the urban advantages	An answer to the dreams of many people in todays population. In the future the urban advantages should continue and hopefully so will the natural beauty.
6. Reasonably good area for commercial development.*	Without question I would say that the area is good for retail commercial development. If the Community finds that this type of development would be undesirable development can so be planned.
7. Good fishing.*	Send congratulations to the DNR and hope it continues. It does put additional tourist pressure on the area.
8. Good neighbors.	Hopefully they can all work together in developing and implementing the best plan for the area.
9. Dead end streets.	Can be a desirable asset in a residential area.

*This potential was identified by the Consultant.

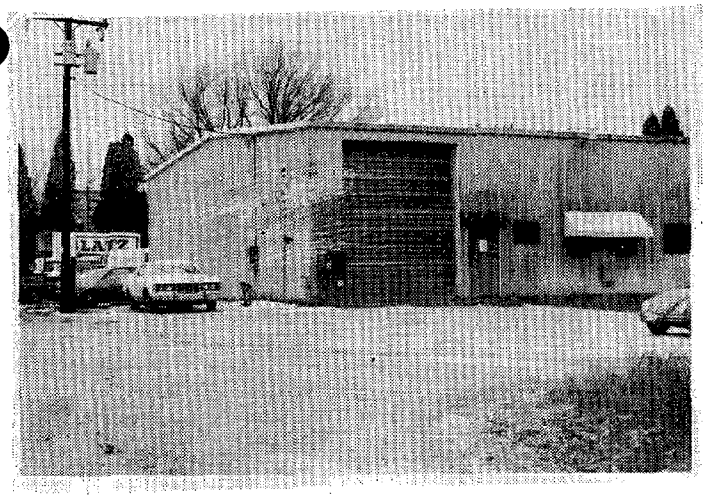
10.	A small, quiet community.	There is enough vacant land in the area that the amount of development could easily double, however the area has the advantage of fixed physical limits.
11.	House was the right price.	If the problems are to be eliminated, real estate will be more valuable.
12.	Large amount of vacant land.*	It is important that the Plan designate how vacant land is to be used so that future problems can be avoided.
13.	Not too congested.	Future development could be done in some instances with an even lower density than presently exists.
14.	Likes the trains.	The likelihood of the trains continuing is completely dependent on the railroad and the industries in Two Rivers. If the Line is abandon possibly the Railroad right-of-way could be used as an advantage to the area.
15.	Rehabilitation in progress or completed.*	Credit should be given to everyone who has attempted or completed improving their homes.
16.	Woodland Dunes.*	A decided advantage to maintaining many of the potentials listed above.

*This potential was identified by the Consultant.



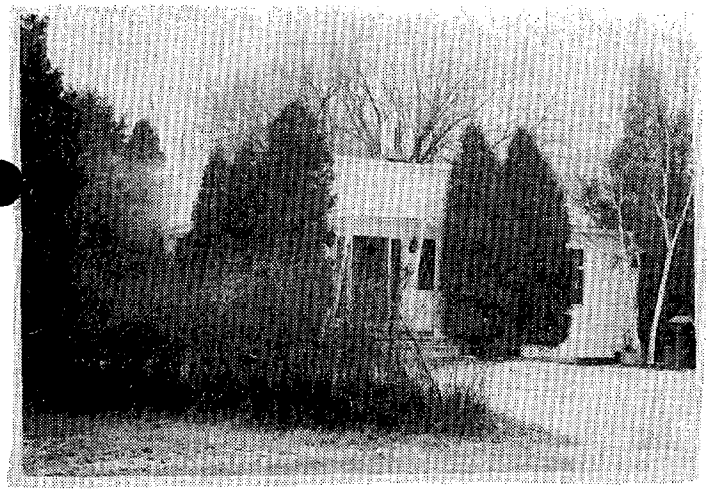
Erdman Motors - the largest commercial use in the area.

Entrance to Erdman Motors in a residential area.

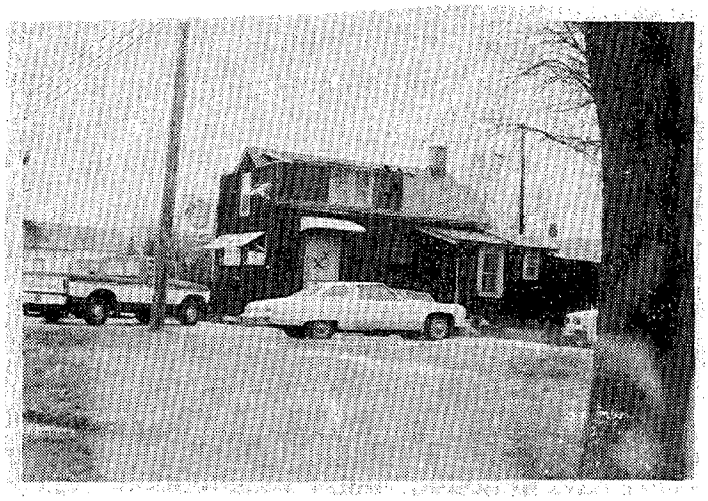


Wholesale beer distributor on West St.

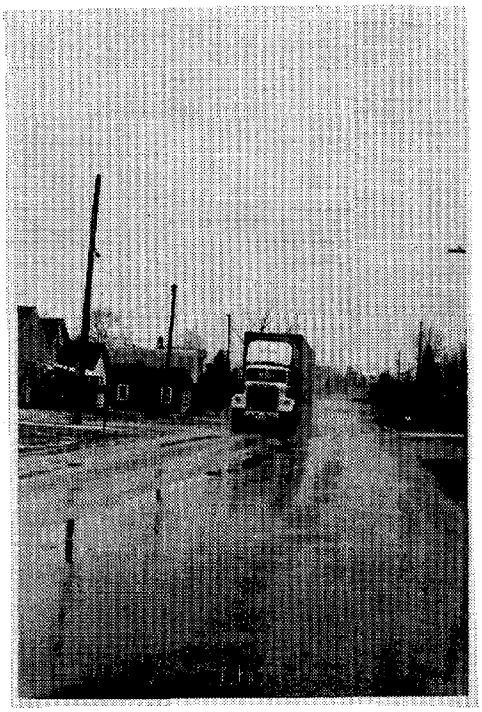
One of three taverns.



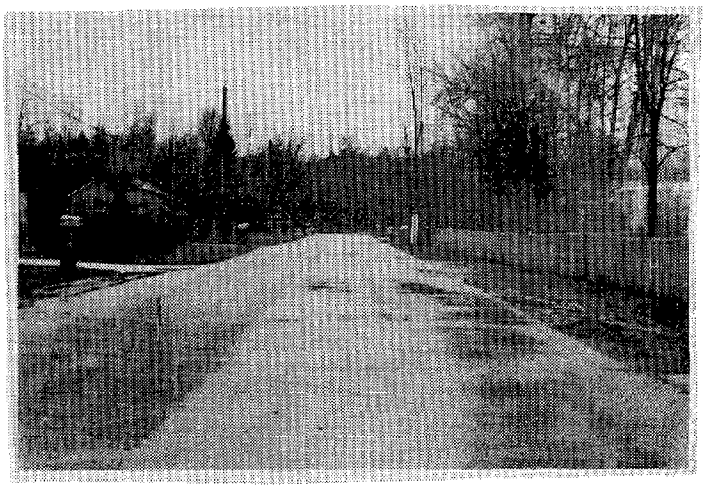
One of three taverns.



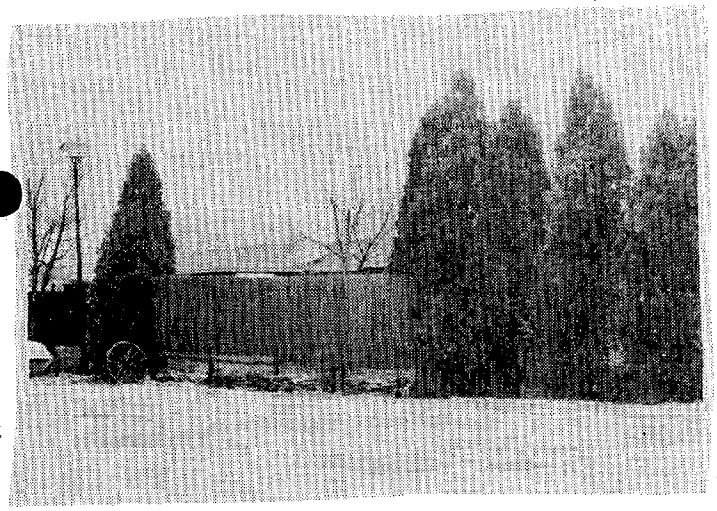
One of three taverns.



The truck traffic on West Street.

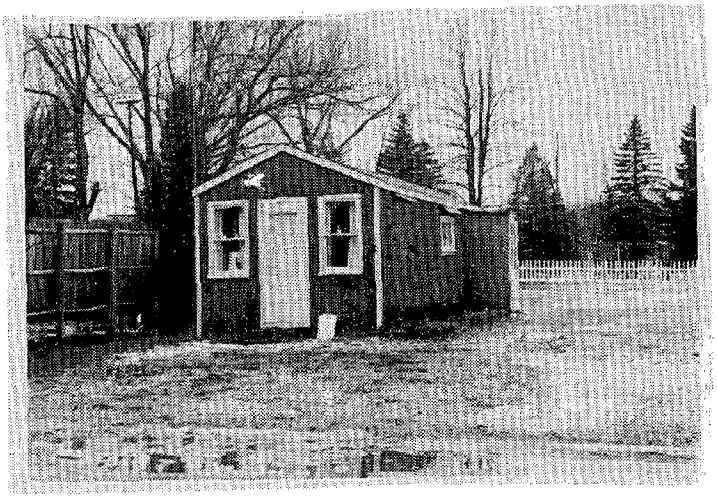


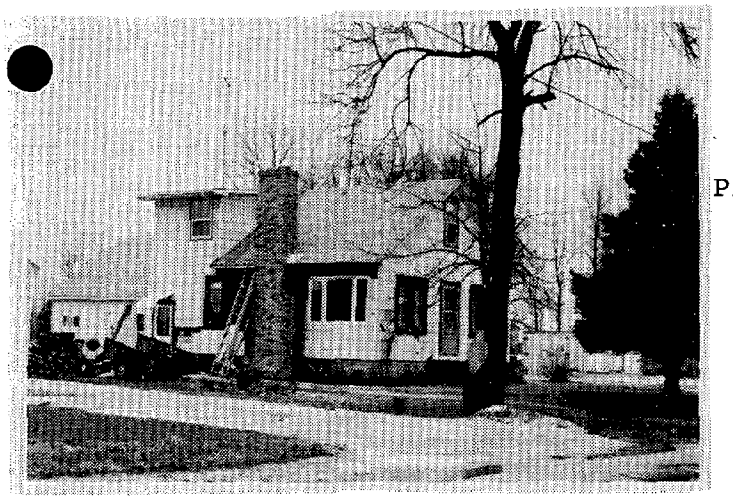
Good quality road.



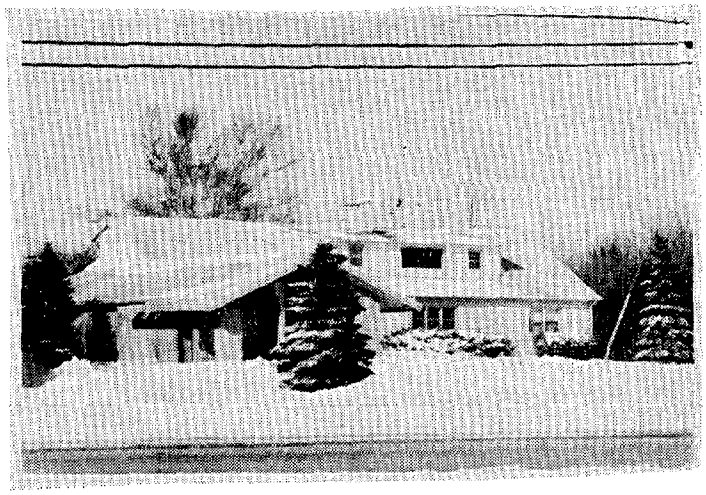
What is this fence hiding?

The fence is hiding a small dwelling with structural problems.

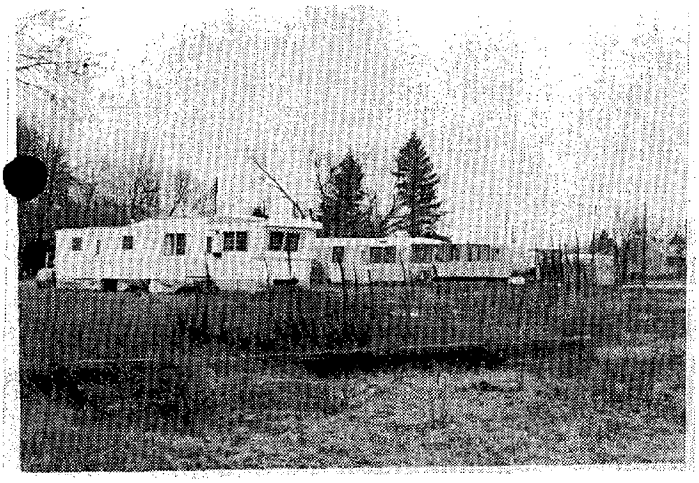




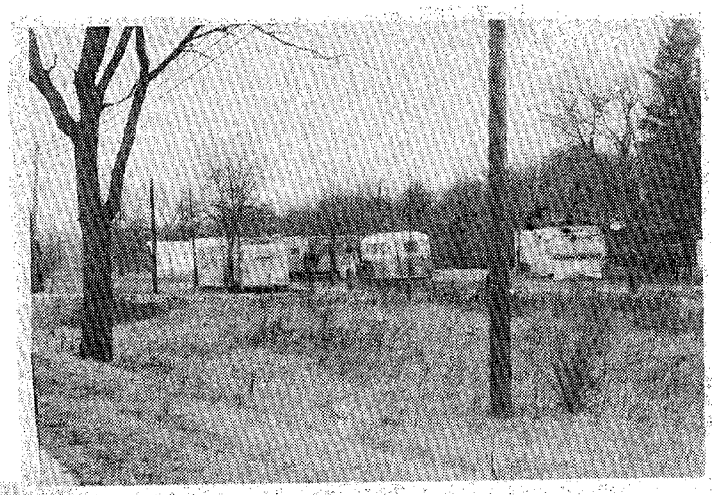
Private housing rehabilitation in progress.

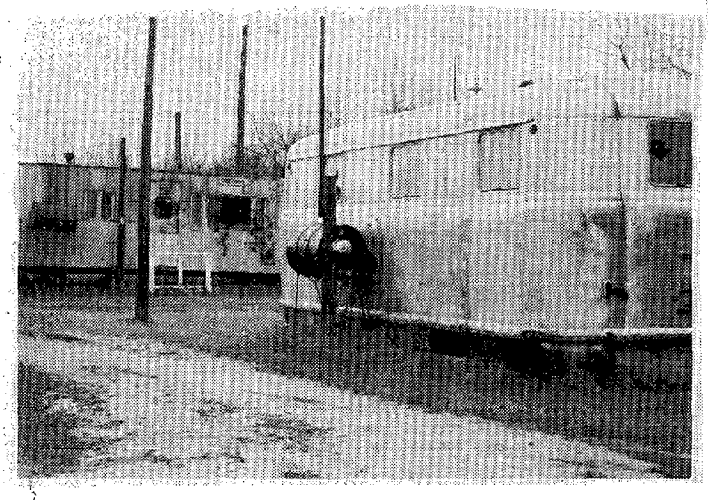


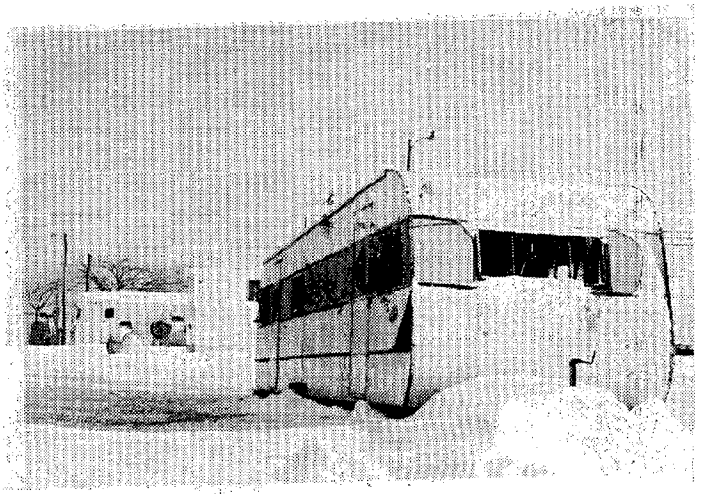
A dwelling that could be an example of the potential of some of the area.



The mobile home park that possibly has one or two mobile homes regularly occupied.

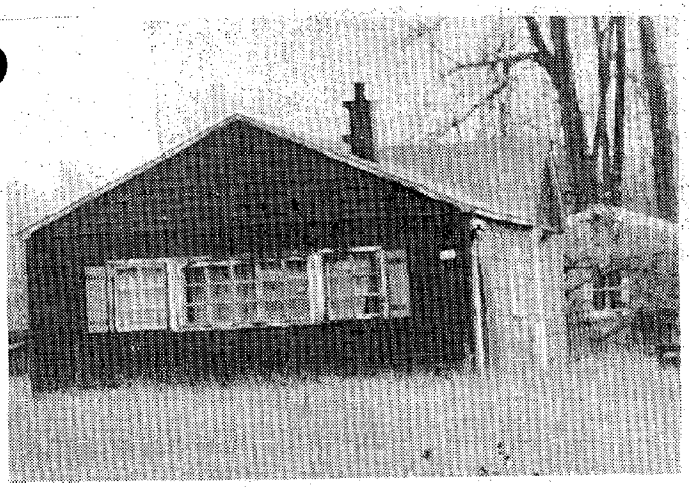




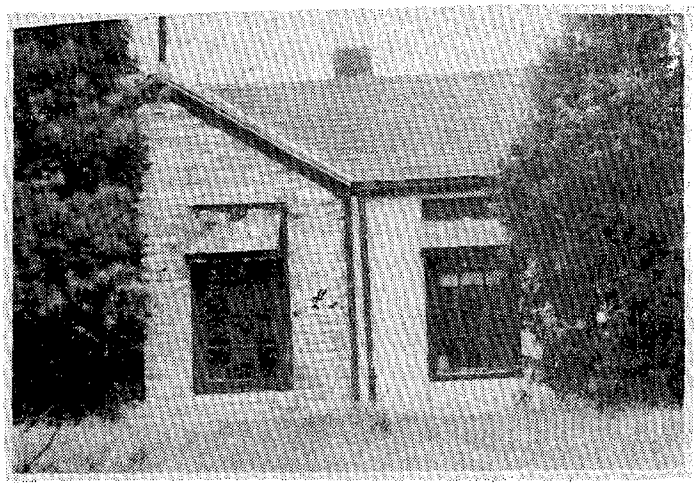


This abandon/vacant house ...

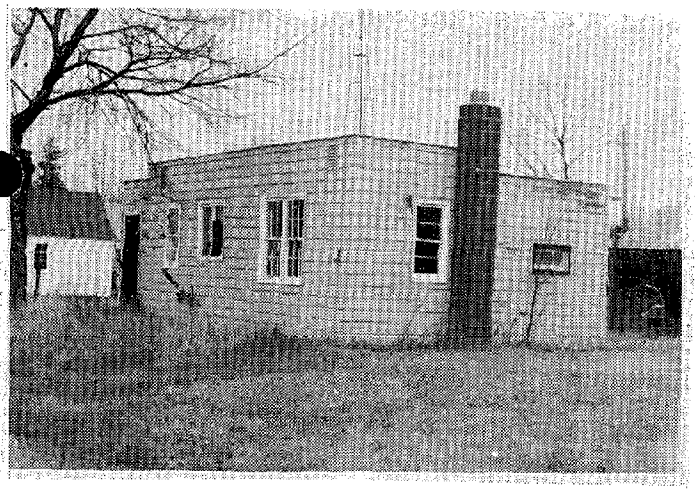
...is located between these standard dwellings.



An abandon/vacant dwelling.



An abandon/vacant dwelling.



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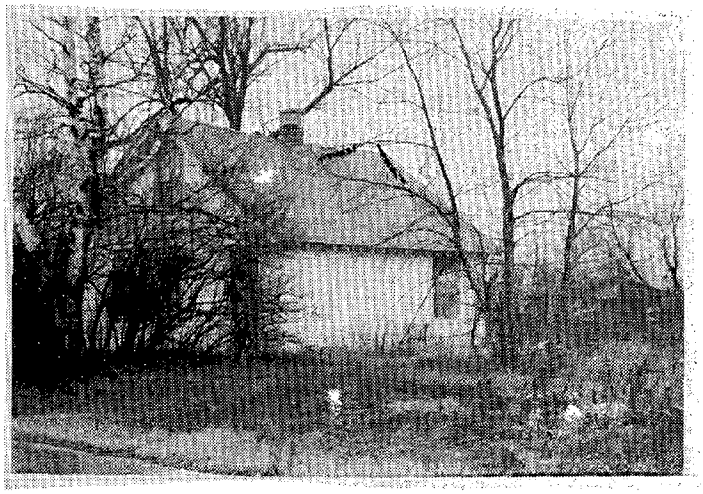

An abandon/vacant dwelling.

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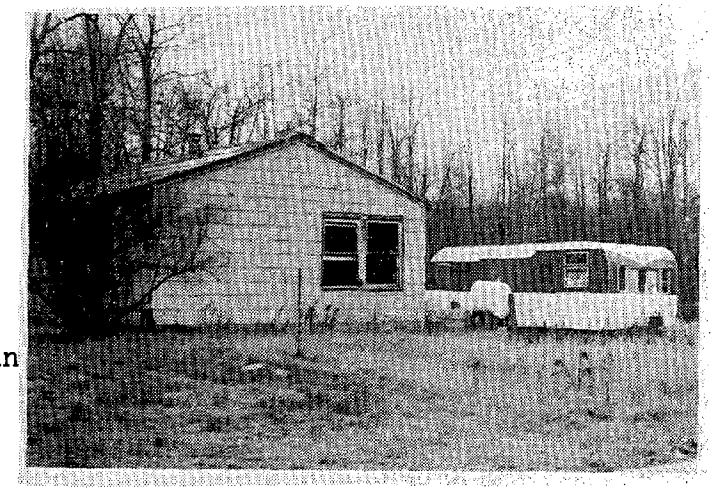
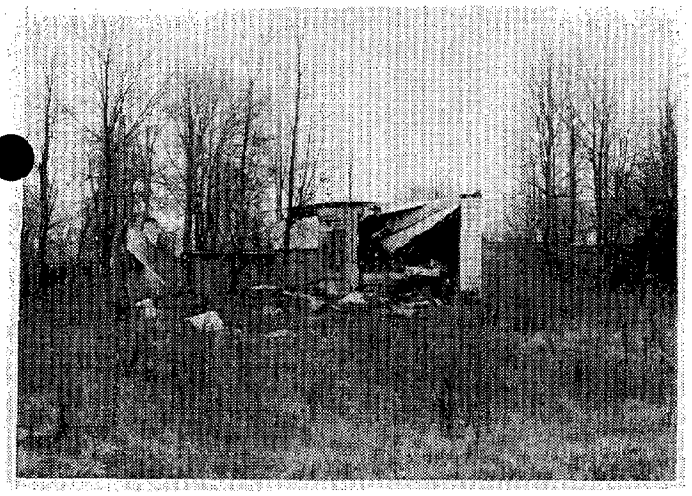
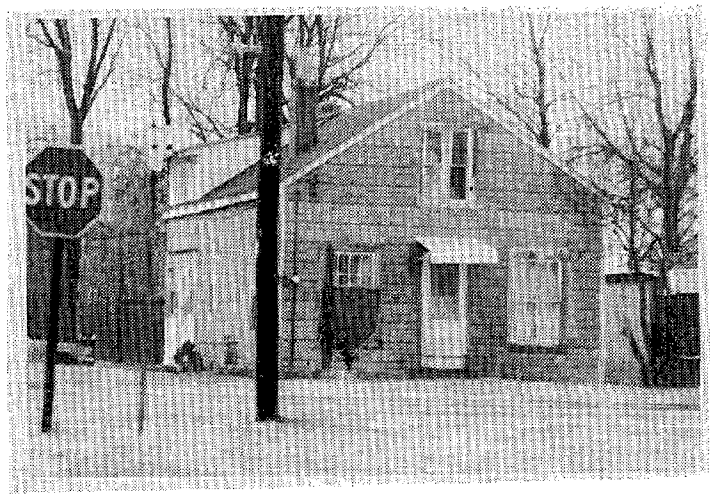


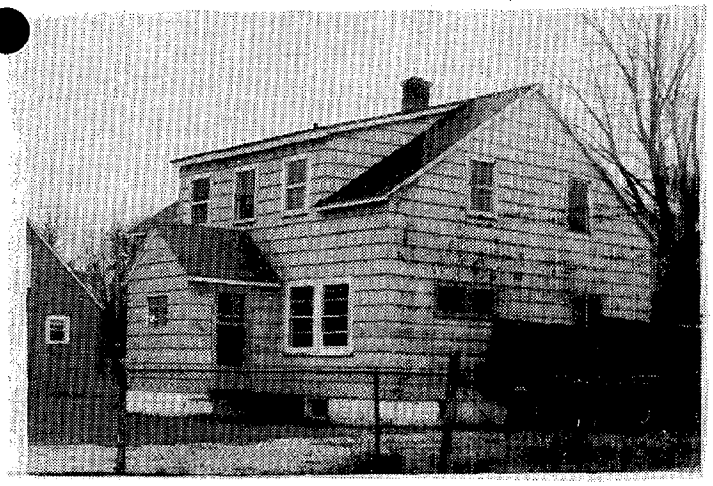
An abandon/vacant dwelling next to an unoccupied mobile home.



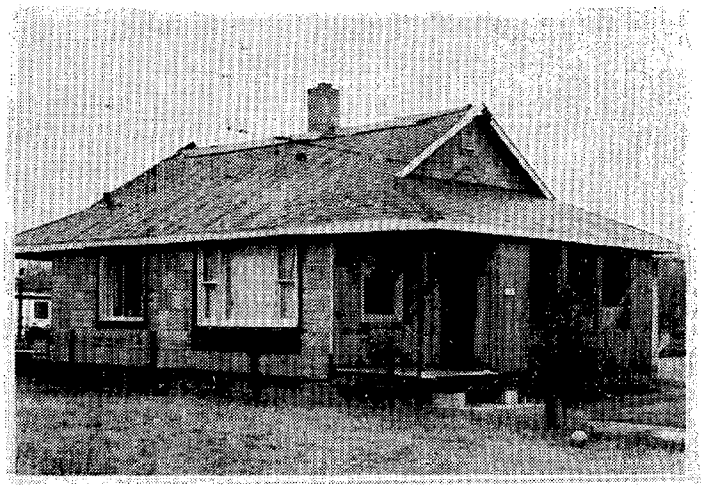
The remains of a dwelling.



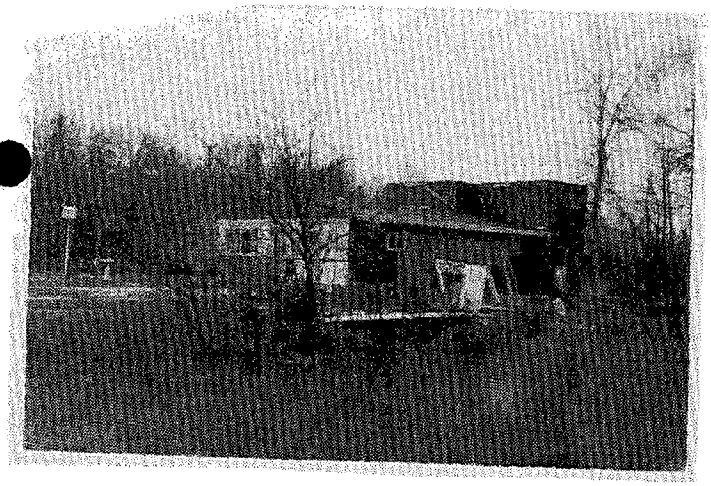
A substandard/occupied dwelling.



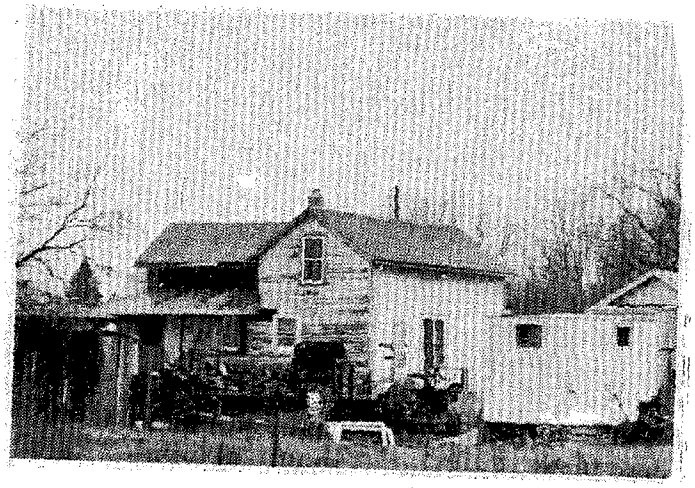
A vacant dwelling although it does not appear substandard.



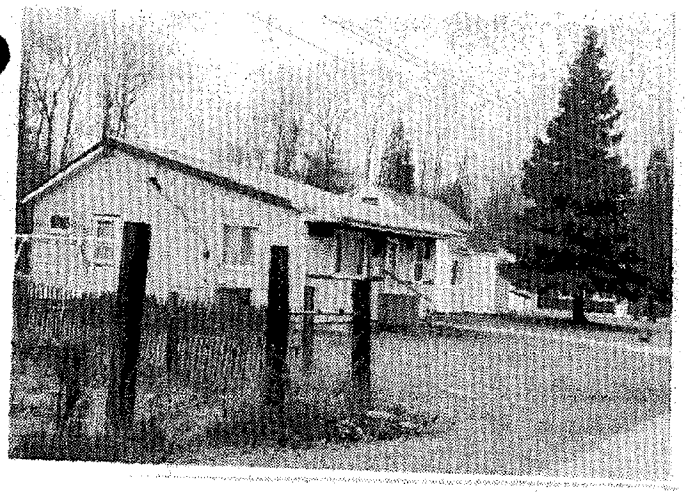
A partially remodeled dwelling.



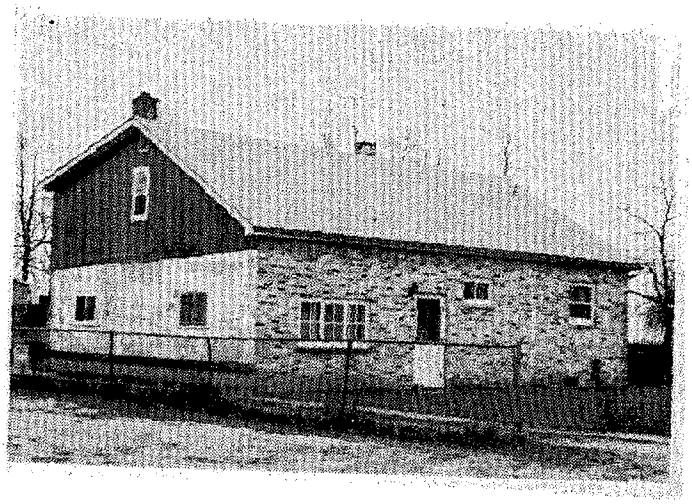
A dwelling in the process of being rehabilitated.



A dwelling in need of significant rehabilitation.



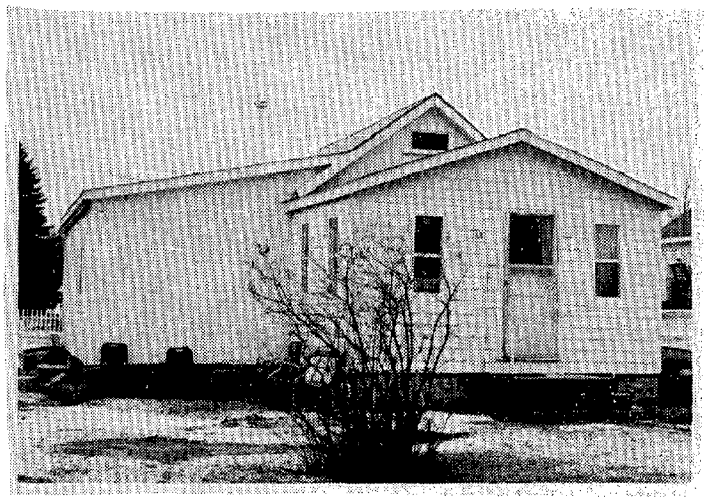
Dwelling partially rehabilitated.

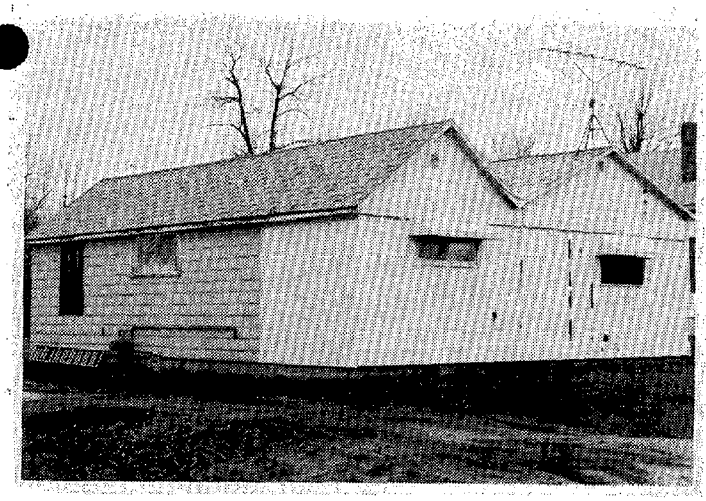


A dwelling with rehabilitation nearing completion.

A standard dwelling not regularly occupied.

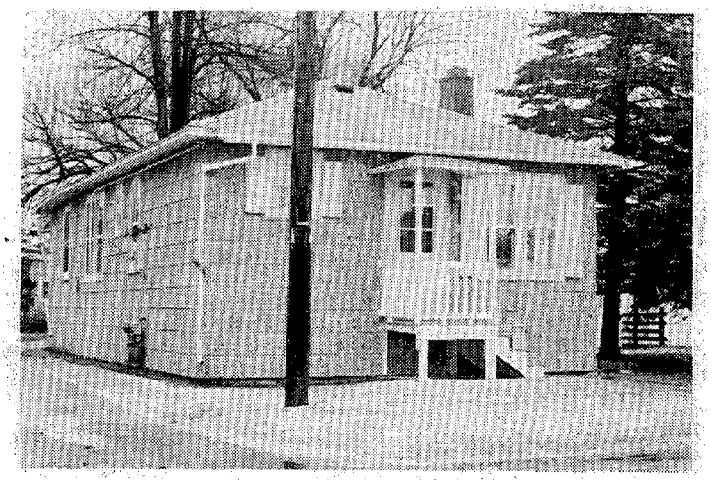
A dwelling with two additions.





A partially rehabilitated dwelling.

A standard dwelling.



PLANNING OBJECTIVES

The improvement of the Manitowoc Beach area will be undertaken in close consultation and collaboration with the residents and business people of the area in the same manner that the planning program has been started and will continue to be operated. It is further expected that the program will be carried out in stages. The renewal of the area will be accomplished through programs of rehabilitation, redevelopment (private and/or public), and the addition of public improvements in accordance with the following objectives:

1. Residential Objectives.

   To eliminate all substandard and deficient housing conditions in the area and to provide standard housing to meet the diverse needs of the area residents in terms of unit sizes, tenure and economic levels. Rehabilitation of the maximum number of units will be encouraged where ever feasible. Clearance and redevelopment will be minimized, but used where necessary to eliminate seriously deteriorated building conditions and as a means for providing sites for new housing or public land uses. Considerations shall be given to constructing housing units for families of low and moderate income.

2. Economic Objectives.

   To support the business in the area and to provide for additional business opportunities in order to add to the economic prosperity of the area. To provide retail and wholesale businesses with public utilities to facilitate their normal operation. Increase real estate tax returns, possible employment opportunities, and possible retail services for the residents are the principal objectives of the proposed improvement program.

3. Social Objectives.

   To encourage and stimulate neighborhood citizen participation in the neighborhood improvement program. To provide a neighborhood identity and stimulate pride among the residents to improve their homes, neighborhood and public services.

4. Environmental Objectives.

To achieve a good residential neighborhood for people by eliminating the environmental problems. To rehabilitate structures, to remove blighting influence and substandard structures where rehabilitation is not feasible. To eliminate drinking water and sewage disposal problems, to provide neighborhood shopping and other needed amenities. To protect the neighborhood from future blighting influences. To provide development in a manner that will recognize the environmental intricacies of the area.

PROJECT IMPROVEMENT OBJECTIVES

Overall project improvement objectives are proposed for the Manitowoc Beach area to achieve sound and attractive development. They are as follows:

1. General Site Planning Objectives

Site planning of buildings for each new parcel shall conform to overall site planning considerations to achieve an integrated, cohesive and attractive project. Each parcel shall be developed in a manner that respects the special character and quality of that parcel plus adjoining parcels.

All buildings in the projects shall be located and designed, if appropriate, with proper considerations given to their relationship to adjacent buildings, both existing and proposed, in terms of height, bulk, light, air, usable open space, access to public streets and off-street parking.

Siting of buildings shall take into consideration the terrain, soil suitability, depth to ground water and natural vegetation.

The design of all streets, sidewalks (if any), and open spaces within the public right-of-way shall be consistent with private development. Where feasible and appropriate, street trees shall be provided and those provided shall be consistent with natural vegetation now in the area.

2. Architectural Objectives

The exterior of buildings shall express the character and purpose of the function which they serve. Commercial buildings shall be sensitively scaled and reflect good exterior qualities.

Treatment of sides and rear of new commercial buildings within the Manitowoc Beach area shall be comparable in amenity

and appearance to the treatment given their street frontage.

Commercial building extensions and accessory structures, including exposed mechanical equipment, and storage spaces, shall receive architectural treatment consistent with that of the building itself.

Building materials for commercial buildings shall be selected for durability, for harmonious relationships and where appropriate, for the continuity of treatment with neighboring structures.

3. Circulation and Parking Design Objectives

Dead end streets within the area shall so remain, however they shall be provided with turn arounds at the dead end.

Truck traffic through the area will be confined to two streets and if possible eliminated from those.

Commercial parking areas shall be screened and landscaped. Lighting for commercial parking areas shall be directed away from adjacent residences.

4. Landscape Design Objectives

A landscape treatment shall consist of shrubs, ground cover and street trees that are appropriate to the character of the Manitowoc Beach area and to the growing conditions of the area. Existing trees shall, where ever possible, be integrated into the landscape design plan. All residential parcels fronting on the railroad and commercial projects shall be screened, where appropriate, with landscaping.

STANDARDS

Residential

Residential development in the Manitowoc Beach area should consist of only single family and multifamily development. No duplex, triplex, or mobile homes, singly or in a park, would be permitted. The apartments may consist of conventional private market apartments, condominiums and/or federally or state assisted housing. Specific standards for development are on the following table:

Type of Unit	Type of Utilities	Lot Frontage	Lot Area
Single family	Central-public, only	60 Ft.	6,000 Sq. Ft.
Multifamily	Central-public, only	90 Ft.	10,000 Sq. Ft.

Commercial

Retail and wholesale development of the type now in existence would be permitted to continue, could replace itself and expand within its present land boundaries. Future commercial development would be restricted to retail and wholesale establishments. Only the types of development selected in the approved plan would be permitted and permitted only in the area specifically designated in the plan.

Public

Other than streets two types of public land use should be permitted in the area. These are a park and a possible location for utility facilities. The park could be one or two locations, but should include play equipment, free play equipment, including knolls, climbing apparatus, rope swings, culverts and sand play area, ball diamond, picnic area, and skating rink. The area may need a utility facilities area to provide room for a pumping station, water storage or other utility facilities. The park and utility area could be the same area. Some utility facilities possibly could be located within the street right-of-ways. A park should also provide room for expansion for a community center, shelter building, and/or fire station.

Semi-public use of a church should be provided for in the land use plan.

Streets

Other than Memorial Drive and Woodland Drive, all streets in the area should be local streets. There should be no new streets opened off of Memorial Drive. Local streets should be developed with 20 to 24 foot driving width, and with 60 or 66 foot right-of-way.

All existing alleys should be vacated with the property being divided equally between adjoining property owners and no new alleys platted.

ALTERNATIVE LAND USE PLANS

This Land Use, Street and Redevelopment Plan is the culmination of a planning process which involved the area's Citizen's Committee, Town Board, County Planning staff, and the Consultants' staffs. The proposed uses and densities described in this plan are based upon the existing physical conditions within and surrounding the Manitowoc Beach area, the provisions with the County Zoning Ordinance, recommendations to amend the County Zoning Ordinance and provisions of State Law.

1. Minimum Development Plan

   A. Justification

      The minimum plan develops the accessible, vacant land. With this plan the area stays the most like it presently is, and recognizes the fact that the area's undeveloped land has problems too severe to overcome even with the installation of utilities.

   B. Residential

      The minimum development plan shows development only in single family residential and generally only in areas that are presently developed. Future development will be on lots of 6,000 to 7,000 square feet, with possibly some to 8,000 square feet. These will be the most efficient to utilize the central utilities system. The plan shows 18 additional acres being developed as single family residential and this would permit approximately 108 additional houses. These houses would hold approximately 339 additional people. This added to the 402 people presently estimated to live in the area would bring the population to 741.

   C. Commercial

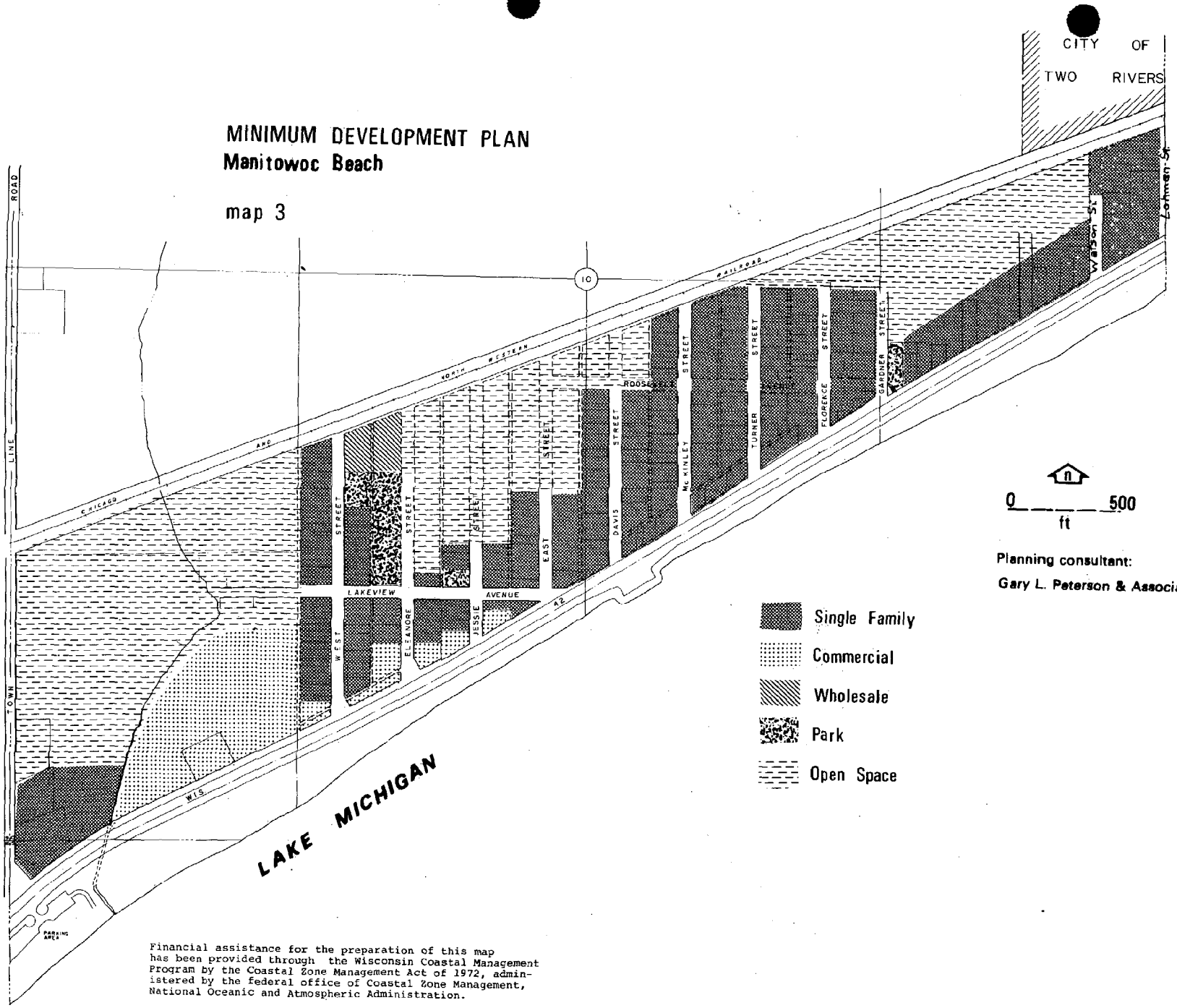
      The minimum plan calls for very little additional commercial development with recommendations for only a grocery store, and possibly an office. These are to be located on Memorial Drive between West and Jessie Streets.

   D. Public

      The minimum plan recommends that from one to three parks be developed. A major park for the play area and utility service facility should be located east of West

MINIMUM DEVELOPMENT PLAN
Manitowoc Beach

map 3



Planning consultant:
Gary L. Peterson & Associates

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Street and north of Lakeview Avenue. Two playgrounds should be provided in the area, one at the corner of Jessie and Lakeview and the other at the corner of Gardener and Memorial Drive.

2. Moderate Development Plan

A. Justification

The assumptions of the moderate development plan are that if the area is developed with utilities the area can and will be developed. The plan is proposing that multiple family development be permitted at the eastern and western ends of the area. It further assumes that other large vacant areas will not stay vacant but will be developed as single family residential.

B. Residential

Two types of residential are proposed in the moderate development plan. The area between West and Watson Streets is expected to be developed almost entirely in single family residential. There are more than 45 acres in this area that can be so developed and this would hold approximately 274 additional units. These units would hold approximately 860 people at the same density as those located in the minimum development plan.

Multiple family residential is also proposed in the moderate development plan. Multiple family is proposed to be located in place of the mobile home park and in the very large vacant parcel between Woodland Drive and West Street. There are approximately 29.5 acres in these areas available for development. This area would hold approximately 474 units which in turn could be occupied by 1184 people. The 402 people presently in the existing area, plus the 860 proposed under the single family development, plus the 1184 in the multiple family area would bring the population holding capacity of the area to 2446 people.

C. Commercial

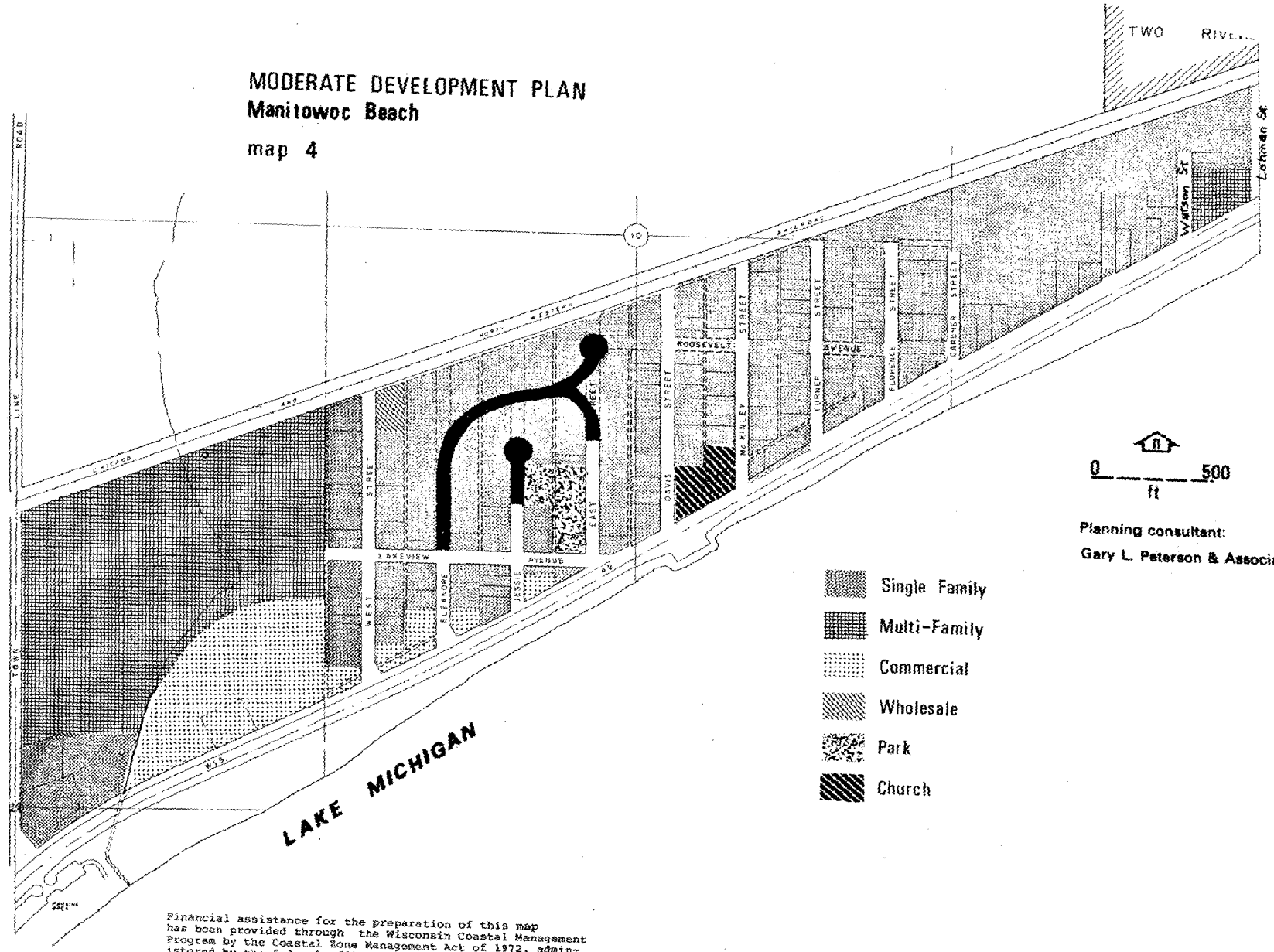
Commercial development is basically the same as that shown in the minimum plan.

D. Public

The moderate development plan calls for one park at the corner of East and Lakeview Avenue. The plan also provides that land be reserved for a church between Davis and McKinley Streets on Memorial Drive.

MODERATE DEVELOPMENT PLAN
Manitowoc Beach

map 4



Planning consultant:
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3. Maximum Development Plan

A. Justification

The maximum development plan shows the area being developed to a maximum extent without significant redevelopment of existing development or the inclusion of a major shopping area or the inclusion of industrial land. The development is related to the location of the Manitowoc Beach area in relation to Manitowoc and Two Rivers and Lake Michigan. The plan as proposed would require less government services, and therefore less government cost, than the moderate development plan. It would also provide the best tax base in relation to the cost to support a utility system.

B. Residential

The maximum development plan proposes two types of residential. Single family development would occur along existing streets plus the extensions of Davis and McKinley Streets. There would be more than 13.5 acres developed in single family residential resulting in 82 units, which would be occupied by approximately 257 people.

Multiple family developments would occur in the large vacant parcel between Florence and Lohman Road and on part of the vacant land between West and East Streets. There are approximately 22 acres in this area for development and that could accommodate 309 multiple family units which would be occupied by approximately 884 people. These 884 plus the 255 in single family resident, plus the 402 presently residing in the area would bring the population to approximately 1543 people.

C. Commercial - Wholesale

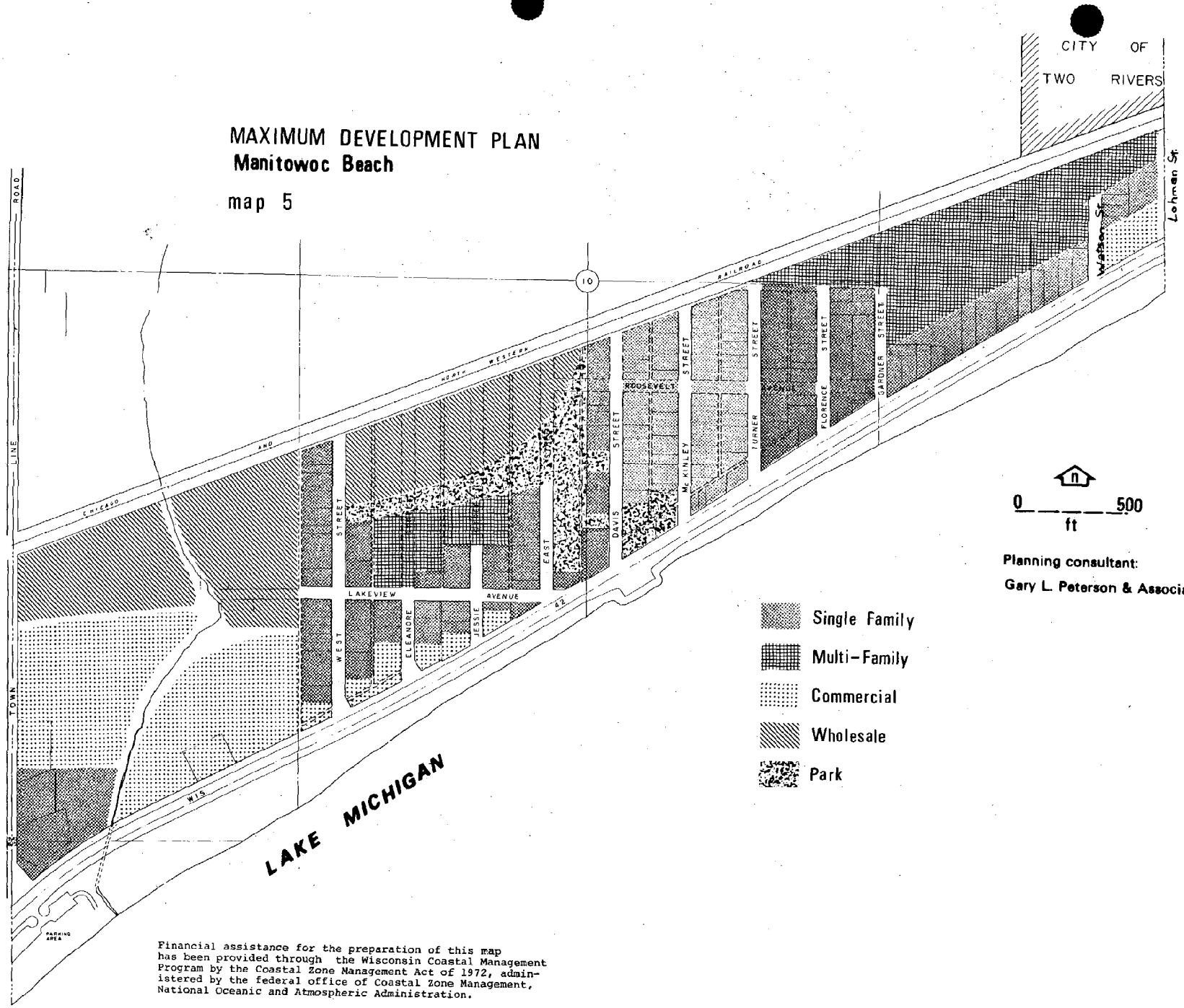
The same commercial development is proposed in the maximum development plan as in the other two plans with two significant additions. The area now occupied by the mobile home park could be used for office or restaurant purposes. The area on Woodland Drive could be used for retail sales store. The large areas along the railroad right-of-way from East Street to the west to Woodland Drive are designated for wholesale business. This excludes any manufacturing or assembling in the area. The boundary between commercial and wholesale west of West Street can vary with the demand.

D. Public

A large park is proposed along East Street with an important connection to Davis Street and another park

MAXIMUM DEVELOPMENT PLAN
Manitowoc Beach

map 5



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there. The Davis - McKinley Streets park could be the utility service area and community center area. There would be an open space between the wholesale and residential.

STREET PLANS

As indicated in the Standards, Woodland Drive and Memorial Drive are the two major boundary arterial streets and it is expected that they would retain that function. The area between Woodland Drive and West Street may need new local streets to open up development in that area. The area between Gardener Street and Watson Road may need new local streets to be extended off of those two streets to open up development in that area. Other existing streets will need to be extended to open up development. With the possible exception of Eleanore, Jessie and East Street, all streets should remain as dead end. The right-of-way to all dead end streets should continue to intersect with the railroad right-of-way.

All alleys, with one exception, within the Manitowoc Beach area plus Roosevelt Avenue should be vacated. By law the land from vacated streets and alleys is equally divided between adjoining property owners. The one alley which should not be vacated is that which parallels and abuts the Chicago and Northwestern Railroad Tracks. That right-of-way should be utilized for utility easements and possibly for a sidewalk connecting the ends of streets.

The dead end streets should all be furnished with a "T" turn around area at the dead end. This should be done within the existing right-of-ways.

It is proposed that a new street be provided on the Chicago and Northwestern Railroad right-of-way, if abandon, or immediately to the north there of for truck traffic using the Truck Terminal and Beer Distributorship.

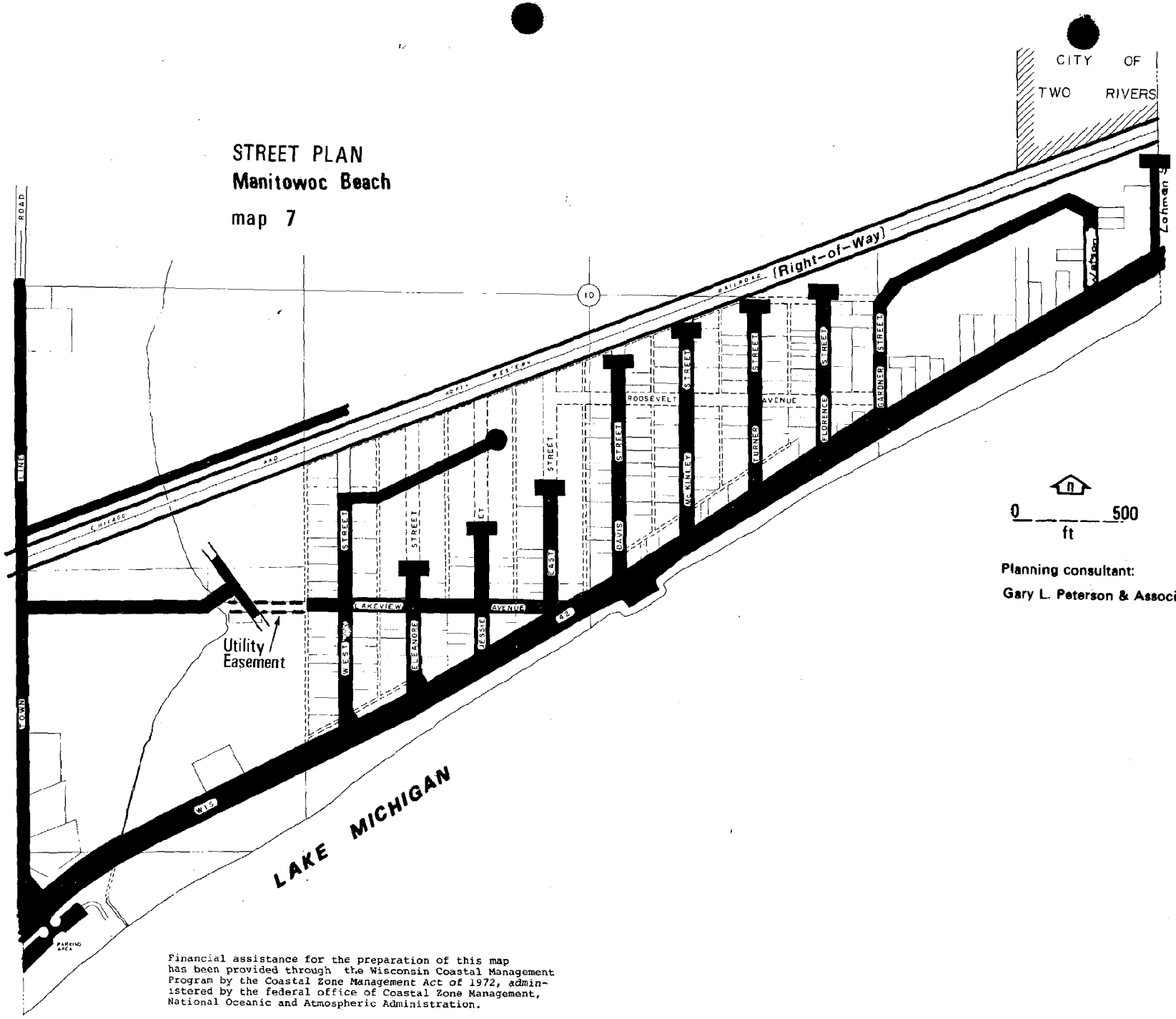
If the railroad right-of-way is abandon, that portion east of West Street could become part of trail system used by Manitowoc Beach residents. Perhaps its use could be coordinated with the Woodland Dunes Trail System.

Proposed local street changes are shown on the street plan map.

POTENTIAL LAND ASSEMBLAGES AND LAND ACQUISITIONS

The Manitowoc Beach Citizen's Committee and the Town Board should consider purchasing a number of parcels in the Manitowoc Beach area and assembling them into two large parcels. One of

STREET PLAN
Manitowoc Beach
map 7



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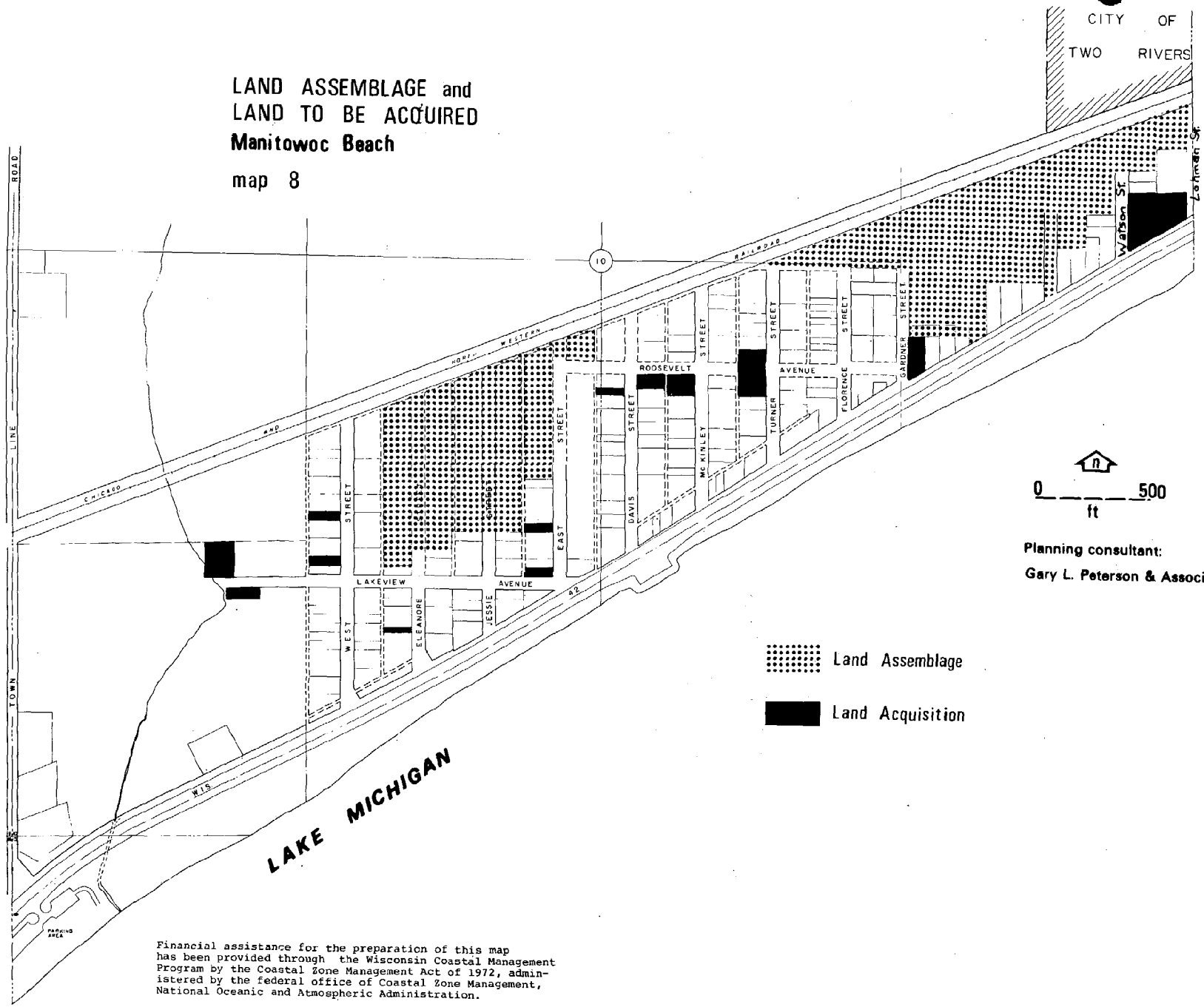
LAND ASSEMBLAGE and LAND TO BE ACQUIRED

Manitowoc Beach

map 8



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the areas to be assembled is that between Gardener Street and Watson, and the other is between East and West Streets. Both of these are indicated on the land assemblage map. The parcels would be reused in the manner indicated on the selected land use plan.

The Manitowoc Beach Citizen's Committee and Two River's Town Board should also consider acquiring land in thirteen other locations. One of the parcels would be utilized for a park and two for wholesale purposes. Ten of the acquisitions would be made because the dwellings are substandard and of these ten parcels only three are believed to involve occupied houses and a fourth parcel may have two occupied mobile homes. Seven of the acquisitions would involve acquiring abandon/vacant houses. The parcels again would be used in accordance with the selected land use plan. These thirteen parcels are shown on the acquisition map.

SELECTED DEVELOPMENT PLAN

At the meeting of the Manitowoc Beach Citizen's Committee on January 18, 1978 the three alternative development plans were considered. After discussion of the plans they were taken under advisement and another meeting was scheduled for January 25, 1978. At that meeting, following discussion, the Committee voted to support the Maximum Development Plan with slight modification. The plan is as follows:

Residential

The residential element of the selected plan is that shown in the Maximum Development Plan.

Commercial-Wholesale

The selected commercial-wholesale plan is that shown in the Maximum Development Plan. However, the retail area has been expanded to include all of the corner of Woodland Drive and Memorial Drive.

Public

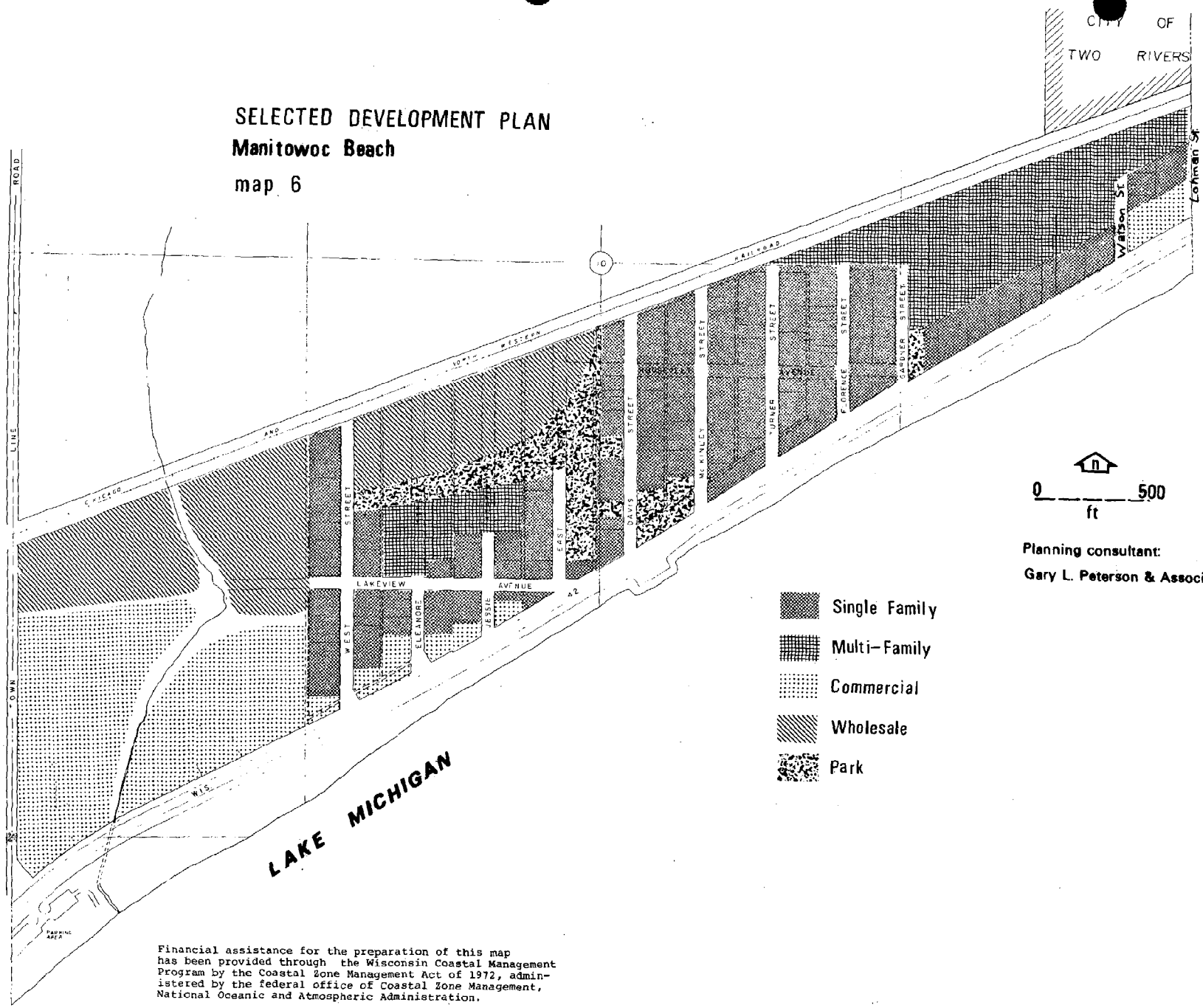
The selected public element of the development plan is that shown in the Maximum Development Plan with the addition of a park at the intersection of Gardener Street and Memorial Drive. Also, the park-buffer zone separating the multiple family area from the wholesale area can change in shape to accommodate the needs for a park and the internal arrangement of the multiple family and wholesale areas.

The selected development plan will provide the most feasible plan for both installing and operating a utility system while requiring less government services than required in the moderate development plan. The selected plan then is in the best interests of both the present and future residents and the governmental bodies and school district.

SELECTED DEVELOPMENT PLAN

Manitowoc Beach

map 6



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IMPLEMENTATION CHART

Planning Element	Implementation
A lack of water that is drinkable and an absence of adequate sanitary sewage disposal system.	The Town of Two Rivers should apply to the Department of Housing and Urban Development for a Community Development Block Grant, or to another agency for a different grant if such becomes available. This grant should be utilized to develop a water and sewer system within the Manitowoc Beach area. The systems should be connected to either Two Rivers or Manitowoc or both. In order to implement this, the Manitowoc Beach area will need to form a sanitary district.
Housing rehabilitation.	The Town of Two Rivers should apply to the Community Development Program for money for housing rehabilitation within the area. The Citizen's Committee or neighborhood residents in another organization would set all the rehabilitation criteria and the eligibility requirements. The rehabilitation program could be implemented by the Citizen's Committee working through the Town Board or a Citizen's Committee working through a Community Development Authority or with just a Community Development Authority.
Uninhabited substandard houses and mobile homes and occupied substandard homes.	The Community Development Program can be utilized to obtain the money to purchase the vacant houses and pay for relocation for residents of occupied substandard houses. The homes can be demolished and the land utilized in accordance with the area wide plan. The area would need to create a Community Development Authority to conform with Wisconsin law.
Storm water drainage.	First, the need and type of system should be determined. A storm water drainage system can be developed and implemented through a Community Development Grant and administered by the sanitary district.

Planning Element	Implementation
Manitowoc Beach area lack of a focus and lack of a park.	The Town or the Community Development Authority should obtain park land either by obtaining tax delinquent land or utilizing the LAWCON and/or Community Development Program for money to purchase land. Any utility facility which is constructed above ground should be done so in a manner that it can serve as a focus or be pleasing to look at. The elevated tank would serve as an excellent focus and should have the name Manitowoc Beach on it which would be lit at night. The construction of a neighborhood facility should be considered. This is particularly true of a fire station which would serve the area plus support the main station at Shoto. The area should also consider the construction of a community center. Both of these projects would be eligible activities under the Community Development Program.
Memorial Drive street lights and street name signs on Memorial Drive.	The Citizen's Committee should meet with State Highway representatives from the Green Bay District to talk about both of these needs. It is somewhat unfortunate that neighborhood streets rely so much on a state highway for their connection but this is the situation and hopefully the State Highway Department will understand the importance of the need for street name signs on Memorial Drive. They do provide cross overs in the median so it would seem only reasonable that they would be willing to permit street name signs. Street lights are another question. They possibly could be purchased through the Community Development Program, but maintenance would be another matter. Possibly the sanitary district could operate and maintain them. If the decision is made to proceed with street lights on Memorial Drive possibly they could be installed at only a few intersections to determine if they provide the desired, anticipated affect.

Zoning Text

It is proposed that the Manitowoc Beach area through the Town of Two Rivers request the County to amend its Zoning Ordinance. This is necessary not because of any County inadequacy, but rather because there are some unique needs and problems, both existing and future, in the area that need special consideration. It is recommended that there be additions to the text including an R-4 Single Family Residential district and an R-5 Multiple Family Residential district to be utilized only when public utilities are installed. These districts will permit smaller lots, smaller setbacks, and more restrictive uses than are presently permitted in the County Ordinance. It is further recommended that a B-3 Business district be developed specifically to permit the types of businesses existing or desired in the Manitowoc Beach area. It is also recommended that a C-2 Conservancy district be developed which would be more restrictive than that presently permitted.

Details of the Zoning districts are as follows:

R-4 RESIDENTIAL DISTRICT

The following regulations shall apply in all R-4 Districts:

Purpose: To be used only in areas with central public sewer available to the lot and connected to any principal structure on the lot.

A. PERMITTED PRINCIPAL USES.

1. One family dwellings.
2. Churches and similar places of worship.
3. Convents and monasteries.
4. Public schools, parks, playgrounds and recreational areas.
5. Public utilities.
6. Public buildings.

B. PERMITTED ACCESSORY USES. The following accessory uses are permitted if located on the same lot with the permitted use:

1. Private garage.
2. Customary home occupations or professional offices

conducted by the resident only, provided that there be no external evidence of such use except an announcement or professional sign not over three square feet in area.

3. Other customary accessory uses and buildings, provided such uses are clearly incidental to the principal use and do not include any activity commonly conducted as a business.

C. CONDITIONAL USES. The following uses are permitted on issuance of a special permit as provided in Section XII.

1. Nursing and convalescent homes.

D. YARD REQUIREMENTS.

1. A front yard shall be as required of 25 feet.

2. Side yards shall each have a width of not less than 10 feet.

E. HEIGHT AND AREA REQUIREMENTS.

1. No building shall be erected to a height in excess of 35 feet.

2. Lot width shall not be less than 60 feet.

3. Lot area shall not be less than 6000 square feet.

R-5 RESIDENTIAL DISTRICT

The following regulations shall apply in all R-5 Districts:

Purpose: To be used only in areas with central public sewer available to the lot and connected to any principal structure on the lot.

A. PERMITTED PRINCIPAL USES.

1. Multiple family dwellings of 4 or more dwelling.

B. PERMITTED ACCESSORY USES.

1. Same as R-4 Districts.

C. CONDITIONAL USES. The following uses are permitted on issuance of a special permit as provided in Section XII.

1. Same as R-4 Districts.

D. YARD REQUIREMENTS.

1. A front yard shall be as required of 25 feet.

2. Side yards shall each have a width of not less than 10 feet.

E. HEIGHT AND AREA REQUIREMENTS.

1. No building shall be erected to a height in excess of 35 feet.

2. Lot width shall not be less than 90 feet.

3. Lot area shall not be less than 10,000 feet with 2,500 sq. ft. per unit.

B-3 BUSINESS DISTRICTS

The following regulations shall apply in all B-3 Districts:

Purpose: To be used only in areas with central public sewer available to the lot and connected to any principal structure on the lot.

A. PERMITTED USES.

1. Grocery stores.

2. Business and professional offices.

3. Taverns.

4. Private clubs and lodges.

B. CONDITIONAL USES. The following uses are permitted on issuance of a special permit as provided in Section XII.

1. Stores and shops for conducting retail or service business.

2. Wholesale establishment.

3. Warehouse.

4. Automobile sales and services dealerships.

C. YARD REQUIREMENTS.

1. A front yard shall be required of 40 feet.

2. Side yards shall each have a width of not less than 10 feet.

3. Rear yard shall be not less than 25 feet.

D. HEIGHT AND AREA REQUIREMENTS.

1. No building shall be erected to a height in excess of 35 feet.

2. Lot area shall be not less than 10,000 feet.

C-2 CONSERVANCY DISTRICTS

The following regulations shall apply in all C-2 Districts:

A. PERMITTED USES.

1. Harvesting of wild crops.

2. Hunting, fishing and trapping.

3. Forestry.

4. Nonresidential buildings and structures used for the raising of wildlife and fish and the practice of forestry.

5. Public parks and recreational areas.

B. CONDITIONAL USES. The following uses are permitted in issuance of a special permit as provided in Section XII.

1. Filling of marsh lands or low lands.

2. Removal of top soil, sand, gravel, stone.

C. YARD REQUIREMENTS.

1. Front yard shall be as required in County Zoning Ordinance Setbacks.

2. Side yards shall each have a width of not less than 25 feet.

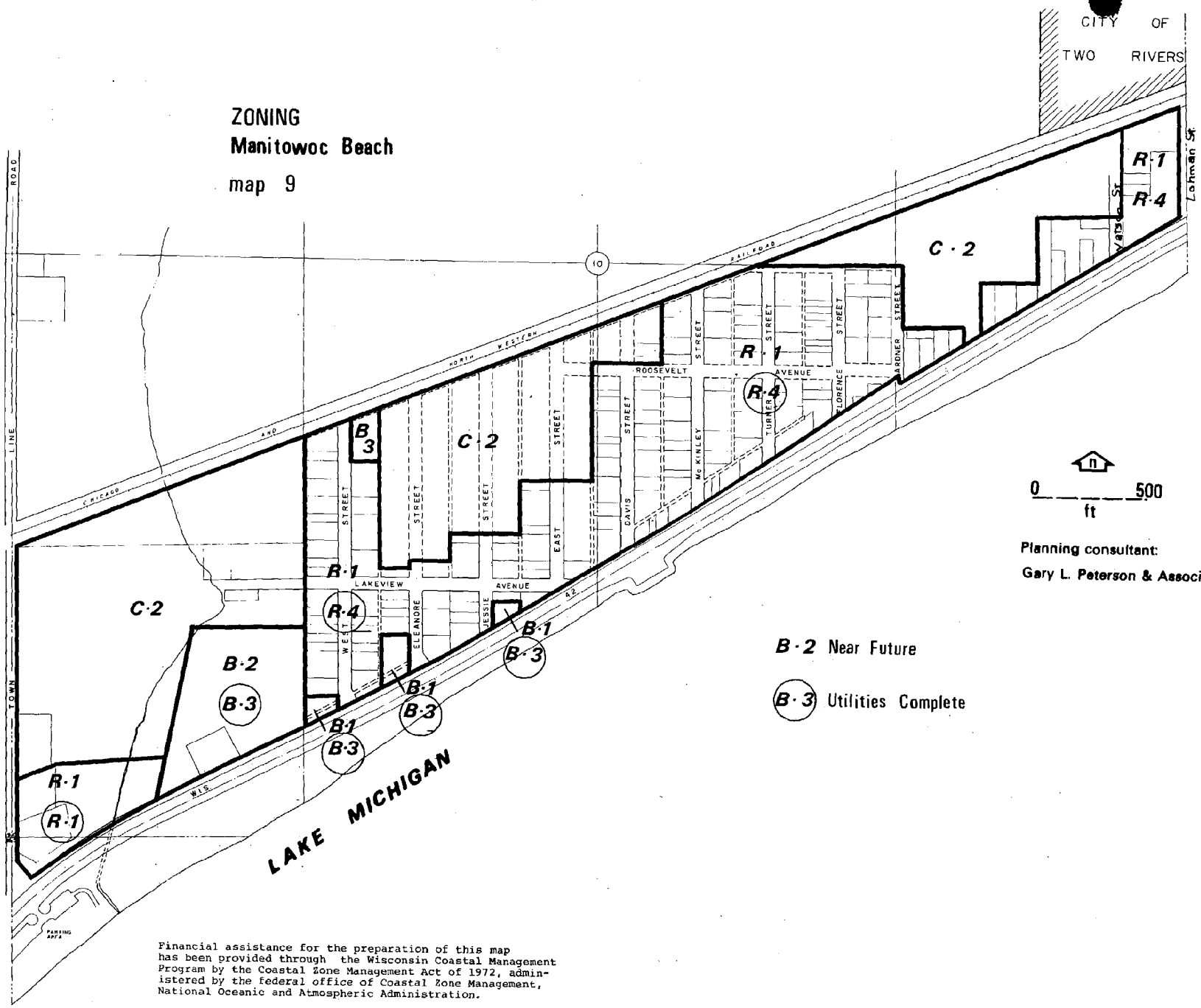
D. AREA REQUIREMENTS.

1. Lot area shall not be less than one acre.

Zoning Map

Zoning map changes are being recommended for both the immediate future and for when the area is served with central utilities. The immediate changes proposed are to bring the existing zoning more into line with the existing situation in the Manitowoc Beach area. The future zoning changes are proposed to account for the fact that central public utilities have been installed. These changes are shown on the proposed Zoning Map.

ZONING
Manitowoc Beach
map 9



Financial assistance for the preparation of this map has been provided through the Wisconsin Coastal Management Program by the Coastal Zone Management Act of 1972, administered by the federal office of Coastal Zone Management, National Oceanic and Atmospheric Administration.

Appendix 1

ASSESSMENTS

The assessed property values have been totaled for the Manitowoc Beach area. This information is important both as a base to build and operate utility systems and as a base record to see how much the property value in the area will improve with the elimination of the major water and sewer problems. The following is a table which summarizes the assessed values:

Real Estate Property Value $	RESIDENTIAL		MERCANTILE		OTHER	TOTAL	
	Land	Structures	Land	Structures	Land	Land	Structures
As Assessed	141,450	745,475	42,900	301,600	4,700	189,050	1,047,075
As Equalized	314,333	1,656,611	95,333	670,222	10,444	420,110	2,326,833

Total Equalized Value of Land and Structures = $2,746,943

Appendix II

DENSITY AND MAXIMUM POPULATION HOLDING CAPACITY

Single Family

Used 6 units per acre based on 6,000 to 7,000 square feet net lot size with some of the acre not developed.

Used 3.14 people per household based on County Planning Department survey.

Multiple Family

Used 16 units per acre based on 2,500 square feet net lot size with some of the acre not developed.

Used 2.5 people per household based on a smaller household in an apartment than in a single family home.

Existing Population

Used an existing population of 402 people based on County survey that found 425 people in 135 units while this study only found 128 units.

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MANITOWOC BEACH LAND USE AND UTILITY STUDY

Town of Two Rivers, Wisconsin

Sanitary Sewer Study

Engineering Consultant: Brey, Stuewe and Braun

Planning Consultant: Gary L. Peterson & Associates

February, 1978

Financial assistance for the preparation of this report has been provided through the Wisconsin Coastal Management Program by the Coastal Zone Management Act of 1972, administered by the federal office of Coastal Zone Management, National Oceanic and Atmospheric Administration.

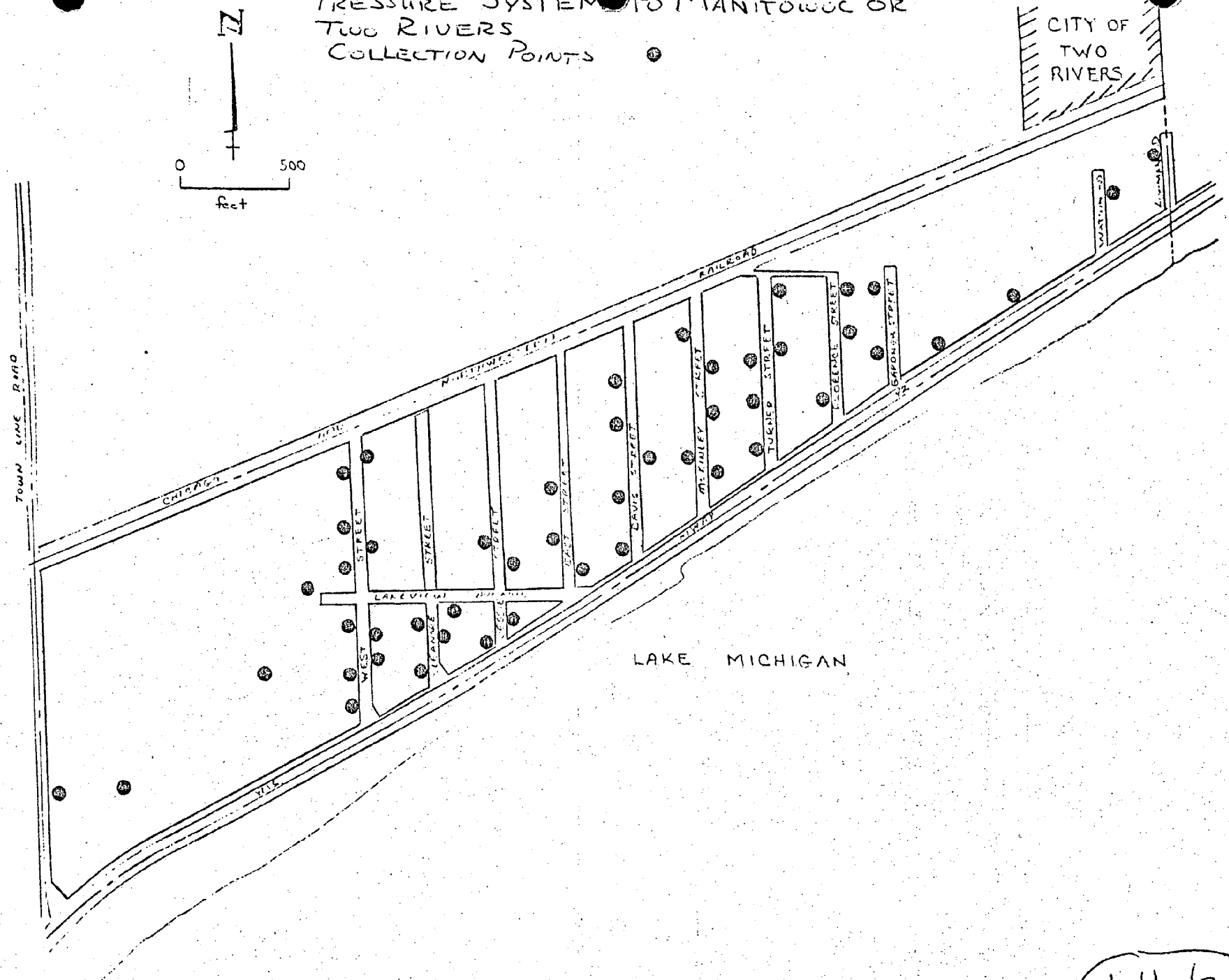
SANITARY SEWER SYSTEM

SUMMARY OF MANITOWOC BEACH ALTERNATIVES

Alternative	Present Worth	First Cost	O & M Annual Cost
Pressure System East of West St. to Two Rivers	$595,450	$493,160	$9,260
East of West St. to Two Rivers (4 Lift Stations)	641,770	561,250	7,150
West of East St. to Manitowoc East of Davis St. to Two Rivers	666,570	596,450	6,230
Pressure System West of Lohman to Manitowoc	670,000	564,450	9,550
West of Lohman to Manitowoc (5 Lift Stations)	711,420	617,800	8,320
Pressure System East of Woodland to Two Rivers	742,850	637,300	9,550
East of West St. to Two Rivers (1 Lift Station)	744,470	710,850	2,990
East of Woodland Dr. to Two Rivers (5 Lift Stations)	753,420	659,800	8,320
East of Woodland Dr. to Two Rivers (2 Lift Stations)	789,100	733,350	4,950
West of Lohman to Manitowoc (2 Lift Stations)	812,100	756,350	4,950
East of Woodland Dr. to Two Rivers (1 Lift Station)	1,008,620	975,000	2,990

MANITOWOC BRANCH

PRESSURE SYSTEM TO MANITOWOC OR TWO RIVERS COLLECTION POINTS



1,4,6

SA-3

SANITARY SEWER SYSTEM

PRESSURE SYSTEM EAST OF WEST ST. TO TWO RIVERS

Installation	$493,160		
Power	2,600		$235\ (P/A)^{8}_{28}$
Maintenance	59,670		$5400\ (P/A)^{8}_{28}$
Repair Pumps at 7 yrs.	13,800		$79(300/\text{pump})\ (P/F)^{8}_{7}$
Replace Pumps at 14 yrs.	21,520		$79(800/\text{pump})\ (P/F)^{8}_{14}$
Repair Pumps at 21 yrs.	4,700		$79(300/\text{pump})\ (P/F)^{8}_{21}$
	$595,450	----	$493,160 initial cost
			$102,290 costs over 28 yr. period
			$9,260/yr. over 28 yrs. at 8%

SANITARY SEWER SYSTEM

PRESSURE SEWER EAST OF WOODLAND TO TWO RIVERS

Installation	$637,300		
Power	2,760	$250 (P/A)$^{8}_{28}$	
Maintenance	59,670	5400 (P/A)$^{8}_{28}$	$4400 Salary $800 Spare Pump $200 Parts
Repair Pumps at 7 yrs.	14,900	85 ($300/pump) (P/F)$^{8}_{7}$	
Replace Pumps at 14 yrs.	23,150	85 ($800/pump) (P/F)$^{8}_{14}$	
Repair Pumps at 21 yrs.	5,070	85 ($300/pump) (P/F)$^{8}_{21}$	
	$742,850	----	$637,300 initial cost
			$105,550 costs over 28 yr. period
			$9,550/yr. over 30 yrs. at 8%

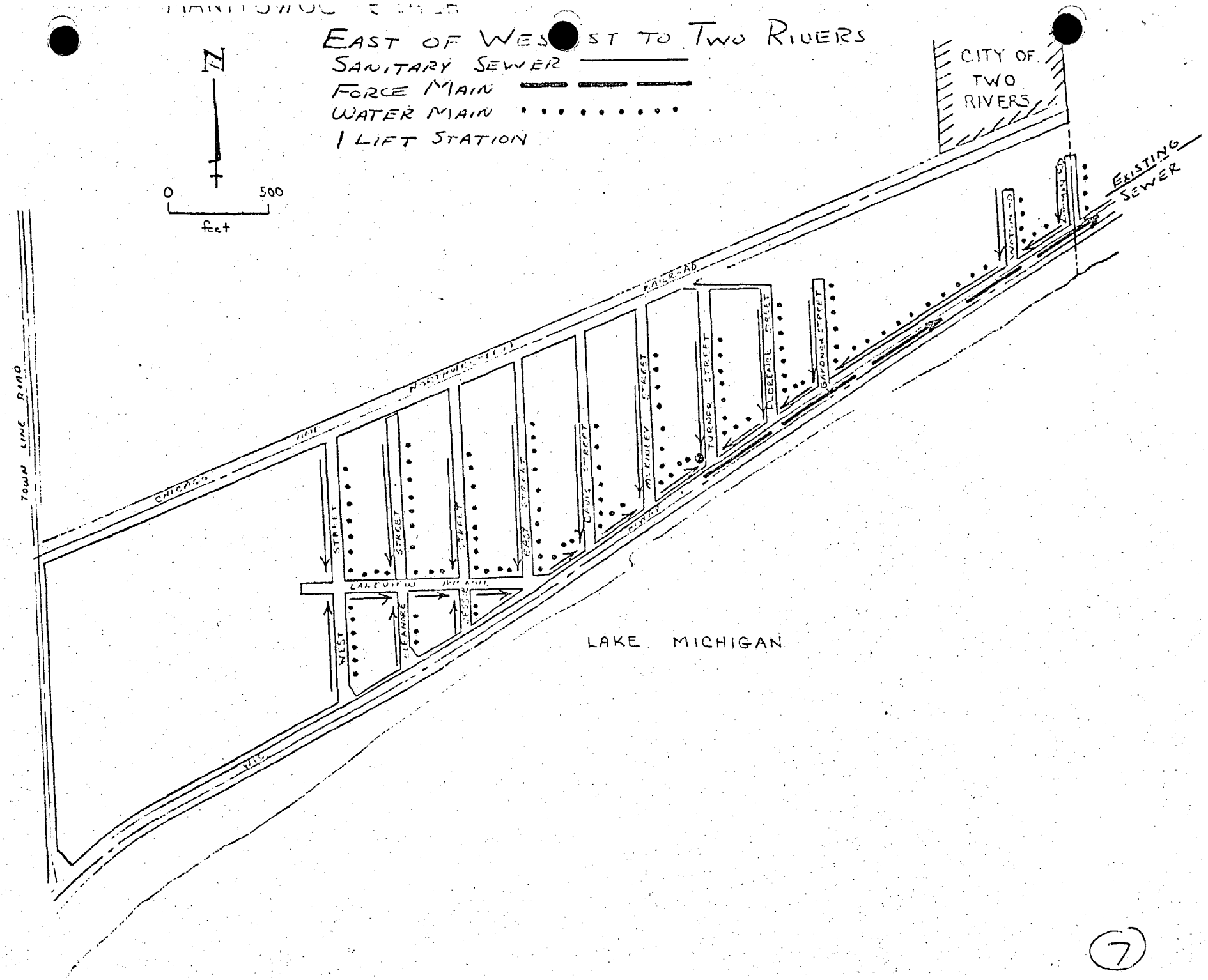
SANITARY SEWER SYSTEM

PRESSURE SEWER WEST OF LOHMAN TO MANITOWOC

Installation	$564,450	
Power	2,760	$250 (P/A)$^{8}_{28}$
Maintenance	59,670	$5400 (P/A)^{8}_{28}$ $4400 Salary, $800 Spare Pump, $200 Parts
Repair Pumps at 7 yrs.	14,900	85 ($300/pump) $(P/F)^{8}_{7}$
Replace Pumps at 14 yrs.	23,150	85 ($800/pump) $(P/F)^{8}_{14}$
Repair Pumps at 21 yrs.	5,070	85 ($300/pump) $(P/F)^{8}_{21}$
	$670,000	---- $564,450 initial cost

$105,550 costs over 28 yr. period

$9,550/yr. over 30 yrs. at 8%


EAST OF WEST TO TWO RIVERS
SANITARY SEWER
FORCE MAIN
WATER MAIN
1 LIFT STATION
N
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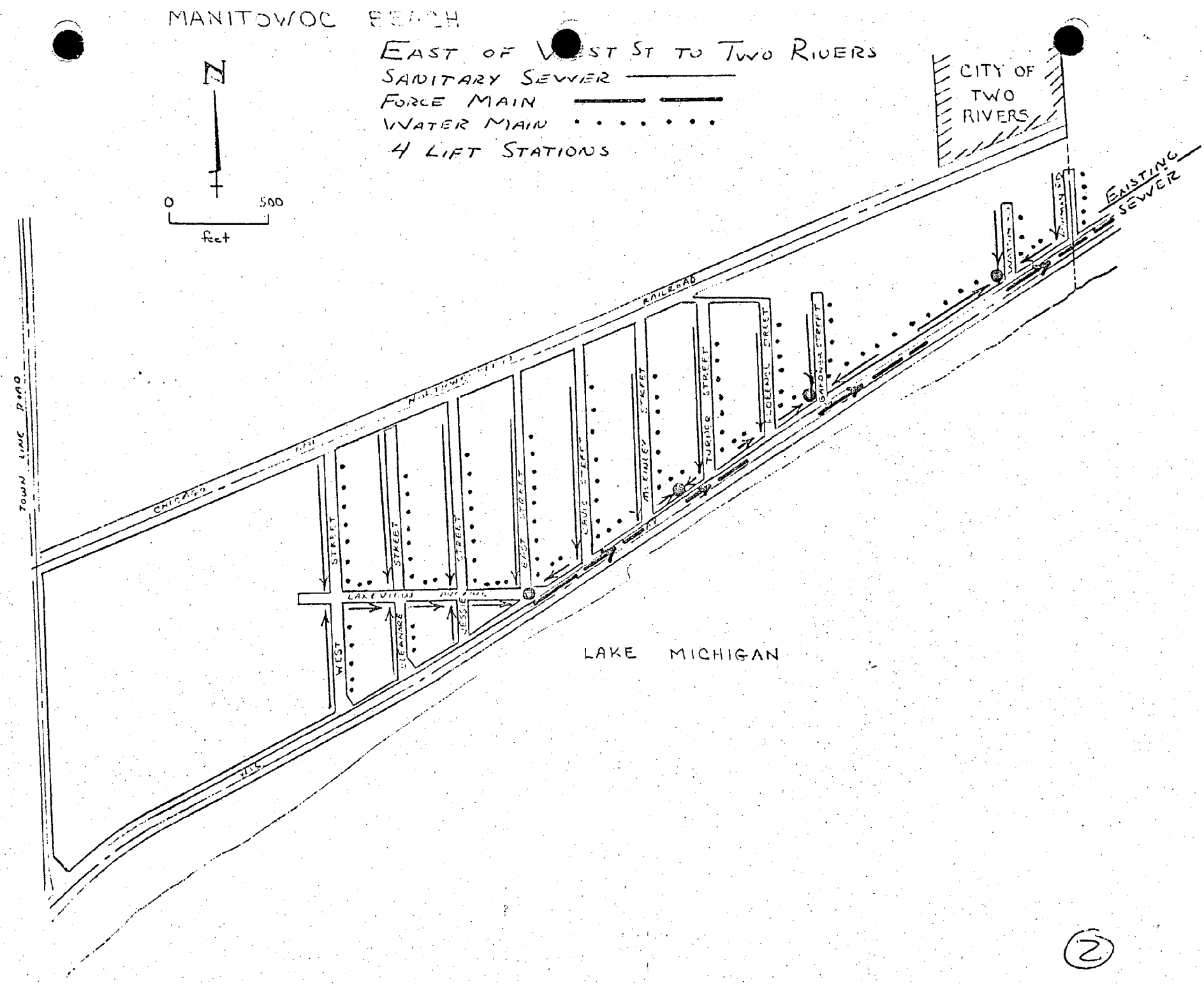
500
feet
CITY OF TWO RIVERS
EXISTING SEWER
TOWN LINE ROAD
RAILROAD
WEST STREET
LAKEVIEW AVENUE
LAKE MICHIGAN
7

SA-7


MANITOWOC BEACH
EAST OF WEST ST TO TWO RIVERS
SANITARY SEWER
FORCE MAIN
WATER MAIN
4 LIFT STATIONS
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feet
CITY OF TWO RIVERS
EXISTING SEWER
RAILROAD
TOWN LINE ROAD
WEST STREET
STREET
STREET
EAST STREET
LAKE VIEW AVENUE
JESSIE
CLEANORE
McKINLEY STREET
TURNER STREET
FLORENCE STREET
GARDNER STREET
LAKE MICHIGAN
2

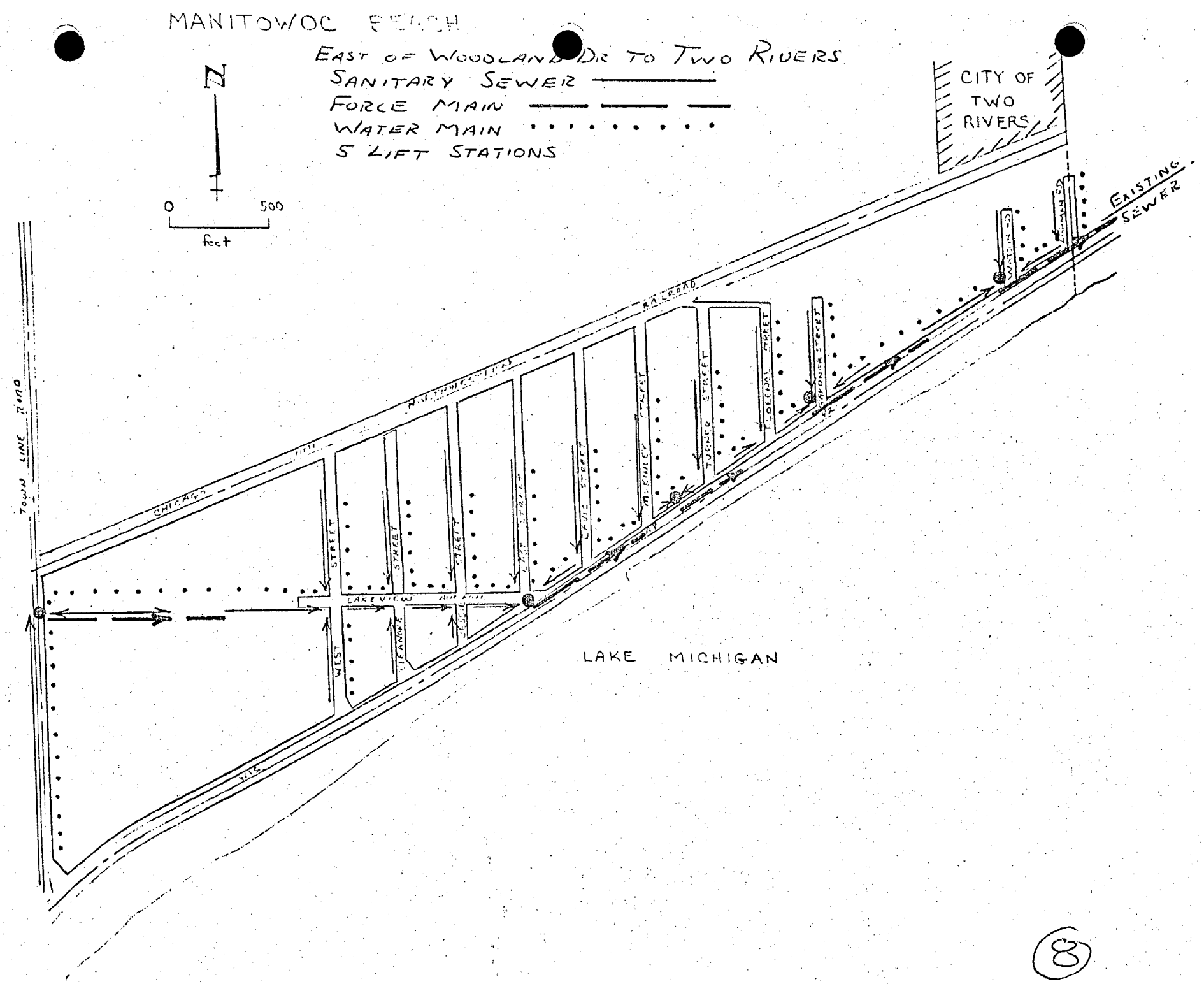
SA-8

Feb. 14, 1978

SANITARY SEWER SYSTEM

EAST OF WEST ST. TO TWO RIVERS
(4 Lift Stations)

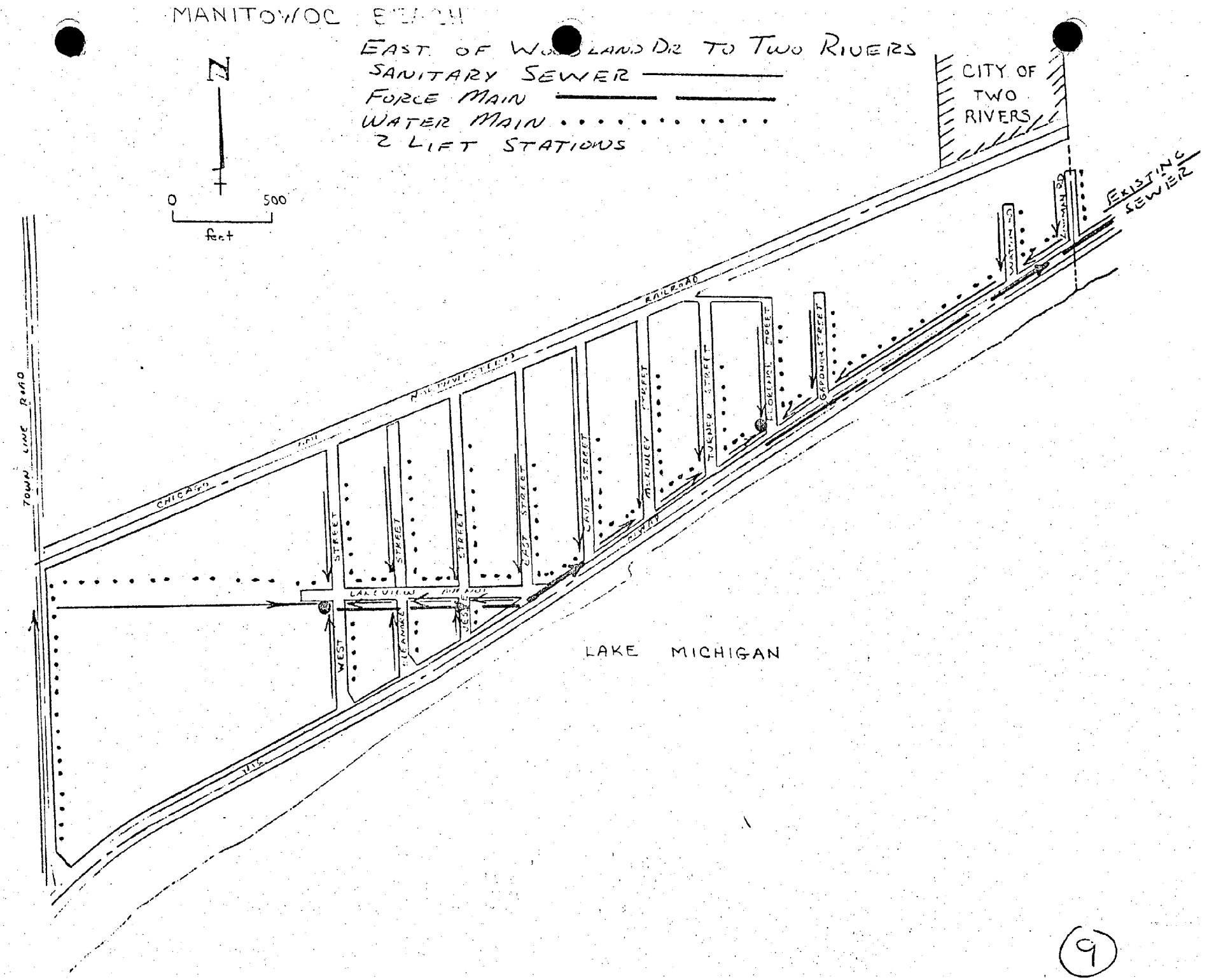
Installation	$561,250		
Power	19,590		$4(435)\ (P/A)^{8}_{30}$
Maintenance	59,670		$5300\ (P/A)^{8}_{30}$ $1200 Parts $4100 Salary
Replace Pumps @ 15 yrs.	1,260		$4(1000)\ (P/F)^{8}_{15}$
	$641,770	----	$561,250 initial cost
			$80,520 costs over 30 yr. period
			$7,150/yr. over 30 yrs @ 8%


MANITOWOC BEACH
EAST OF WOODLAND DR TO TWO RIVERS
SANITARY SEWER
FORCE MAIN
WATER MAIN
5 LIFT STATIONS
N
0
500
feet
CITY OF TWO RIVERS
EXISTING SEWER
RAILROAD
TOWN LINE ROAD
LAKE VIEW
WEST STREET
LAKE MICHIGAN
8

SANITARY SEWER SYSTEM

EAST OF WOODLAND DR. TO TWO RIVERS
(5 Lift Stations)

Installation	$659,800		
Power	24,490		$5(435)\ (P/A)^{8}_{30}$
Maintenance	67,550		$6000\ (P/A)^{8}_{30}$ $4500 Salary $1500 Parts
Replace Pumps at 15 yrs.	1,580		$5(1000)\ (P/F)^{8}_{15}$
	$753,420	----	$659,800 initial cost
			$93,620 costs over 30 yr. period
			$8,320/yr. over 30 yrs. at 8%


MANITOWOC BEACH
EAST OF WOODLAND DR TO TWO RIVERS
SANITARY SEWER
FORCE MAIN
WATER MAIN
2 LIFT STATIONS
N
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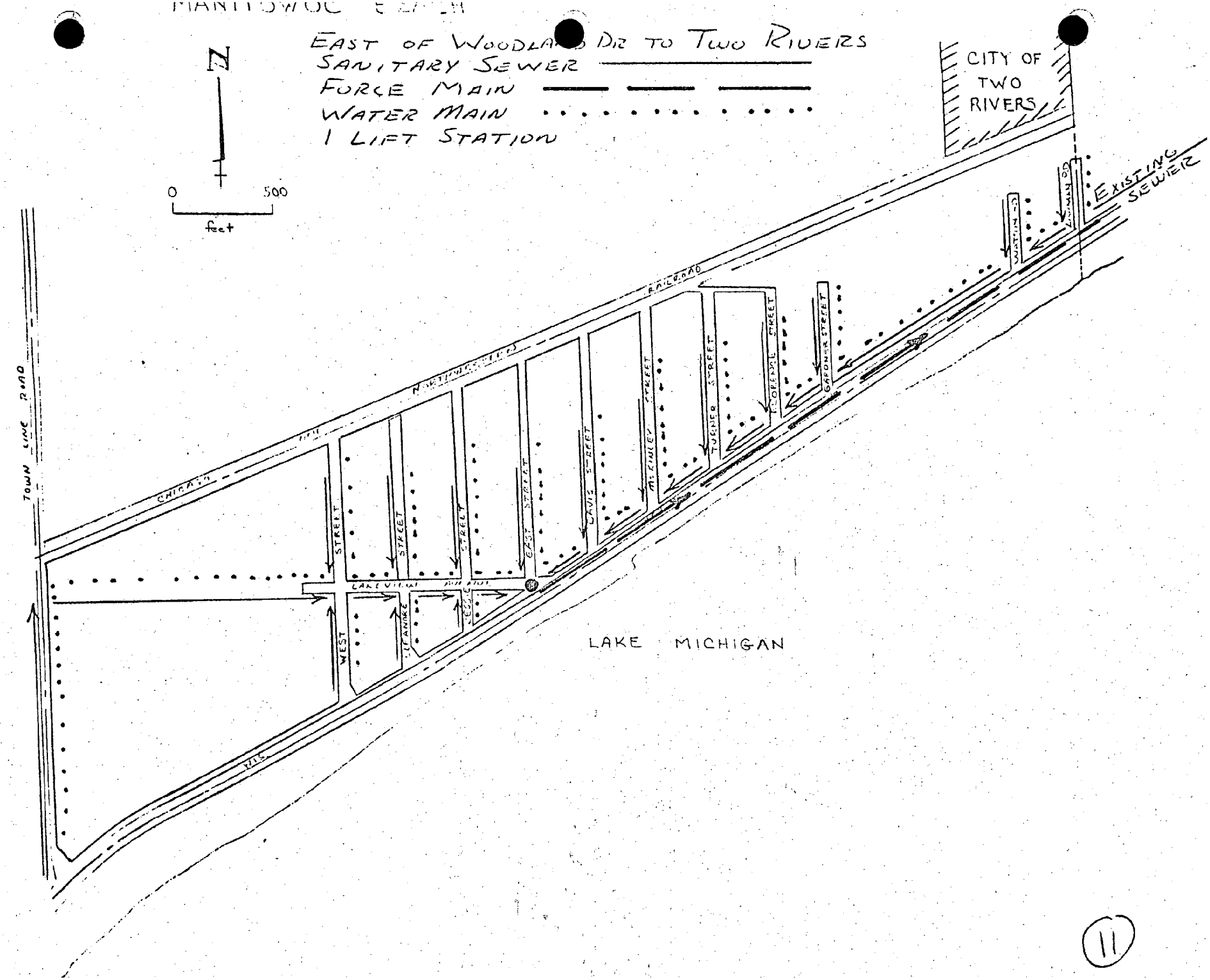
500
feet
CITY OF TWO RIVERS
EXISTING SEWER
RAILROAD
CHICAGO
TOWN LINE ROAD
WEST STREET
LAKEVIEW
CLEANORE
JESSE
EAST STREET
LAVIS STREET
MCKINLEY STREET
TURNER STREET
FLORENCE STREET
GARDNER STREET
LAKE MICHIGAN

SA-12

9


MANITOWOC
EAST OF WOODLAND DR TO TWO RIVERS
SANITARY SEWER
FORCE MAIN
WATER MAIN
1 LIFT STATION
N
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500
feet
CITY OF TWO RIVERS
EXISTING SEWER
RAILROAD
TOWN LINE ROAD
WEST STREET
STREET
STREET
EAST STREET
DAVIS STREET
McKINLEY STREET
TURNER STREET
FLORENCE STREET
GARDNER STREET
LAKE MICHIGAN

SA-13

11

MANITOWOC BEACH

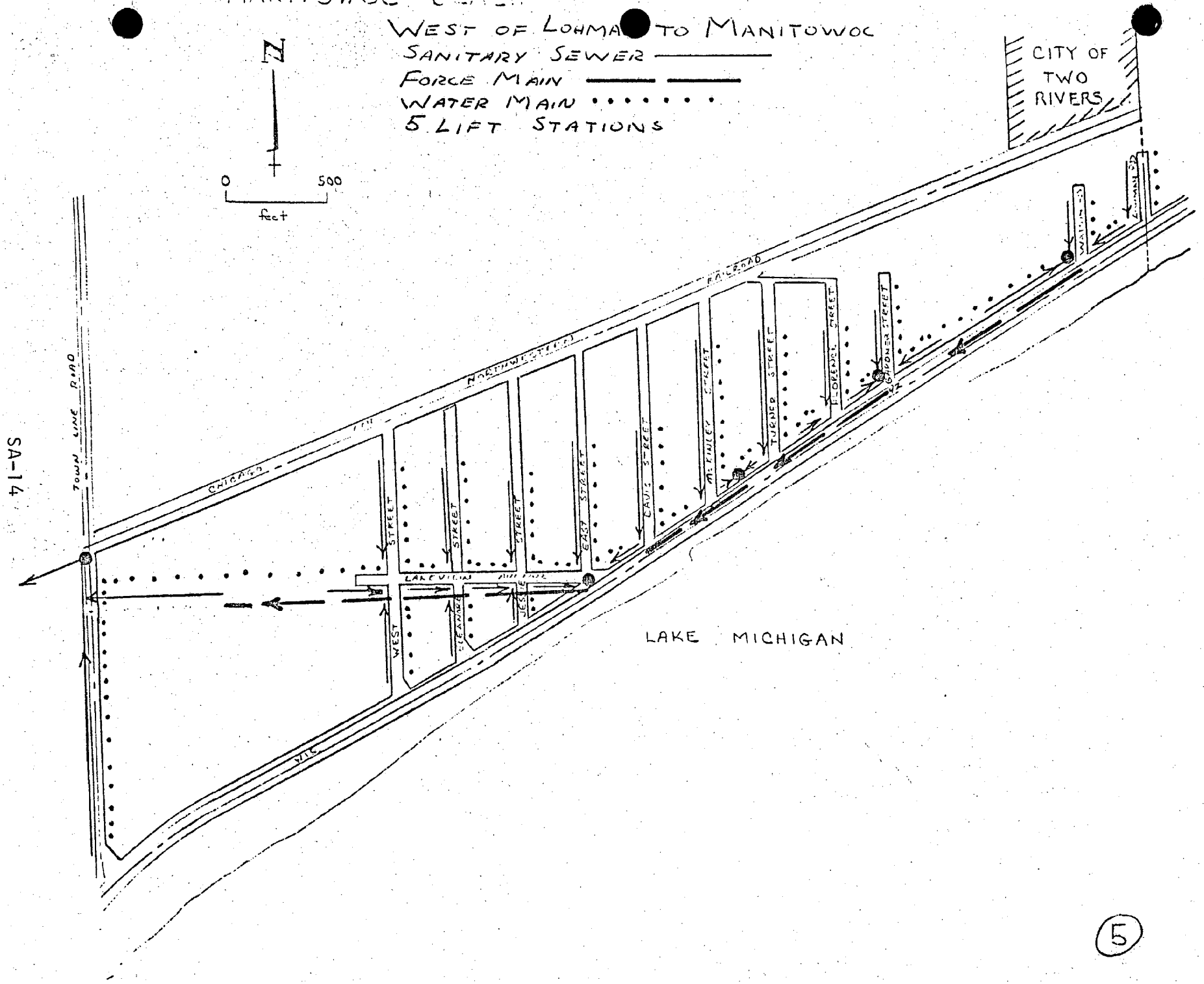
WEST OF LOHMA TO MANITOWOC

SANITARY SEWER ——

FORCE MAIN —— ——

WATER MAIN .....

5 LIFT STATIONS



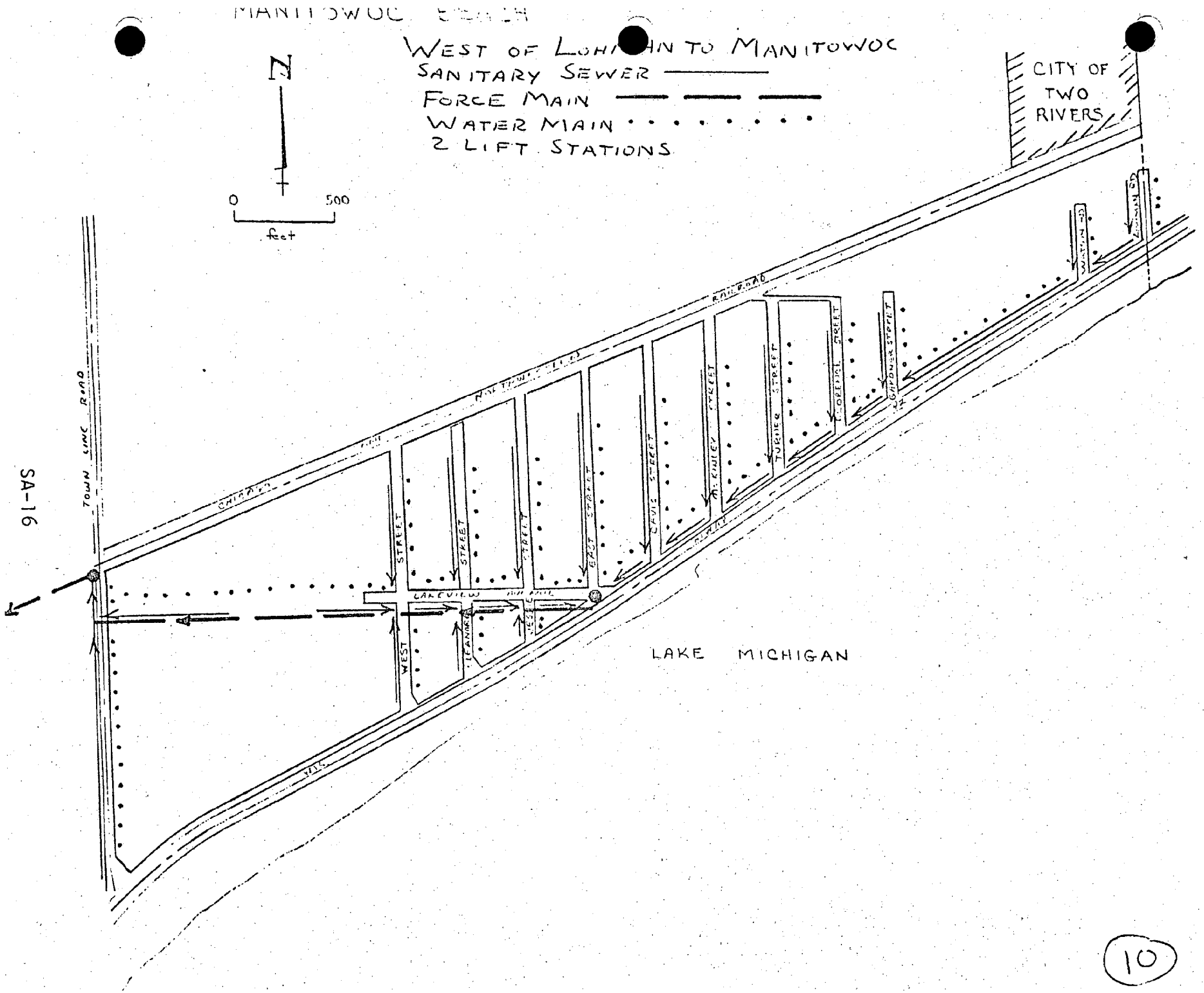
SA-14

(5)

SANITARY SEWER SYSTEM

WEST OF LOHMAN TO MANITOWOC
(5 Lift Stations)

Installation	$617,800		
Power	24,490		$5(435)\ (P/A)^{8}_{30}$
Maintenance	67,550		$6000\ (P/A)^{8}_{30}$ $1500 Parts, $4500 Salary
Replace Pumps at 15 yrs.	1,580		$5(1000)\ (P/F)^{8}_{15}$
	$711,420	----	$617,800 initial
			$93,620 costs over 30 yr. period
			$8,320/yr. over 30 yrs. at 8%


MANITOWOC BEACH
WEST OF LOHMAN TO MANITOWOC
SANITARY SEWER
FORCE MAIN
WATER MAIN
2 LIFT STATIONS
N
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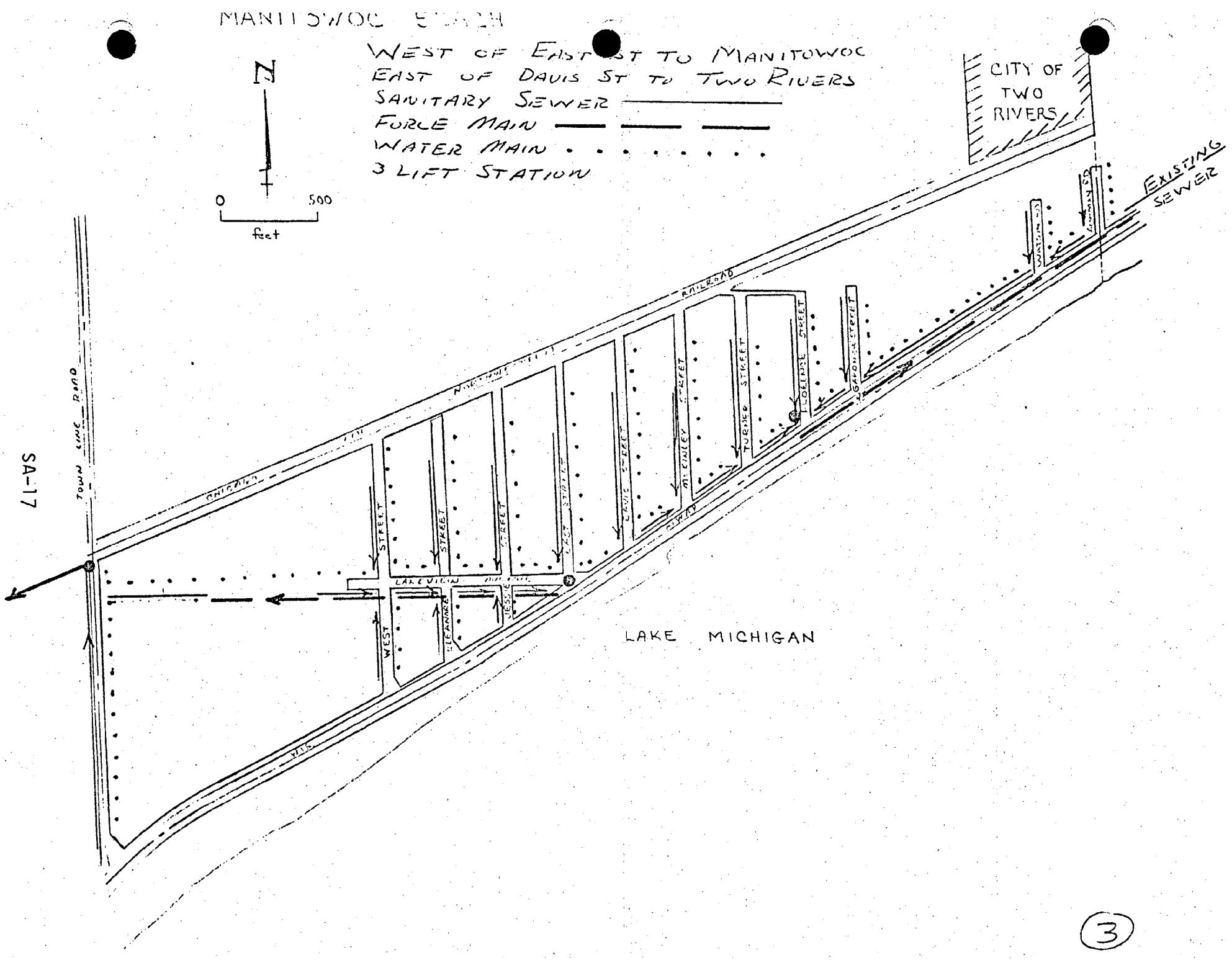
500
feet
CITY OF TWO RIVERS
TOWN LINE ROAD
RAILROAD
WEST STREET
LAKEVIEW
LAKE MICHIGAN

SA-16

10


MANITOWOC
WEST OF EAST ST TO MANITOWOC
EAST OF DAVIS ST TO TWO RIVERS
SANITARY SEWER
FORCE MAIN
WATER MAIN
3 LIFT STATION
N
0
500
feet
CITY OF TWO RIVERS
EXISTING SEWER
RAILROAD
TOWN LINE ROAD
WEST STREET
LAKEVIEW
LAKE MICHIGAN
3

SA-17

SANITARY SEWER SYSTEM

WEST OF EAST ST. TO MANITOWOC
EAST OF DAVIS TO TWO RIVERS
(3 Lift Stations)

Installation	$596,450	
Power	14,700	$3(435)\ (P/A)^{8}_{30}$
Maintenance	54,000	$4800\ (P/A)^{8}_{30}$ $900 Parts $3900 Salary
Replace Pumps at 15 yrs.	1,420	$3\ (1500)\ (P/F)^{8}_{15}$
	$666,570	---- $596,450 initial cost
		$70,120 costs over 30 yr. period
		$6,230/yr. over 30 yrs. at 8%

SANITARY SEWER SYSTEM

The purpose of the economic study we have conducted for the Manitowoc Beach Sanitary District is to find the best alternative. A good method of comparing alternatives is called present worth. Present worth is the amount all the payments for installation, maintenance, pump replacement, and electricity are worth at this date at a given interest rate. It is a good method of comparing alternatives because it puts all the alternatives at the same level. For example, if one alternative has a small first cost, but will require a large amount of maintenance, the maintenance will show up in the present worth figure. Many times the present worth figure will show the cheapest first cost is not always the best alternative.

One of the alternatives for the Manitowoc Beach area is a Pressure Sewer System. Pressure sewer systems are a fairly new idea and are in use in only a small number of communities. In a pressure system, the sewage from 1 to 4 houses flows into a holding tank. The holding tanks contain one or two grinder pumps which grind the sewage and pump it into the main line. These pumps provide enough pressure to allow the sewage to flow on a flat slope or even uphill. Aside from being ideal in any terrain the pressure sewers are easier to install because they only have to be approximately 6 feet deep. By being shallow sewers they are much cheaper to install and there is less chance of disturbing the ground water table. There is also less chance of infiltration from ground water using a pressure sewer.

Some disadvantages of a pressure system are, the pumps have a short life. The manufacturer claims the pumps have a life of 24 years with a major overhaul at twelve years, but places that have used these pumps have found these pumps need a major overhaul at 7 yrs. and may have to be replaced at 14 yrs. The large number of units makes this system more expensive to maintain and 2 or more spare pumps will have to be on hand to handle any emergency situations. If a pump breaks down the cost of replacement will have to be handled by the Sanitary District. Each pumping station has to have an above ground electrical control panel. Leaving these control panels out in the open like this, there is a possibility of vandalism and damage from snowplows.

A second alternative would be a gravity system with 4 or 5 lift stations. The use of a large number of lift stations will keep the sewers at a shallower depth. This shallower depth makes installation cheaper and will have less effect on the ground water table than a deep sewer. Advantages over a pressure system are, a fewer number of pumping stations and the costs of maintenance are smaller. Some disadvantages are, this system is deeper than a pressure system which will make installation more expensive because of wet sandy soil in the area. Some places along Memorial Drive will require shoring

SANITARY SEWER SYSTEM

because of a lack of usable area in the right-of-way. Conventional sewers of this type could have some infiltration from the ground water and because of their greater depth, they also could lower the ground water table by creating an underground river along the gravel bedding for the sewer.

A third alternative would be a gravity system with one or two lift stations. About the only distinct advantage of this system is, there is only a small amount of maintenance because there would be one or two lift stations. The disadvantages of this system are, the deep sewers will require shoring along the entire Memorial Drive section, there will be a greater possibility of lowering the water table and infiltration because of the added depth. Also the deep sewers will be hard to get at if a section of sewer must be repaired or connections made.

The prices we have arrived at would be the basic construction cost. To arrive at a project cost an approximate figure of 20% should be added for contingencies, engineering and legal fees to cover unforseen costs or changes in the system during construction.

CITY OF TWO RIVERS SEWER SERVICE

City Rates

Present

402 x 100 x 30 = 1,206,000 gallons or 161,230 C.F.

1st 20,000 = 106.65 ±

Next 141,230 @ 0.44 = 564.92 ±

$671.57 ± /Mo. x 1.4 = $940.20

940.20 ÷ 115 = 8.20 ± each unit

+Local O & M 6.30

$14.50 ± each unit

Maximum Development

1543 x 100 x 30 = 4,629,000 gallons or 618,850 C.F.

1st 20,000 = 106.65 ±

Next 180,000 @ 0.44 = 792.00 ±

Next 418,850 @ 0.40 = 1,675.40 ±

$2,574.05 x 1.4 = 3,603.67

3,603 ÷ 506 = 7.10/mo. each unit

+Local O & M (8,670/yr) 1.50/mo. each unit

8.60/mo. each unit

CITY OF MANITOWOC SEWER SERVICE

Probable - They have not finalized current rate study

Rates based on same provided to Town of Manitowoc Rapids Sanitary District #2

Category "A" O & M - 0.353/1000 Gal

Category "B" (Present Debt Service on S.T.P.)

$\frac{1,543 \times 100}{15,500,000} \times \$318,737/yr. = 3,172.98/yr.$

Category "C" (Capital Cost Participation Existing Sewer System)

M.R.S.D. #2 (17,000/yr.) $\frac{154,300}{600,000} = 4,371.83/yr.$

Present

"A" 402 x 100 x 365 x 0.403/1000 = 5,913.22/yr.

"B" = 3,172.98/yr.

"C" = 4,371.83/yr.

$13,458.03/yr.

or 1,121.50/mo.

1,121.50 ÷ 115 units = $9.75/mo. each unit

+Local O&M ($8,670/yr.) = 6.30/mo. each unit

$16.05/mo.

Maximum Development

"A" 1543 x 100 x 365 x 0.403/1000 = 22,696.76

"B" = 3,172.98

"C" = 4,371.83

$30,241.57/yr.

or 2,520.13/mo.

2,520.13 ÷ 506 = 5.00/mo. each unit

+Local O&M ($8,670/yr.) = 1.50/mo. each unit

$6.50/mo.

MANITOWOC BEACH LAND USE AND UTILITY STUDY

Town of Two Rivers, Wisconsin

Water Study

Engineering Consultant: Brey, Stuewe and Braun

Planning Consultant: Gary L. Peterson & Associates

February, 1978

Financial assistance for the preparation of this report has been provided through the Wisconsin Coastal Management Program by the Coastal Zone Management Act of 1972, administered by the federal office of Coastal Zone Management, National Oceanic and Atmospheric Administration.

Feb. 15, 1978

MANITOWOC BEACH AREA

WATER SYSTEM (LOCAL DISTRIBUTION SYSTEM)

6"	-	$10.00	Valves w/M.H. & Casting	-	$550.00
8"	-	$12.00	Valves w/M.H. & Casting	-	$600.00
10"	-	$14.00	Valves w/M.H. & Casting	-	$650.00

Fire Hydrants w/Leads, Valve & Valve Box - $750.00
Services 1" Copper w/Curb Stop @ 4.00/ft.

Local System (east of Creek)

6500' - 6"	@ $10.00	=	$65,000
5200' - 10"	@ $14.00	=	72,800
12' - 6" Valves	@ $550.00	=	6,600
17' - 10" Valves	@ $650.00	=	11,050
27 Fire Hyd.	@ $750.00	=	20,250
250 Services	@ $120.00	=	30,000
SubTotal (Dist. System)		=	$205,700
Elevated Storage		=	100,000
Const. Costs Subtotal		=	$305,700
Contingencies, Engr., Legal @ 20%		=	61,140
Project Costs			$366,840

Local System (West of Creek)

Addition required to serve Woodland Dr. from Two Rivers

2300' - 10"	@ $14.00	=	$32,200
2 - 10" Valves	@ $550.00	=	1,100
4 Fire Hyd.	@ $750.00	=	3,000
20 Services	@ $120.00	=	2,400
Const. Cost Subtotal		=	$38,700
Contingencies, Engr. Legal @ 20%		=	7,740
Project Cost Additional			46,440

Total Project Costs $413,280

TOWN OF TWO RIVERS (INDEPENDENT WATER SYSTEM)

Well	$35,000	
Pump House	40,000	
Treatment	40,000	(Iron Removal, Hardness, Odor, Taste)
Const. Costs	115,000	
Contingencies, Engr., Legal 20%	23,000	
Project Costs	$138,000	

Project Costs	Water Supply	=	$138,000
	Distribution System	=	366,840
	Total for Area East of Creek	=	$504,840
	Area West of Creek	=	46,440
	Total for Study Area	=	$551,280

MANITOWOC BEACH AREA

WATER SYSTEM

6"	-	$10.00	Valves w/M.H. & Casting	-	$550
8"	-	$12.00	Valves w/M.H. & Casting	-	$600
10"	-	$14.00	Valves w/M.H. & Casting	-	$650
12"	-	$16.00	Valves w/M.H. & Casting	-	$700

Fire Hydrants w/Leads, Valve & Valve Box - $750.00
Services 1" Copper w/Curb Stop - 4.00/ft.

From Manitowoc

1700' - 12"	@	16.00	=	$27,200
1000' - 10"	@	14.00	=	14,000
3 - 12" Valves @	@	700.00	=	2,100
1 - 10" Valve	@	650.00	=	650
Const. Costs				$43,950
Contingencies, Engr., Etc. 20%				8,790
Project Costs				$52,740

Alt. (Possible St. along R.R.)

1700' - 12"	@	16.00	=	$27,200
1600' - 8"	@	12.00	=	19,200
3 - 12" Valves	@	700.00	=	2,100
2 - 8" Valves	2	600.00	=	1,200
Const. Costs				$49,700
Contingencies, Engr., Etc. 20%				9,940
Project Costs				$59,640

Alt. (Memorial Dr.)

200' - 12"	@	16.00	=	$ 3,200
1800' - 8"	@	12.00	=	21,600
2 - 12" Valves	@	700.00	=	1,400
2 - 8" Valves	@	600.00	=	1,200
Const. Costs				$27,400
Contingencies, Engr., Etc. 20%				5,480
Project Costs				$32,880

MANITOWOC BEACH AREA

WATER SYSTEM (FROM MANITOWOC)

Base: (Elevated Storage not Required)	
Local System (East of Creek)	$246,840
Connection to Manitowoc	52,740
Total Project	$299,580
Alt. #1 to Possible Street along Tracks	
Local System (East of Creek)	$246,840
Connection to Manitowoc	59,640
	$306,480
Alt. #2 along Memorial Drive	
Local System (East of Creek)	$246,840
Connection to Manitowoc	32,880
	$279,720

Note: Alternate #2 does not provide service to Woodland Dr. area

Feb. 15, 1978

MANITOWOC BEACH AREA

WATER SUPPLY

6" - $10.00	Valves w/M.H. & Castings	-	$550
8" - $12.00	Valves w/M.H. & Castings	-	$600
10" - $14.00	Valves w/M.H. & Castings	-	$650.
12" - $16.00	Valves w/M.H. & Castings	-	$700

Fire Hydrants w/Leads, Valve & Valve Bos - $750.00
Services 1" Copper w/Curb Stop - 4.00/ft.

From Two Rivers

Replace 831' of 6" with 10" from Columbus St. to west
Would suggest running parallel and leaving 6" in service by cutting in a new connection to the existing 12" on Columbus

1100' - 10" @ 14.00 =		$15,400
3 - 10" Valves @ 650.00 =		1,950
Const. Costs		$17,350
Contingencies, Engr., Etc. 15%		2,602
		$19,952

Feb. 15, 1978

MANITOWOC BEACH AREA

WATER SYSTEM (FROM TWO RIVERS)

Base:

Local System (East of Creek)	$366,840
Connection to Two Rivers	19,952
	$386,792

Note: Base does not service Woodland Dr. or area west of creek

Alt. #1 (include Woodland Dr. area)

Base	=	$386,792
Alt. #1		46,440
		$433,232

MANITOWOC BEACH AREA

WATER SYSTEM

WITH COMPLETE INTERCONNECTION WITH BOTH CITIES

City of Manitowoc Base	$299,580
City of Two Rivers Connection	19,952
	$319,532

WATER SYSTEM

MANITOWOC BEACH AREA

Comparative cost for water service from the City of Manitowoc, City of Two Rivers, and a local well were analyzed in this report, both through the initial cost and probable service charge, to determine the most feasible means of providing service to the area.

Local Well Supply

If a local source of supply is to be used, the initial cost would involve the drilling of a well, constructing a pumping station, and construction of an elevated storage tank. Since the wells within the area are known to be of poor quality, it is very possible that water would have to be treated before it could be used. The initial costs of this source of supply would at least double the cost of connecting to one of the neighboring communities. The cost of operation might be slightly less than the purchase price from the other communities depending upon what treatment would be required. A disadvantage to this source of water would be the possible quality of the water and the fact that should there be a problem with the well or pump, all the water is from the one source, and you could be without water for a period of time. This system would require an elevated storage tank to provide uniform pressure and an adequate supply for fire fighting.

City of Two Rivers Supply

Connecting to the City of Two Rivers would be the simplest means of obtaining a water supply of known quality. It would mean construction of a metering station and replacing of approximately 830 feet of 6" main within the City of Two Rivers. It would also require an elevated storage tank to provide sufficient pressure and supply for fire fighting. A disadvantage is that you are still obtaining water from only one source, and a broken main along Memorial Drive could disrupt service

The service charge for purchase of water is based upon current rates. It is apparent that with increasing operational costs due to increased power costs, wages, etc., that there will have to be adjustments to these rates. The City of Two Rivers does not presently have a rate for service outside of its' city limits, and if they do establish one, they will probably have to add a surcharge to cover certain costs born by the city.

City of Manitowoc Supply

Connecting to the City of Manitowoc would require extension of lines from Memorial Drive and Woodland Drive by one of three alternatives. One would be by extending the 12" water main north of Woodland Drive to a point where Lakeview Avenue extended would intersect, and then come over to West Street with a 10" line. A second would be to extend the 12" mains north on Woodland Drive to the railroad right-of-way to a point where a new street might parallel the railroad over to West Street. The third would be to continue along Memorial Drive to

WATER SYSTEM

MANITOWOC BEACH AREA

West Street with a 10" or 12" line. The disadvantage of the third alternative is that additional mains would then be required to service Woodland Drive and the area west of the Creek. Additional direct service from this alternative would be minimal due to the limited access off of Memorial Drive in this area.

The advantage of the connection to Manitowoc would be the elimination of an elevated storage tank, its problems with overflowing or freezing up during subzero weather, and the reduced initial cost.

Service charges are based upon current rates and reflect a 40% surcharge for service outside of the city limits. This surcharge is to cover other city costs that are not covered in the local rates. At present, the City of Manitowoc is attempting to get a 10% rate increase; however, there still is little difference in apparent rates required from Two Rivers or an independent supply. Again a disadvantage would be that the entire supply is coming from a single source that could be interrupted by a broken main.

Supply From Both Communities

An interconnection to both communities would probably be the most desirable system. It would eliminate the need for an elevated storage tank, and would provide a continued supply of water in event of a break in the line from one source. This system could also help each of the supplying communities as water demands in the extremities of their systems varied. It would require a double metering system at each connecting point to measure inflow and outflow systems. I would feel that the advantage of a continued supply would outweigh any additional construction costs. If for some reason or other the rates of one community increased drastically, it would be possible to throttle off normal supply from that community to control your costs some.

WATER COSTS

SANITARY DISTRICT PROVIDING OWN SUPPLY

Present Without Treatment

O & M (Supply)

Pumping	2,000
Wages	2,000
Chemical	1,000
Adm. Ins. Tax	2,000
	$7,000/yr.

Unit Costs

Supply Approx.	$5.00
Distribution System	3.00
	$8.00/mo.

Present - If Treatment Required

O & M (Supply)

Pumping	2,000
Wages	4,000
Chemicals	2,000
Adm. Ins. T_ax	2,000
	$10,000/yr.

Unit Costs

O & M Supply Approx.	$7.00
O & M Distribution System	3.00
	$10.00/mo.

WATER COSTS

Maximum Development Without Treatment

O & M (Supply)	
Pumping	8,000
Wages	4,000
Chemicals	3,000
Adm. Ins. Tax	3,000
	18,000/yr.

Unit Costs

O & M Supply Approx.	$3.00
O & M Distribution System	1.50
	$4.50/mo.

Maximum Development With Treatment

Pumping	8,000
Wages	6,000
Chemicals	4,000
Adm. Tax Ins.	3,000
	$21,000/yr.

Unit Costs

O & M Supply Approx.	$3.50
O & M Distribution System	1.50
	$5.00/mo.

SERVICE CHARGES FOR PURCHASE OF WATER & SEWER USE

Probable Usage:

Present Population
402 x 75 G.P.C.D. = 30,150 Gal/Day
or 4,030 C.F.

Minimum Development
741 x 75 G.P.C.D. = 55,575 Gal/Day
or 7,430 C.F.

Moderate Development
2446 x 75 G.P.C.D. = 183,450 Gal/Day
or 24,525 C.F.

Maximum Development
1543 x 75 G.P.C.D. = 115,725 Gal/Day
or 20,820 C.F.

City of Manitowoc Water
Present Population

Monthly (30 Days) 120,000 C.F.
1st 100,000 = 500.00
Next 100,000 = 0.18/100 = 50.40
Total $550.40
Average Cost Per Unit(115) = $5/Mo.
Local Cost for O & M = $3/Mo. +
$8.00/Mo.

Maximum Development

Monthly (30 Days) 624,000 C.F.
1st 100,000 = 500
2nd 100,000 = 252
Over 200,000 @ 0.14/100 = 833
Total 1,585
Average Cost Per Unit(506) = $3/Mo. +
Local Cost for O & M = $1/Mo.
$4.00/Mo.

Feb. 14, 1978

CITY OF TWO RIVERS WATER

Present Population

Monthly (30 Days) 120,000C.F.			
1st 8,000 C.F.	=	150.00 ±	
112,000 @ 0.34 C.F.	=	380.80	
		530 ±	
Ave. cost per unit (115)	=	4.65	*6.51
Local cost for O & M	=	3.00	3.00
		7.65/mo.	9.51/mo.

Maximum Development

Monthly (30 Days) 624,000 C.F.			
1st 8,000 C.F.	=	150.00	
Next 142,000 @ 0.34	=	482.80	
Next 474,000 @ 0.21	=	995.40	
		1,478.20 ±	
Ave. Cost per unit (506)	=	3.00	*4.20
Local cost for O & M	=	1.00	1.00
		4.00/mo.	$5.20/mo.

* At City current rate - They may also have a surcharge for service outside of the City.

Assuming there will be a surcharge for service outside of the city of 40% similar to that established by Manitowoc.

TOWN OF TWO RIVERS SANITARY DISTRICT
MANITOWOC BEACH AREA WATER SUPPLY

From Two Rivers
Probable Area of Service - Turner St. - East

Based upon fire flow of 650 gpm on end of present Memorial Drive line, probable residual at Columbus and Memorial = 36.8 psi.

Location	Residual Pressures @ C=100 @ 600 gpm	@ 500 gpm	@ 400 gpm
Columbus & Memorial	40 psi	43 psi	45 psi
-831' West w/10" (new) & 6" (existing)	-0.7	-0.6	-0.4
-2100' -8" (existing)	-10.9	-7.2	-4.6
4" Turbo Meter approximately 2ps. (new)	-2.0	-2.0	-2.0
@ Lohman St. & Memorial	26.4 ±	33.2±	38.0±
1775 - 10" (new)	-3.0	-2.2	-1.4
@ Florence St. & Memorial	23.3±	31.0±	36.6±
600' - 6" (new)	-11.5	-8.6	-5.7
@ North End Florence	11.8±	22.4±	30.9±
@ Florence St. & Memorial	23.3±	31.0±	36.6±
370' -10" (new)	-0.6	-0.5	-0.3
@ Turner St. & Memorial	22.7±	30.5±	36.3±
800' - 6" (new)	15.3	11.4	7.6
@ North End Turner	7.4±	19.1±	28.7±

Metering - 4" Turbo w/accurace of 98½% - 101½% between 15 gpm & 1000 gpm for approximately 6 hours. Thus Sanitary District to pay premium for possible unmeasured flow as follows:

10gpm x 60 min/hr x 6 hrs/day x 30 days/mo. ÷ 7.48 gal/c.f. = 14,400 c.f./mo.

Probable Service Charge - Monthly
Present: 30 x 3.5 = 105 persons
Future: Multiple Family=580
Single Family 230
810 persons

Probable Usage 75 gal per capita per day

Present

$$\frac{105 \times 75 \times 30}{7.48} = 31{,}584 \text{ C.F./mo.}$$

+ 14,400 C.F./mo.
45,984 C.F./mo.

		Accumulative
First 8,000 C.F. = 40.10		73.35
Next 37,984 C.F. @ 0.34 = 129.15		202.50
	Surcharge	x 1.25
		253.13

253.13 ÷ 30 = $8.44 cost per unit for city water
+3.00 cost per unit for O & M
$11.44 probable total cost per unit

$\frac{810 \times 75 \times 30}{7.48}$ = 243,650 C.F.
+ 14,400 C.F.
258,050 C.F.

First 150,000 = 556.15	556.15	
Next 108,050 @ 0.21 = 226.91	783.06 x 1.25	(surcharge)
	978.83	

978.83 ÷ 230 = $4.26 cost per unit for City water
+2.00 cost per unit for O & M
* $6.26 probable total cost per unit

*Inflation factor causing increase in rates would probably prevent rates from going much below what the present rate would be.

Note: Total billing from each City would probably be added together along with the local operational costs to determine total costs. This would then be divided by the probable total water usage to arrive at a rate for the local units. This would be done so that everyone would be paying on the same basis within the district rather than having two different rates. The above estimate will vary depending upon amounts of water used.

TOWN OF TWO RIVERS SANITARY DISTRICT
MANITOWOC BEACH AREA WATER SUPPLY

From Manitowoc
Probable Areas of Service-McKinley St. - West

Fire flow at Woodland Drive & Memorial Drive 940 gpm
Residual Pressure 41 psi

Location	Residual Pressures @ C=100 @750 gpm	@600 gpm	@500 gpm
Woodland & Memorial	45±	50±	55±
4" Meter	-3	-2	-1
1600' - 12"	-1.7	-1.1	-0.8
	40.3±	46.9±	53.2±
(1) Woodland @ Lakeview Ext.	10.4	2.6	1.8
1500' - 10"	29.9±	44.3±	51.4±
(2) West & Lakeview	22.5	15.3	11.4
800' - 6"	7.4±	29.0±	40.0±
(2A) West & R.R.	6.9	1.7	1.2
1000' - 10"	23.0±	42.6±	50.2±
(3) Lakeview & Memorial	4.8	1.2	0.8
700' - 10"	18.2±	41.4±	49.4±
(4) Memorial & McKinley	25.4	17.2	12.9
900' - 6"	0	24.2±	36.5±
(4A) North End - McKinley			

Metering - 4" Turbo w/accuracy of 95% - 10 gpm - 1000 gpm

*Negotiable as to possible unmetered flow assuming night time flow may go below 10 gpm for approximately 6 hrs.

Thus sanitary district to pay premium for possible unmetered water as follows:

10 gpm x 60 min/hr x 6 hrs/day x 30 days/mo ÷ 7.48 gal/cf = 14,400 cf/mo

Probable service charge - monthly
Present 85 x 3.5 = 300 persons
Future Multiple Family 294 persons
Single Family 428 persons
Commercial P.E. 100
822 persons

Probable usage 75 gal. per capita per day

Present

$$\frac{300 \times 75 \times 30}{7.48} = 90{,}240 \text{ cf/mo}$$

14,400
104,640 cf/mo

			Accumulative
First 100,000	272.10		272.10
Next 4,640 @ 0.18	8.35		280.45
		Surcharge	x 1.40
			392.63

392.63 ÷ 85 = $4.62 cost per unit for City water
3.00 cost per unit O & M
$7.62 probable total cost per unit

$\frac{822 \times 75 \times 30}{7.48} = 247{,}260 + 14{,}400 = 261{,}660$

			Accumulative
First 200,000 = 452.10			452.10
Next 61,600 @ 0.14 = 86.32			538.42
		Surcharge	x 1.40
			753.79

753.79 ÷ 230 = $3.28 cost per unit for City Water
2.00 cost per unit for O & M
*$5.28 probable total cost per unit

*Infaltion factor causing increase in rates would probably prevent rates from going much below what the present rate would be.

MANITOWOC BEACH LAND USE AND UTILITY STUDY

Town of Two Rivers, Wisconsin

Storm Sewer Study

Engineering Consultant: Brey, Stuewe & Braun, Inc.

Planning Consultant: Gary L. Peterson & Associates

February, 1978

Financial assistance for the preparation of this report has been provided through the Wisconsin Coastal Management Program by the Coastal Zone Management Act of 1972, administered by the Federal Office of Coastal Zone Management, National Oceanic and Atmospheric Administration.

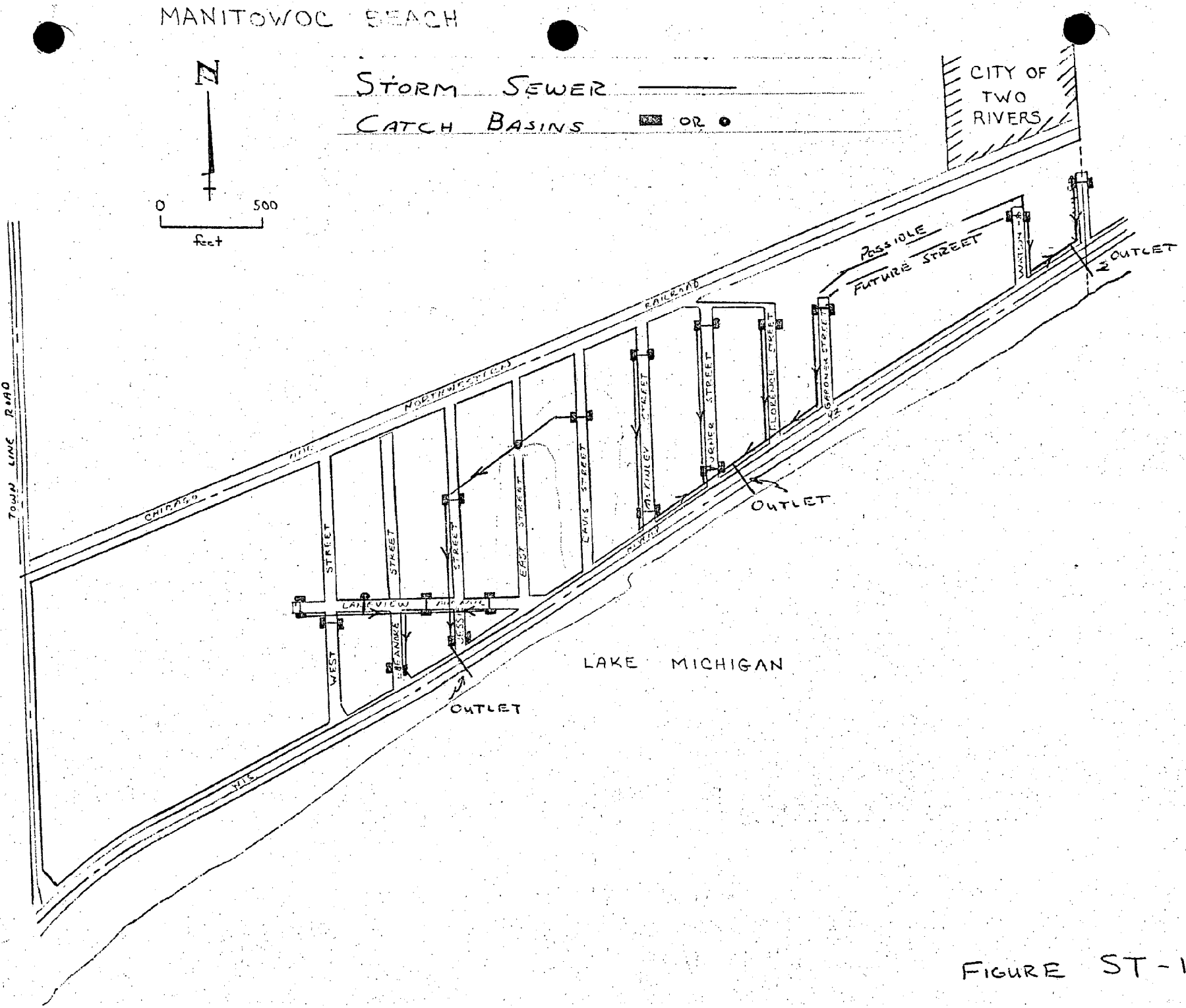

MANITOWOC BEACH
N
STORM SEWER
CATCH BASINS OR
0
500
feet
CITY OF TWO RIVERS
TOWN LINE ROAD
CHICAGO
NORTHWESTERN
RAILROAD
PARK
STREET
EAST STREET
LAVIS STREET
A. FULLER STREET
TURNER STREET
FLORENCE STREET
GARDNER STREET
MADISON
LAKEVIEW
PARK AVE.
WEST
MEANDER
POSSIBLE
FUTURE STREET
OUTLET
OUTLET
OUTLET
LAKE MICHIGAN
FIGURE ST-1

FIGURE ST-1

STORM SEWER SUMMARY

Over the years the Manitowoc Beach area has shown a need for a storm drainage system. Many of the residents have water in their basements every spring. Two factors contribute to this problem, one is that the area is relatively flat, and the other is the high ground water table in the area.

There are two possible ways of dealing with the drainage problem. One, there can be a perforated tile system to lower the ground water table and two, a storm sewer system can be installed.

Advantages of a storm sewer system would be that it could more easily be adapted to expansion. By running a line from Davis Street to Jessie Street extended, the sewer can serve the maximum development plan. The area between Gardner Street and Watson Road could also be served by a storm sewer system by putting a high point in the road between the two streets, allowing the water to flow each way. All the water in the area would flow to Lake Michigan via three culverts that would be placed under Memorial Drive. These culverts would be located at Jessie Street, between Florence and Turner, and between Watson and Lohman. (See Figure ST-1) A tile system could be incorporated into this system to lower the ground water table in areas that do not slope enough for sufficient runoff.

The basic formula to determine the quantity of runoff to be expected is $Q = CiA$. Q = Quantity of runoff. C = Co-efficient of runoff. This coefficient is determined by the nature of the soil and the slope of the ground. This area is flat with sandy soil, so a coefficient of 0.1 was used. i = rainfall intensity. The rainfall

intensity used here is 2.45 in/hr, that is the maximum one hour rainfall to be expected once in 25 years. A = Area served by the sewer. The following calculations were used in order to design a storm sewer system for the Manitowoc Beach Area.

	Area (Acres)	Sum Area (Acres)	Q=CiA (cfs)	Pipe Size	Pipe Length
West	3.10		0.75	12"	130'
Lakeview	2.02		0.50	12"	223'
Eleanore	1.93		0.47	12"	200'
Lakeview	10.84	17.89	4.38	24"	450'
Davis	7.71		1.89	24"	400'
East	4.13		1.01	12"	250'
Jessie North	5.51	17.35	4.25	24"	900'
Lakeview	1.38	1.38	0.34	12"	145'
Jessie South	0	36.62	8.97	36"	230'
Under Mem. Dr.	0.46	37.08	9.08	36"	110'
McKinley	7.19		1.76	18"	900'
Turner	6.62		1.62	18"	852'
Florence	5.96		1.46	18"	600'
Gardner	7.16		1.75	18"	450'
Mem. Dr. - McKinley to Turner	7.19		1.76	18"	332'
Mem. Dr. - Turner to crossing	0	13.81	3.38	24"	100'
Mem. Dr. - Gardner to Florence	7.16		1.75	18"	300'
Mem. Dr. - Florence to crossing	0	13.12	3.21	24"	268'
Under Mem. Dr.	0	26.93	6.6	36"	110'
Watson	6.98		1.71	18"	380'
Lohman	4.04		0.99	12"	370'
Mem. Dr. - Watson to crossing	6.98		1.71	18"	279'
Mem. Dr. - Lohman to crossing	4.04		0.99	12"	50'
Under Mem. Dr.	0	11.02	2.70	24"	110'

The following cost estimate for storm sewer construction is based on previous projects. The actual cost will be different than the price arrived at here.

Item	Quantity	Unit Cost	Cost
12" pipe	1368 LF	$15/LF	$20,520
18" pipe	4093 LF	$19/LF	77,767
24" pipe	2118 LF	$21/LF	44,478
36" pipe	230 LF	$23/LF	5,290
Jacking Sewer Under Mem. Dr.	330 LF	$200/LF	66,000
Vertical Feet of Manhole	314 VF	$60/LF	18,840
Catch Basin Castings	34	$140/ea	4,760
Manhole Castings	20	$115/ea	2,300
Contingencies; Legal Fees, Engineering Fees, etc.			47,991
			$287,946

The prices we have arrived at are the basic construction costs plus the 20% for contingencies, engineering and legal fees to cover unforeseen costs or changes in the system during construction.

DATE DUE

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