

VILLAGE OF PENTWATER  
OCEANA COUNTY, MICHIGAN

MARINA DEVELOPMENT STUDY

JULY, 1984

Financial Assistance for this Study has been provided by the Coastal Zone Management Act of 1972 administered by the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration and the Michigan Coastal Management Program, administered by the Department of Natural Resources, Division of Land Resource Programs.

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## INTRODUCTION

The Village of Pentwater is located along the shore of Lake Michigan north of Pentwater Lake near the southwestern corner of Oceana County, Michigan. (Location Map 1A, Vicinity Map 1B)

The Village has owned and operated a marina on the site for many years. Substantial improvements have been made to the southern part of the site. In October of 1982, the Pentwater Waterfront Commission recommended that the Village Council purchase the "Sunoco" property on the lake immediately north of the Village marina. The Village did purchase this property, with 198 feet of frontage, adjacent to the north marina property line. The purpose of this study is to develop a plan for the improvement of the newly acquired property.

The study scope includes a topographic survey of the entire marina property. The field survey combined with information on hand from previous projects is the basis for the mapping. The area has been mapped at a scale of 1 inch = 20 feet, which will be utilized when construction plans for the marina improvements are drawn. Drawings in the report are reduced to half size, or a scale of 1 inch = 40 feet, to be more manageable.

The Village received partial funding for this study from the Michigan Coastal Management Program. A requirement of the grant was public involvement. Representatives of the Village were very much involved in determining the overall scope and direction of study. Two additional hearings were held for public input. Most aspects of the proposed plan reflect public input. The Waterways Commission staff has reviewed the recommended plan and approved the study concept.



**LOCATION MAP (MDOT 1982)**  
**VILLAGE OF PENTWATER**  
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**VICINITY MAP (USGS 1959)  
VILLAGE OF PENTWATER  
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## SITE DESCRIPTION

The marina site lies on the east shore of Pentwater Lake along Hancock Street and between Fourth and Fifth Streets. There is a moderate slope between Hancock Street and the lake. Water depths are quite deep a short distance offshore. (Lake Chart 2A)

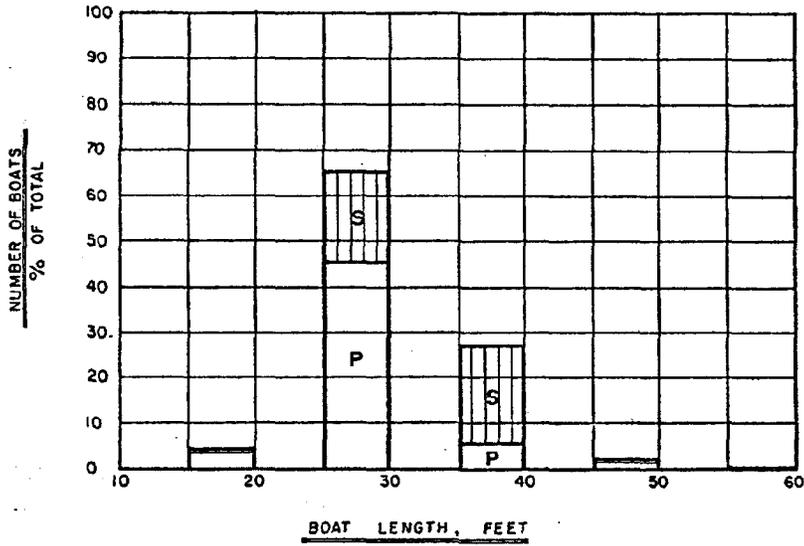
The site is former lake bed laid down under the former Lake Michigan when it existed at a higher elevation. Soils are sand with some organic materials and fill materials encountered along the shoreline. It was possible to obtain considerable information on subsoil conditions from projects north and south of the site. Borings made by Michigan Drilling Company in 1961 for the present marina show sands to a depth of 50 feet below lake level. Borings in 1982 by Soils and Structures, Inc. for the Spinnaker Condominiums show sands to approximately 40 feet underlain by a stiff gray clay.

Soil borings were not included in the scope of the project. It is recommended that soil borings be obtained in the area of each head pier before construction. The results of the borings will enable a better determination of piling lengths and cost. They were not necessary in finalizing the dockage layout.

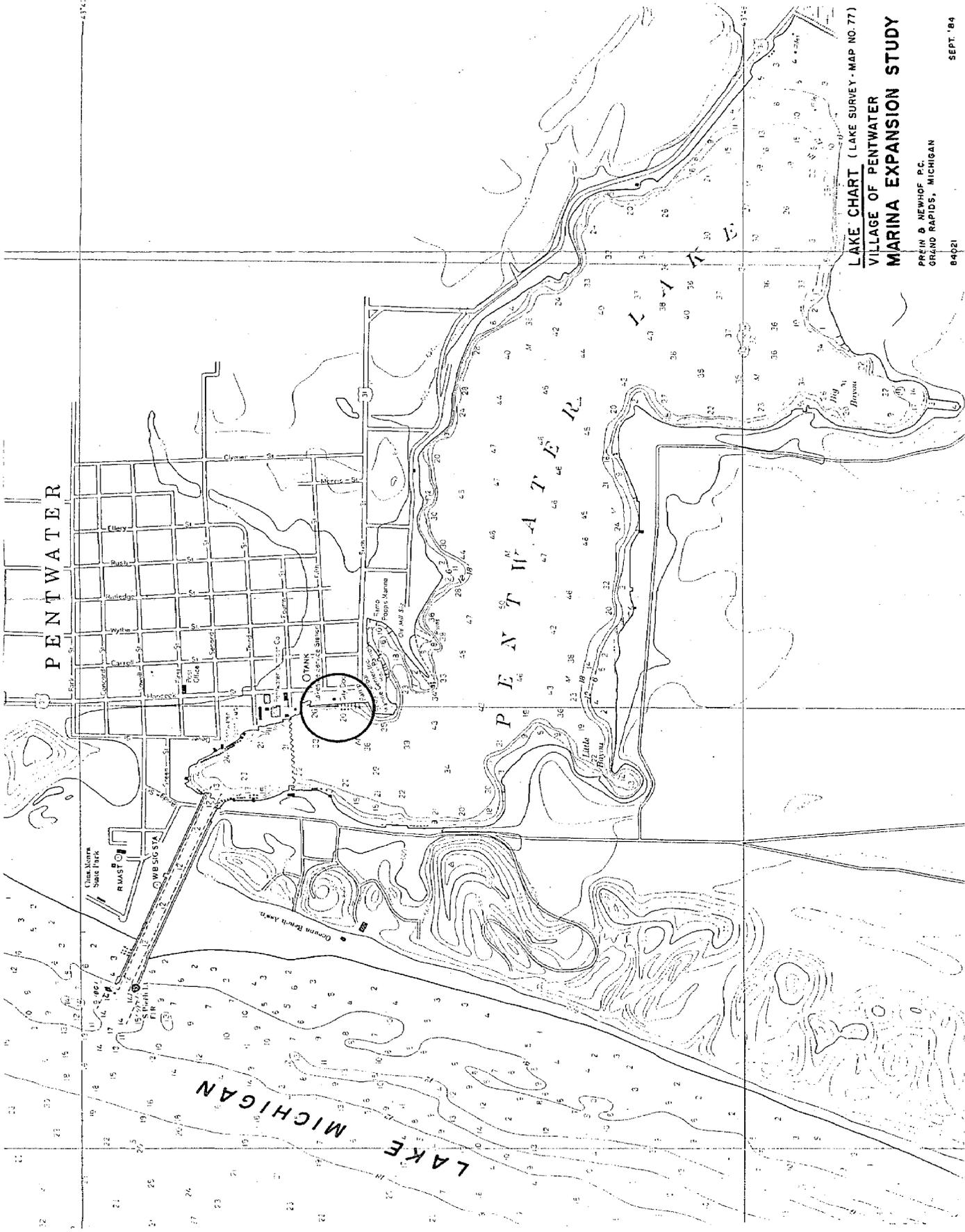
The present marina consists of a service pier and eight finger piers extending from a shoreline revetment. The site contains a very nice service building with restroom and shower facilities for the boaters.

Use of the marina is primarily transient with four slips being reserved for charter boat operators. The following chart indicates harbor use during the 1983 season by boat length and classification of power or sail.

# PENTWATER HARBOR - 1983 SEASON



The majority of boats using the marina are under 30 feet. There were comments that the greatest need for slips is for smaller boats.



PENTWATER

LAKE MICHIGAN

PENTWATER

LAKE CHART ( LAKE SURVEY - MAP NO. 77 )  
 VILLAGE OF PENTWATER  
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## DEVELOPMENT

The primary recommendation of the Waterfront Committee was to develop the property into a marina with as many slips as feasible. The plan should incorporate the existing facilities to maintain the single marina concept. Other criteria was providing landscaping, keeping the area between the street and water open and developing a potential of expanded public access to the water. Design criteria regarding dockage of Waterways Commission Standards described is in Appendix A.

There was sentiment for construction of one or more head piers which would extend some distance into the lake to service a large number of finger piers. A preliminary engineering design for this concept was made and cost estimate prepared. It was found that, because of the deep water depths a short distance offshore, such dockage would be very expensive and not cost effective.

Because of the relatively narrow width of the lake opposite the marina, adjacent development and use of the lake, it is felt that it would be extremely difficult to obtain a permit for construction of dockage in the lake much beyond the end of the existing docks. This was confirmed in preliminary fashion in discussions with Waterways Commission staff. If permit criteria and future construction techniques make this concept feasible in the future, it would be possible to extend the head piers.

The design progressed through a series of layouts and cost estimates to the proposed development plan (Sheet No. 4A). This plan, which evolved after much comment, is the consensus plan of the community. The cost benefit ratio

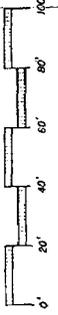
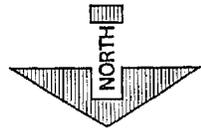
5 54TH STREET

5 FIFTH STREET

5 HANCOCK STREET (as U.S.A.)  
(10' wide, 100' long, 10' high, 10' deep)  
(10' wide, 100' long, 10' high, 10' deep)

GREEN BELT BUFFER ZONE

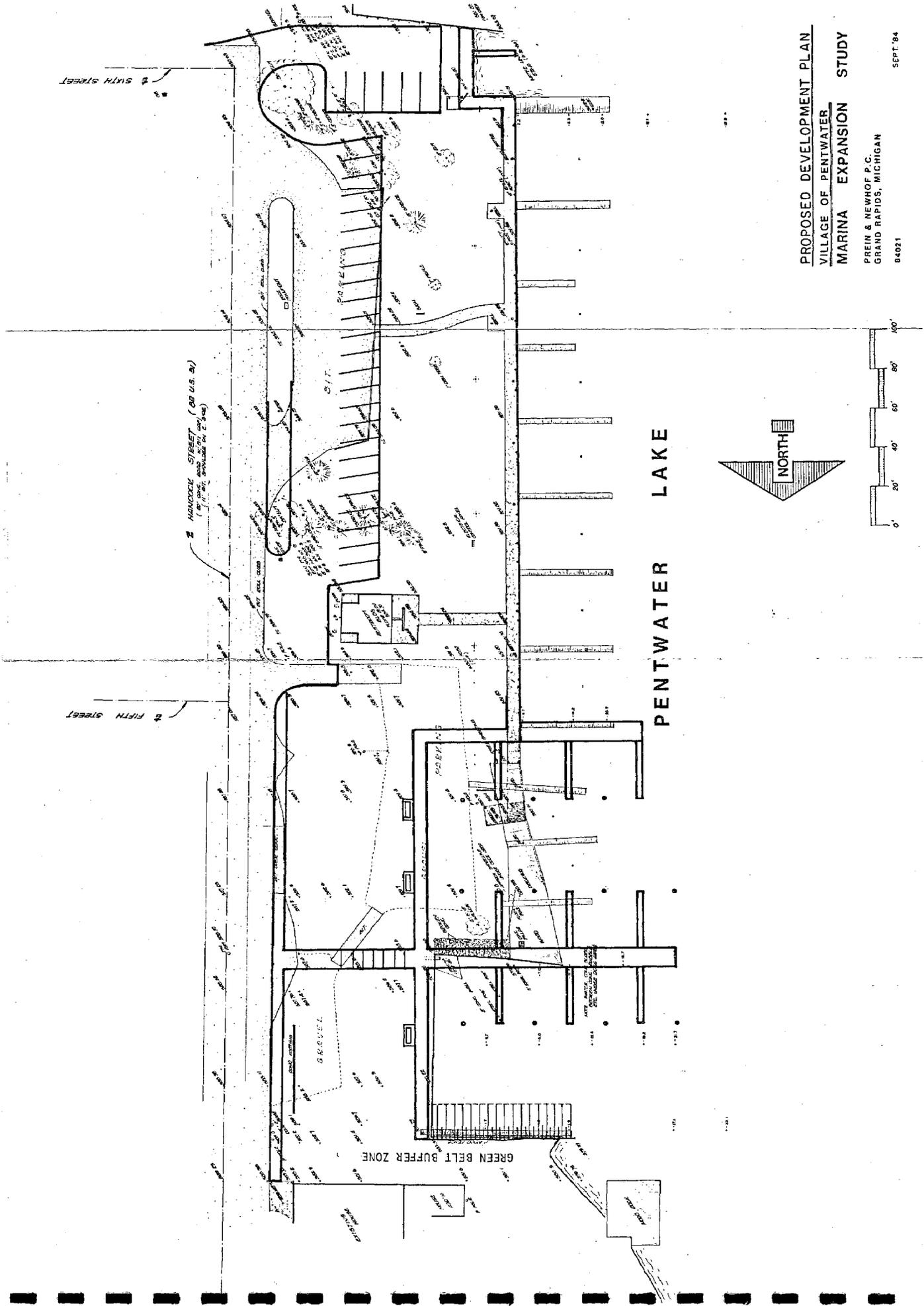
PENTWATER LAKE



PROPOSED DEVELOPMENT PLAN  
VILLAGE OF PENTWATER  
MARINA EXPANSION STUDY

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of this plan, considering land value and dockage cost, is best.

Alternative designs which were evaluated are included for reference in Appendix "C".

The plan results in a new gain of 19 boat slips including dockage along the revetment. It also results in minimum expenditure along the north property line against land owned by others.

Even though the proposed project adds only 30 feet long slips the mix of slip size in the overall marina is good considering the high percentage of 45 foot long piers in the existing marina. The south head pier could function as one 60 foot slip or two 30 foot slips.

The proposed development plan provides for 17 additional parking spaces. This is short of normal criteria. However, because the Village Council and the newly formed Planning Commission are actively pursuing additional parking spaces in the area both in adjacent side streets and in the form of additional lot space across Hancock Street, the plan should qualify for future Waterways participation. If sufficient parking area is acquired off site some of the proposed on site spaces may be eliminated.

The area between Hancock Street and the revetment will be graded and landscaped to provide a park like environment and encourage use of the water frontage by the public.

There was public sentiment for fuel service for the expanded marina. It was stated there is only one other fueling facility on the lake. In this regard,

data was acquired on fuel sales from 8 similar sized marinas at locations felt comparable to Pentwater. The data was evaluated on the basis of a facility providing both diesel and gasoline fuel estimated to cost \$30,000. Based on estimated fuel sales it is felt that the profits from fuel sales could not repay construction costs at today's interest rates. Also, it may be advisable that the Village not get into the fuel business in competition with private business. Therefore, a fuel service facility is not recommended.

There was discussion on the desirability of a permanent fish cleaning station at the marina. The existing limited fish cleaning operation on the site has worked well with the charter boats cooperation. A fish cleaning station could be considered a permanent commitment to charter boats. In the future the charter boats may be moved to another location. For these reasons a fish cleaning facility is not recommended in this plan.

Expanded public restrooms were suggested early in the study. Restroom facilities should be adequate for the expanded marina. It is felt that construction of a new service building could be a subsequent project if determined to be needed after the marina is expanded.

The construction cost for the project is contained in Appendix B. Construction costs are estimated on 1984 data and may have to be adjusted when the project proceeds.

APPENDIX

"A"

## APPENDIX - DESIGN CRITERIA

Although this study does not include project design, certain features of the project must be assumed for the purpose of more accurately determining the project cost. The purpose in stating these criteria at this time is for general information and also to form a basis for the project design at a future time.

### MARINA

- All pier construction is of steel supporting members with 2" x 6" wood decking and 6" x 6" wood fenders. The head piers are 10 feet wide and the finger piers 3 feet wide. All wood decking and fenders are to be pressure preservative treated with a waterborne preservative. (CCA Design live load for both finger and head piers is 100 psf.
- Support for the piers is by 12" diameter heavy wall (0.250") steel pipe piles 15' <sup>±</sup> on center. Piles may be driven open ended and the top portion filled with concrete or stone. Piling lengths of 75 feet are anticipated based upon 500 psf soil friction and ice uplift loads of 45,000 lbs. (24" ice).
- Spring piles are 8 x 36 steel H-piling 70 feet long. H-piles have been used to facilitate attachment of wood fenders.
- Rip rap shore protection consists of 6" granular filter material, plastic filter cloth, 8" of 4" to 6" mattress stone and 12" of heavy rip rap stone.
- The area will be dredged to a depth of 7 feet below low water datum.

APPENDIX

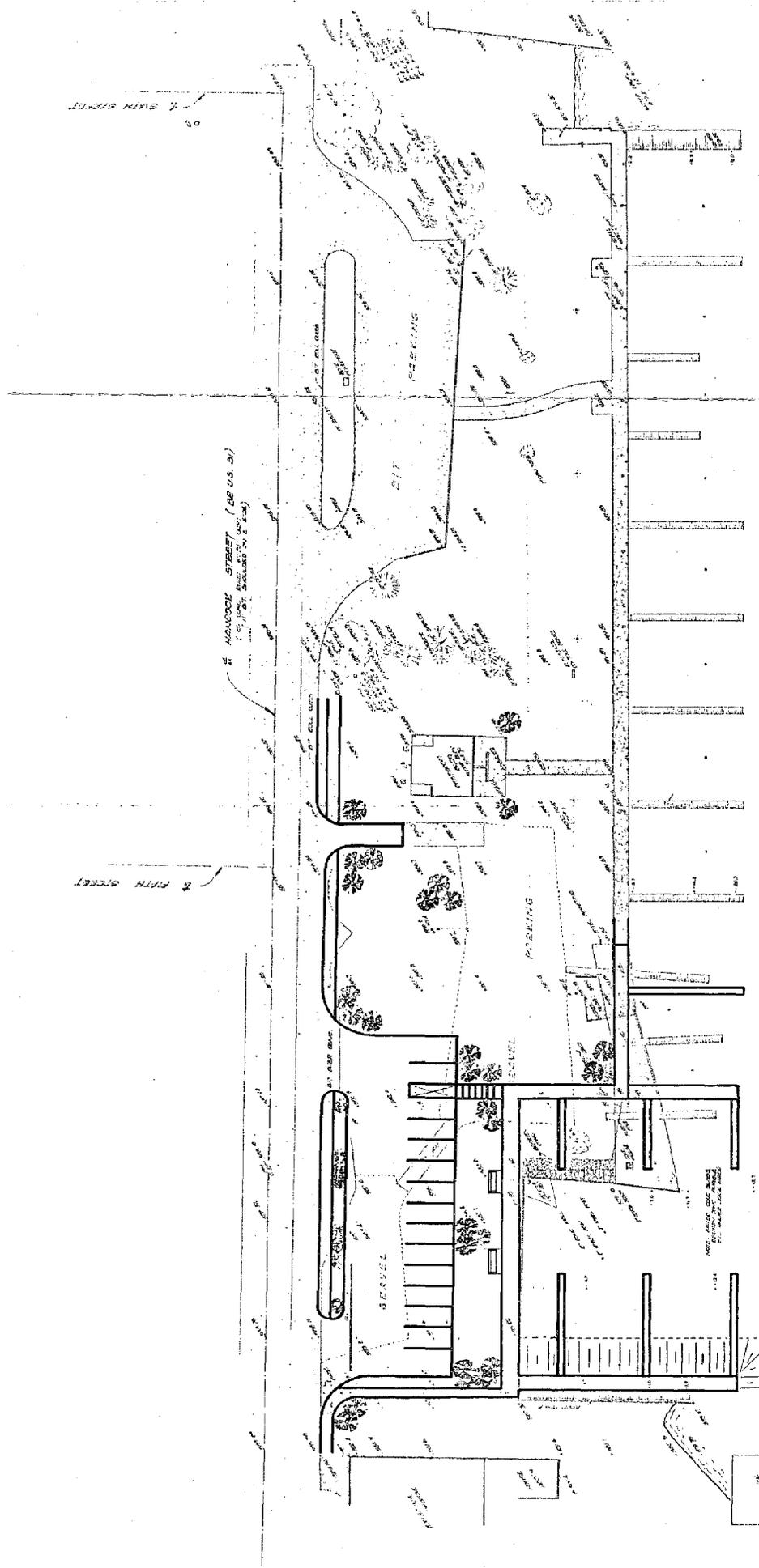
"B"

APPENDIX "B"

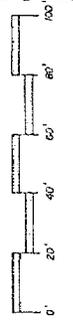
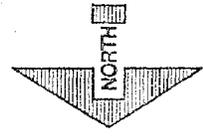
PRELIMINARY COST ESTIMATE

1.	Steel Sheet Piling (Revetment) 275'(L) x 22'(D) @ \$25-S.F.	\$151,000
2.	Steel Piling (Pier) 52 75' Long @ \$25+L.F.	98,000
3.	Pier - Structural Steel Deck 2,650 S.F. @ \$20	53,000
4.	Rip Rap 100 L.F. @ \$100	10,000
5.	Excavation (Lump Sum)	8,000
6.	Concrete Walks (Lump Sum)	12,000
7.	Parking - Bituminous Concrete (Lump Sum)	15,000
8.	Landscaping (Lump Sum)	20,000
9.	Electrical Service	30,000
10.	Mechanical	<u>25,000</u>
		\$422,000
	Contingencies & Engineering	<u>88,000</u>
	TOTAL	\$510,000

APPENDIX "C"  
ALTERNATE DESIGNS EVALUATED  
(A, B, C & D)



PENTWATER LAKE



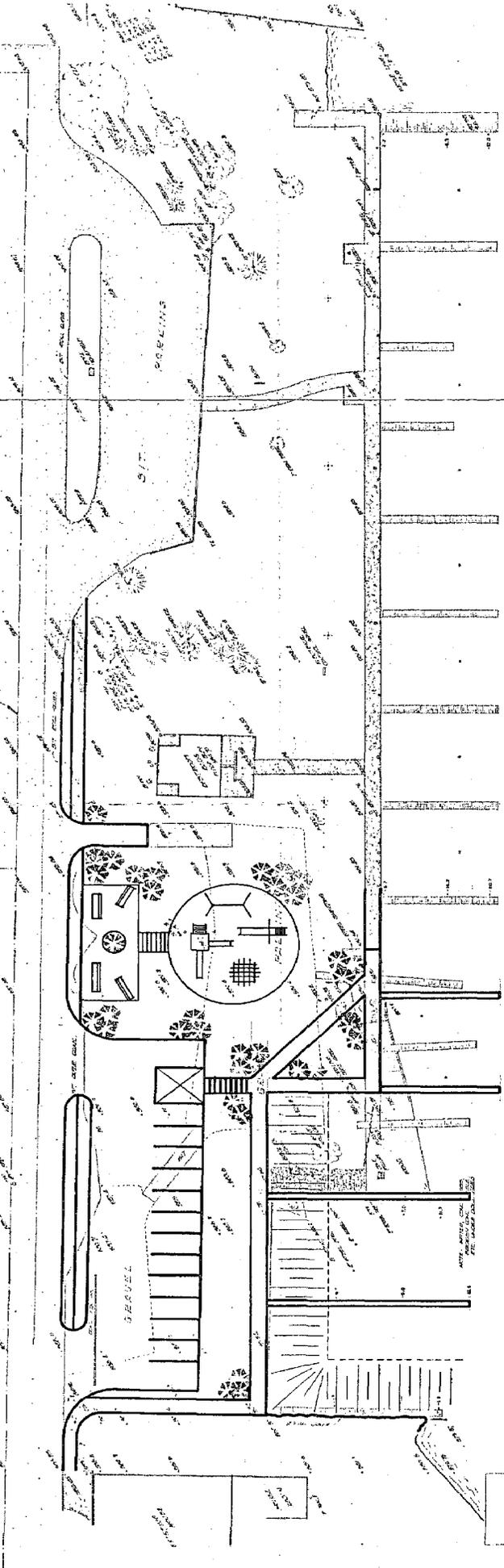
VILLAGE OF PENTWATER  
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A

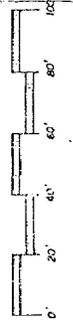
5 SEVENTH STREET

5 FIFTH STREET

5 HARWOOD STREET (201 U.S. 91)  
1 1/2" SCALE AND 1/4" = 10' (SEE SHEET 84031)



PENTWATER LAKE



VILLAGE OF PENTWATER  
MARINA EXPANSION STUDY

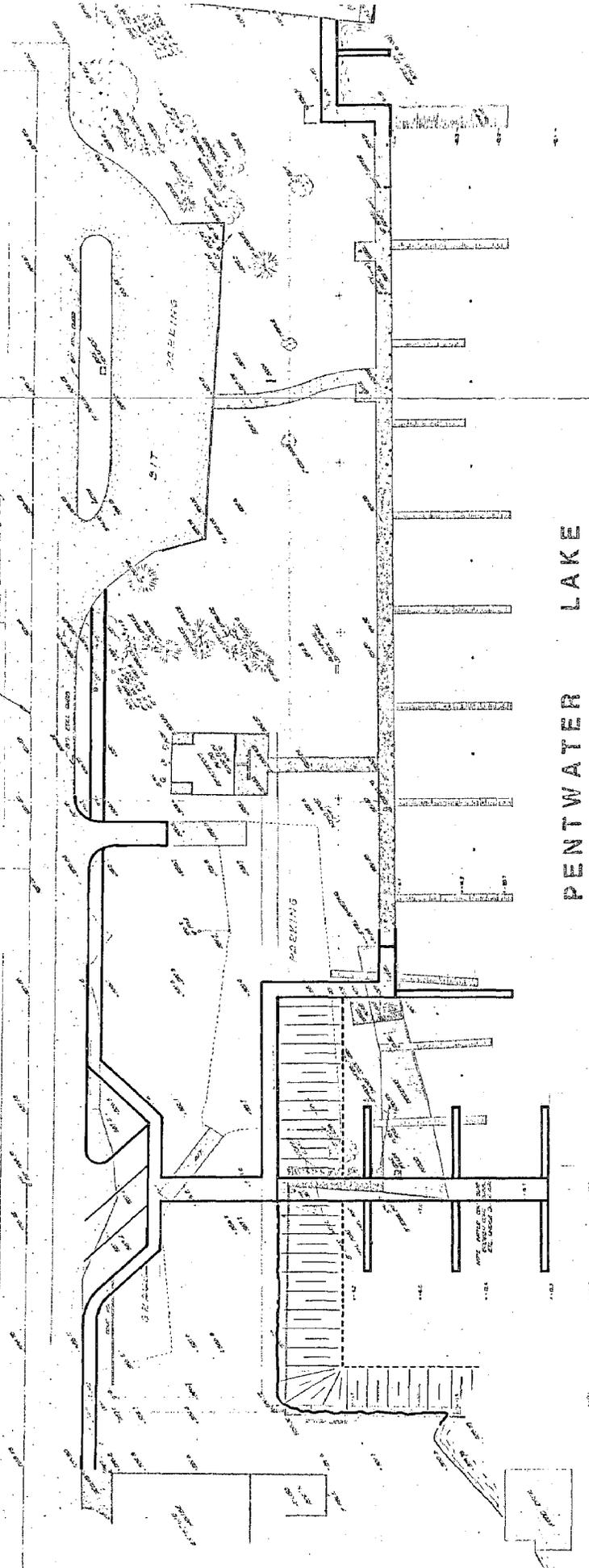
PREIN & NEUHOFF P.C.  
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B

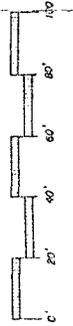
5th Street

5th Street

WOODWARD STREET (55 W.S. 21)  
1/2" = 10' (Scale for 1/2" = 10')



PENTWATER LAKE



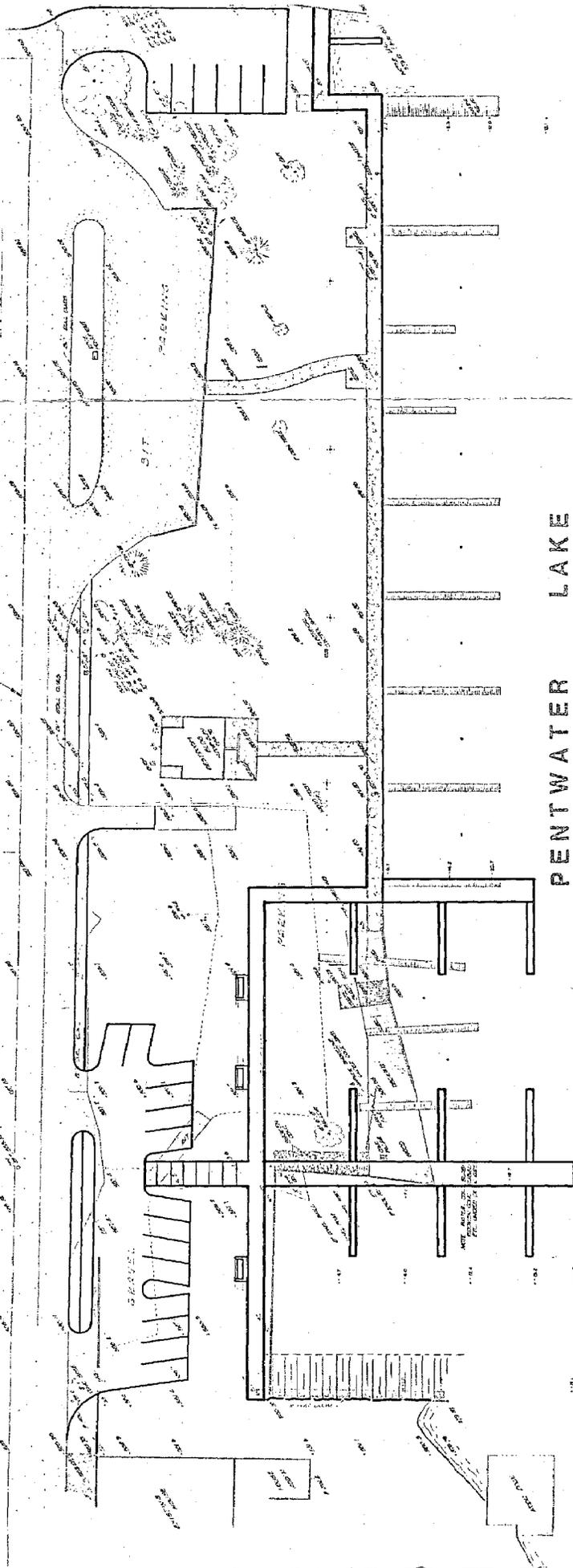
VILLAGE OF PENTWATER  
**MARINA EXPANSION STUDY**  
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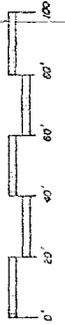
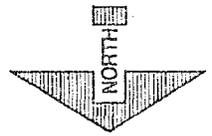
2 SUNN STREET

2 FLYN STREET

2 MARWOOD STREET (SEE U.S. 31)  
(20' FROM ADJACENT LOT)



PENTWATER LAKE



VILLAGE OF PENTWATER  
 MARINA EXPANSION STUDY  
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