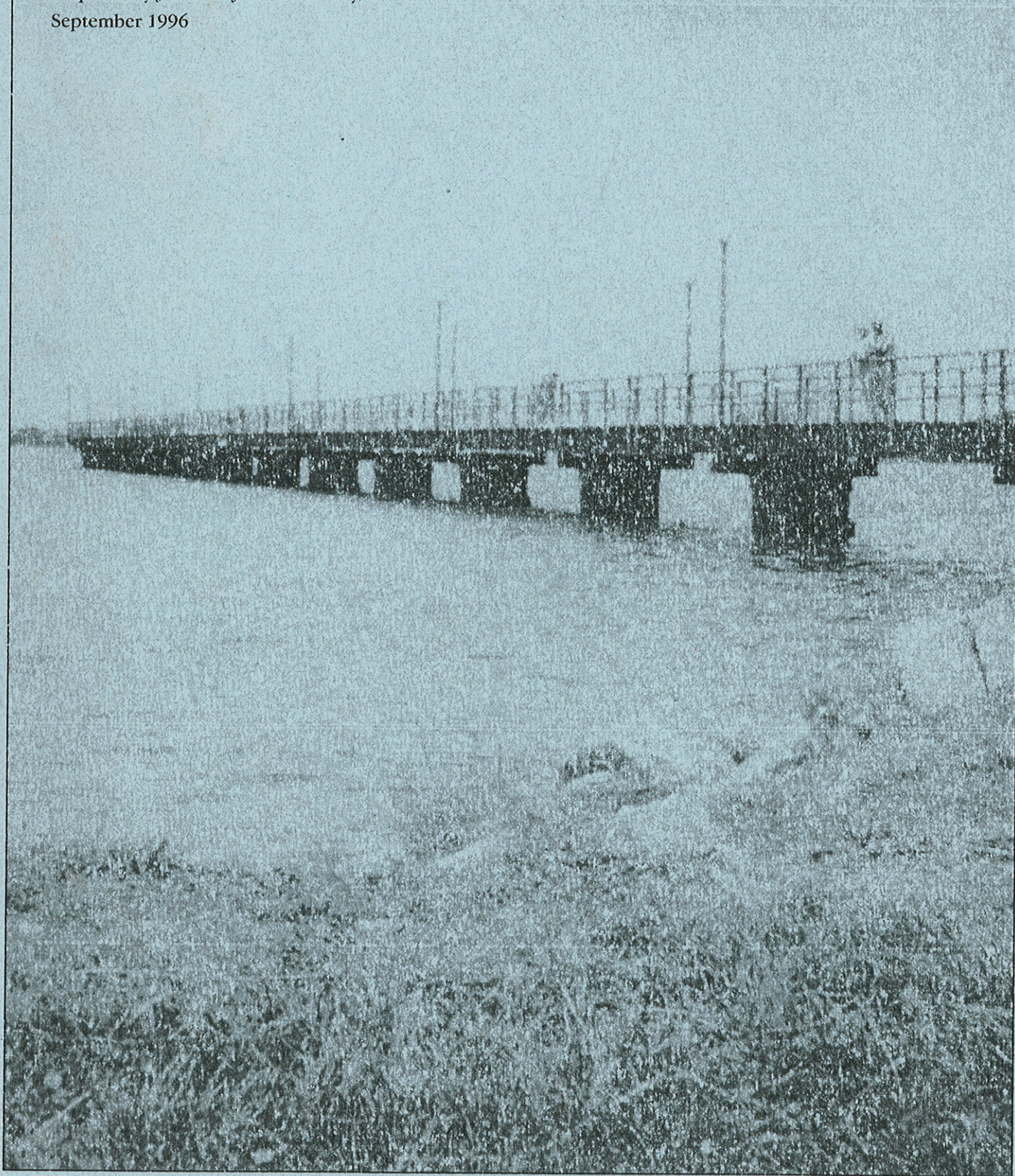


Belle Isle Piers

Fishery Habitat Enhancement

Prepared by Johnson Johnson & Roy, Inc
September 1996



SECTION I INTRODUCTION

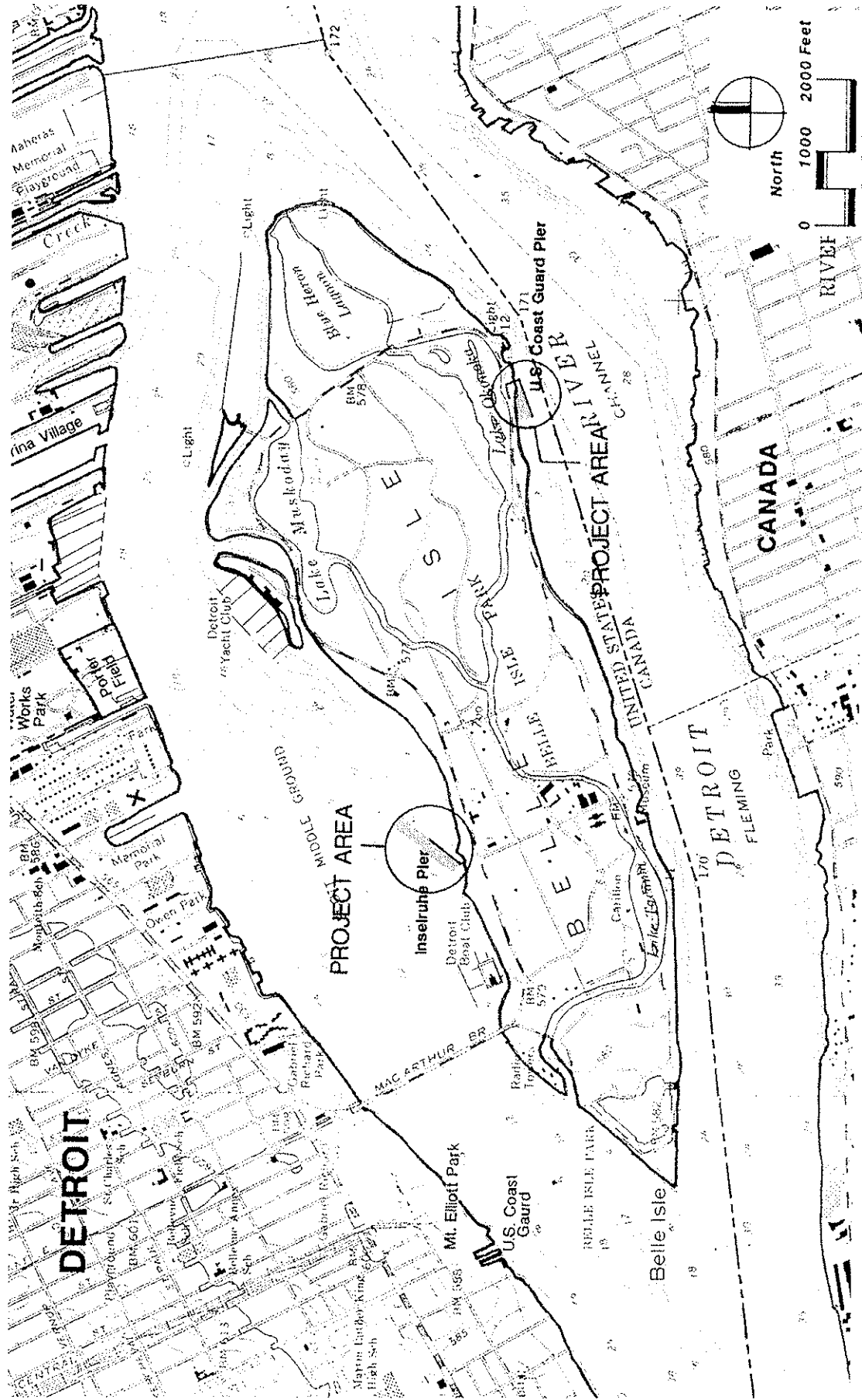
Belle Isle, a 982 acre island park located in the Detroit River, is the most heavily used park in the City of Detroit (Figures 1 and 2). For many of its eight million annual visitors, Belle Isle is the only opportunity to experience the natural environment of which they are a part. Recognizing the value of this unique resource, the City of Detroit is committed to maintaining and improving this island park as well as restoring basic recreational activities which have historically been part of the Belle Isle experience. This commitment to maintain, improve and restore Belle Isle has been exemplified in the completion of the Belle Isle Lakes and Canal Rehabilitation Project. This project involved the development and implementation of a comprehensive, long-term management strategy to improve water quality, restore recreational activities (fishing and canoeing) and aesthetic character of the island's inland aquatic resource. The determination to improve Belle Isle's unique recreational resources has been extended to areas along the island's shoreline, notably the areas contiguous with the two fishing piers situated on the north and south shoreline. The proposed enhancement of fishery habitat adjacent to the fishing piers serves a dual purpose, creating important feeding, refuge and spawning areas for fish and providing anglers increased opportunities for successful fishing experiences.

The Fishery

Belle Isle has the potential to provide an urban population unique access to an excellent fishery. Belle Isle is located near Lake St. Clair, widely recognized as one of the premier freshwater recreational fisheries in the continental United States. The Detroit River recreational fishery consists of more than 20 species of gamefish of warm, cool and cold water varieties including smallmouth bass, muskellunge, northern pike, walleye, channel catfish, white bass and yellow perch. Several fish species including rainbow trout, lake trout, sturgeon and whitefish inhabit the Great Lakes and use the Detroit River as a migratory, spawning, forage and nursery habitat.

The Problem

Intensive commercial and industrial development along the Detroit River has rendered much of its fishery inaccessible to shore anglers. During the 1970's, two fishing piers were constructed on Belle Isle to provide urban anglers (primarily those who fish from the shore) public access to some of the finest fishing waters in the Midwest. The piers were to serve as readily accessible locations where anglers could partake in a fishing experience and enjoy the diverse recreational fishery offered by the Detroit River. Unfortunately, fishing success from the piers was poor. Consequently, anglers sought out more successful fishing opportunities at other locations along the shoreline with erratic and limited success. Strong currents existing at some of these locations cause anglers to use thicker fishing poles and larger weights. These are cumbersome for young anglers and reduce angler success when attempting to capture light-biting species such as walleye and yellow perch. Often anglers find fishing in such a large expanse of water without defined areas of structure intimidating and find it difficult to locate fish or "feel" fish habitat.



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Figure 2
Vicinity Map

Belle Isle Piers Fishery Habitat Enhancement

In seeking to provide anglers improved fishing success from the piers, the City of Detroit Recreation Department consulted with MDNR Fisheries Division personnel (Appendix D). As a result of these meetings, the City of Detroit Recreation Department concluded that to provide angler successful fishing experiences, fishery habitat around the piers must be improved.

The Solution

The decision to enhance fish habitat around the piers was the most prudent solution to improve the fishery and increase pier utilization. Upon review of existing information regarding habitat surrounding the piers, it became evident that the piers were constructed in two locations along the Belle Isle shoreline recognized as areas containing significant sediment deposition (Appendix A). These areas are quite shallow and exhibit little variation in river bottom elevation (Appendix A). In a freshwater riverine ecosystem, depositional areas are often deficient in habitat required to attract sufficient numbers of gamefish necessary for a successful recreational fishery. Lack of habitat such as deep water areas, submerged structures, and spawning and nursery habitat which typically constitute the foundation for a diverse recreational fishery resulted in poor gamefish populations near the piers. Construction of deep water areas and structure will attract larger numbers and sizes of gamefish. Furthermore, the structure would serve as a base for the development of a large community of macroinvertebrates and forage fish upon which gamefish prey, and result in increased gamefish populations near the piers. The created habitat will be designed to be within reach of the average angler's cast (about 50 feet). This would allow anglers to locate fish holding habitat and increase their chances of catching fish.

Enhancement of fishery habitat adjacent to the piers will produce recreational and environmental benefits. Recreational benefits include the following:

- concentrated fishing opportunities and associated pedestrian traffic in two locations;
- allows anglers to experience a Great Lakes fishery without the use of a boat or cumbersome, expensive equipment (i.e., "big water fishing with an inland water feel");
- allows shore anglers increased success in locating and catching fish;
- increases public use of the fishery and the pier structures; and,
- establishes Belle Isle Piers as one of the elite public access locations of the Great Lakes similar to Grindstone City Pier, Frankfort Pier and Grand Haven Harbor Pier.

Environmental benefits include the following:

- increased edge habitat for forage;
- increased area of refuge from current;

- increased winter refuge area;
- increase areas of spawning and nursery habitat; and,
- increased production and concentration of forage fish and macroinvertebrates.

This is the only project of its kind to be proposed in United States waters of the Detroit River. The project addresses the need for improvement of aquatic habitats for fish populations within the Detroit River which have undergone degradation since the 1800's. It will also serve to improve the quality of recreational experience associated with this natural resource resulting in greater appreciation for the resource. Greater appreciation for natural resources leads to changes in attitudes regarding environmental issues that affect the river. Decisions to protect, preserve and enhance natural resources often originate with positive experiences in the use of the resource. Therefore, enhancement of the fishery habitat will lead to other projects to improve aquatic ecosystems within the river which, in turn, result in overall improvement to the Detroit River. The City of Detroit Recreation Department believes that improvement of this natural resource will result in considerable economic, educational and environmental benefits to the City of Detroit and communities along the Detroit River.

SECTION II PROJECT DESCRIPTION

The City of Detroit Recreation Department is proposing to enhance fishery habitat adjacent to the fishing piers (Inselruhe North Wharf and U.S. Coast Guard Fishing Pier) on Belle Isle. Belle Isle is a 982 acre island city park with seven miles of shoreline. During the 1970's the piers were constructed to provide readily accessible locations whereby urban anglers and their families could partake in a fishing experience more commonly found in inland lakes and streams, while enjoying the diverse recreational fishery offered by the Detroit River. Unfortunately, the fishing piers were constructed in areas deficient in the habitat (deep water areas, spawning/nursery habitat, and submerged, structural habitat) necessary to attract sufficient numbers of gamefish needed to sustain a successful recreational fishery. Lack of deep water areas and submerged structures which typically support a diverse recreational fishery resulted in poor gamefish populations near the piers. A Fishery Habitat Enhancement Design has been developed to be implemented in a one year period and includes the following actions:

- 1) dredge deep water areas;
- 2) create structural habitat and stabilize slopes of deep water areas with riprap and bedding stone;
- 3) create spawning/nursery habitat; and,
- 4) construct a riprap sediment deflector to preserve enhanced habitat.

Agency Coordination

The design concepts of the Fishery Habitat Enhancement Project were developed in cooperation with the City of Detroit Recreation Department and the Michigan Department of Natural Resources Fisheries Division (MDNR). The preferred alternatives were reviewed by the MDNR, Michigan Department of Environmental Quality Land and Water Management Division (MDEQ).

A visit was made to the Corps of Engineers, Detroit District on October 23, 1996. Two separate discussions took place; one with the Chief of Operations Technical Support and another with two members of the District's Planning Branch, including the Branch Chief, Mr. Dale Monteith. A brief description of the alternatives was presented to the Planning Branch meeting participants and an interest in participating in the project was expressed. A number of Corps of Engineers authorities were discussed which relate to environmental restoration that could allow for partnering in developing the Fishery Habitat Enhancement Project. A formal request to the Corps of Engineers for consideration and potential participation under either Section 206 of the Water Development Act (WRDA) of 1996, and/or Section 401 of the WRDA 1990, would be the means to initiate Corps participation and determine the ability to secure Federal funds for technical assistance and/or implementation.

The most viable option for Corps participation is under Section 206 of the Water Resources Development Act (October 1996). This is a new program called the Aquatic Ecosystem Restoration. It may provide funding to improve the quality of the environment if the project is in the public interest. Funding can be made available for feasibility study, design and construction with a 35 percent local match. This project is strictly an aquatic ecosystem enhancement entirely designed for the benefit of the public trust. The second authority is the Section 401 of the Water Resources Development Act of 1990 which may provide technical, planning and engineering assistance in the development and implementation of Remedial Action Plans for the Great Lakes Areas of concern. Participation by the ACOE would impact the project's estimate of probable construction costs.

SECTION III DESCRIPTION OF PREFERRED ALTERNATIVES FOR FISHERY HABITAT ENHANCEMENT

U.S. Coast Guard Fishing Pier

The Preferred Alternative for the U.S. Coast Guard Fishing Pier Fishery Habitat Enhancement contains three important elements. Deep water areas and areas of submerged structural habitat are two elements needed for attracting and concentrating gamefish near the piers. A sediment deflector is needed for the preservation of deep water areas and structural habitat from excessive sedimentation.

Along the U.S. Coast Guard Fishing Pier, mean water depth averages 6 feet. Deep water habitat is proposed 20 feet off of the shore-side face of the pier. The deep water area adjacent to the U.S. Coast Guard Fishing Pier will consist of two oval shaped basins located between the Belle Isle shoreline and the section of the pier which parallels the shoreline (Figure 3). The combined areas will require approximately 7,400 cubic yards of dredging over a 0.8 acre area.

Basin 1 will require approximately 2,800 cubic yards of dredging to create a 0.3 acre area approximately 180 feet long, 92 feet wide and 15 feet deep. Side slopes are 4:1 on the shortest axis (Figure 4). Basin 2 will require approximately 4,600 cubic yards of dredging to create a 0.5 acre area approximately 180 feet long, 130 feet wide and 15 feet deep. Side slopes will be a minimum 4:1 on the shortest axis and 8:1 on the longest axis.

Creation of structural habitat and ^{riprap} stabilization of slopes of deep water areas will be conducted within the areas adjacent to the U.S. Coast Guard Pier (Figures 3 and 4). A total of 350 tons of bedding stone and 400 tons of will be placed along the slope of Basin 1. A total of 600 tons of bedding stone and 650 tons of riprap will be placed along the slope of Basin 2. In both basins, the toe of the stone will begin at the 84 foot river bottom elevation.

A sediment deflector to protect deep water areas and submerged structural habitat from sediment deposition will be constructed within the areas adjacent to the U.S. Coast Guard Pier. The deflector will be constructed upstream and parallel to the section of the pier that extends perpendicular to the shoreline (Figure 4). The toe of the sediment deflector will be adjacent to the pier supports. A total of 350 tons of bedding stone and 1,500 tons of riprap will be used to create a sediment deflector approximately 130 feet long by 40 feet wide at the base. Side slopes will be 2:1. A crest approximately 5 feet wide and 95 feet long will extend 2 feet above the surface of the water at elevation 96.0.

Inselruhe North Wharf

The Preferred Alternative for the Inselruhe North Wharf Fishery Habitat Enhancement was designed to encourage movement of gamefish from deep water areas, approximately 1,000 feet offshore, to areas near the pier. The design consists of a simple channel extending the length of the pier and proceeding out to a depth of about 15 feet. Spawning and nursery habitat consists of a series of mounds immediately downstream of the channel.

In the areas adjacent to the Inselruhe North Wharf, mean water depth averages 6 feet. Deep water habitat is proposed 20 feet off of the downstream face of the pier (Figure 5). The proposed deep water habitat will require approximately 12,400 cubic yards of dredging to create a channel approximately 15 feet in depth, 960 feet long, 68 feet wide at the top and approximately 4 feet at the base. Side slopes will be a minimum of 4:1 (Figure 5). The channel will be aligned parallel to the pier until termination at the 81 foot river bottom elevation.

Physical and Chemical Analysis of Sediments

Physical and chemical analysis of sediments within the project area is scheduled to be completed prior to the Fishery Habitat Enhancement project. A pre-application meeting will be held with the U. S. Army Corps of Engineers Regulatory Functions Branch and Environmental Division to approve the proposed sampling frequency and methodology for the sediment analysis. Analysis of the physical and chemical properties is critical in determining the final deposition of dredge materials. Several alternatives are currently being evaluated.

U. S. COAST GUARD FISHING PIER

- NOTE
1. REFER TO SURVEY DRAWING NO. 10000-10000-10000 FOR THE EXISTING BODGE INFORMATION.
 2. ALL DIMENSIONS SHALL BE CLEAR UNLESS A CLEAR DIMENSION IS SPECIFICALLY NOTED. DIMENSIONS SHALL BE TO THE CENTERLINE OF THE STRUCTURE UNLESS OTHERWISE NOTED.
 3. LIMITS OF STONE STABILIZATION SHALL BE AS SHOWN ON THIS DRAWING. STONE STABILIZATION SHALL BE TO THE CENTERLINE OF THE STRUCTURE UNLESS OTHERWISE NOTED.
 4. THE BODGE SHALL BE CONSTRUCTED WITH A CLEAR WIDTH OF 100'-0" AND A CLEAR LENGTH OF 100'-0".
 5. THE BODGE SHALL BE CONSTRUCTED WITH A CLEAR WIDTH OF 100'-0" AND A CLEAR LENGTH OF 100'-0".

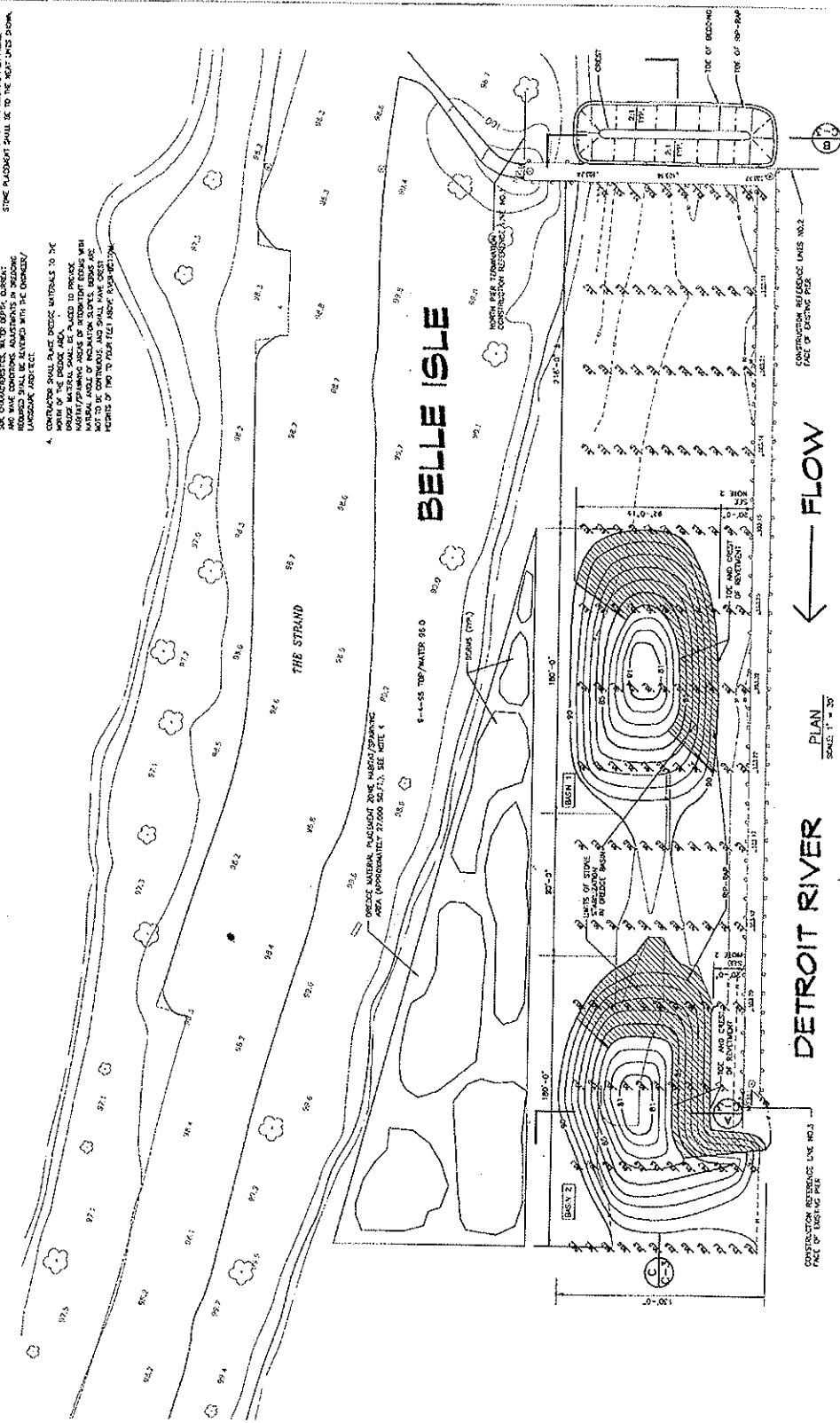


Figure 3 Preferred Alternative Final Design for Proposed Fishery Habitat along U.S. Coast Guard Fishing Pier - Plan View **Belle Isle Piers Fishery Habitat Enhancement**

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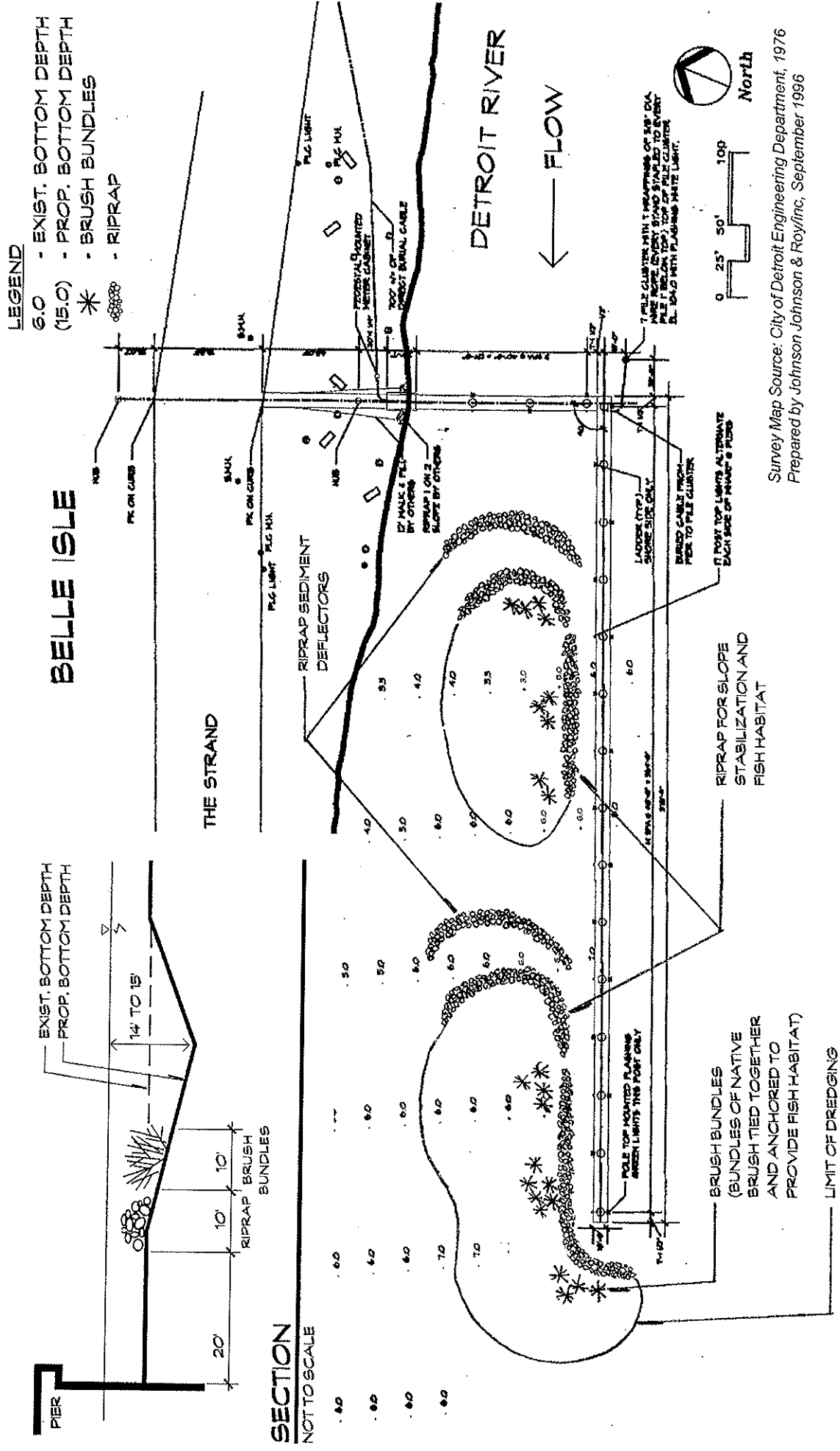
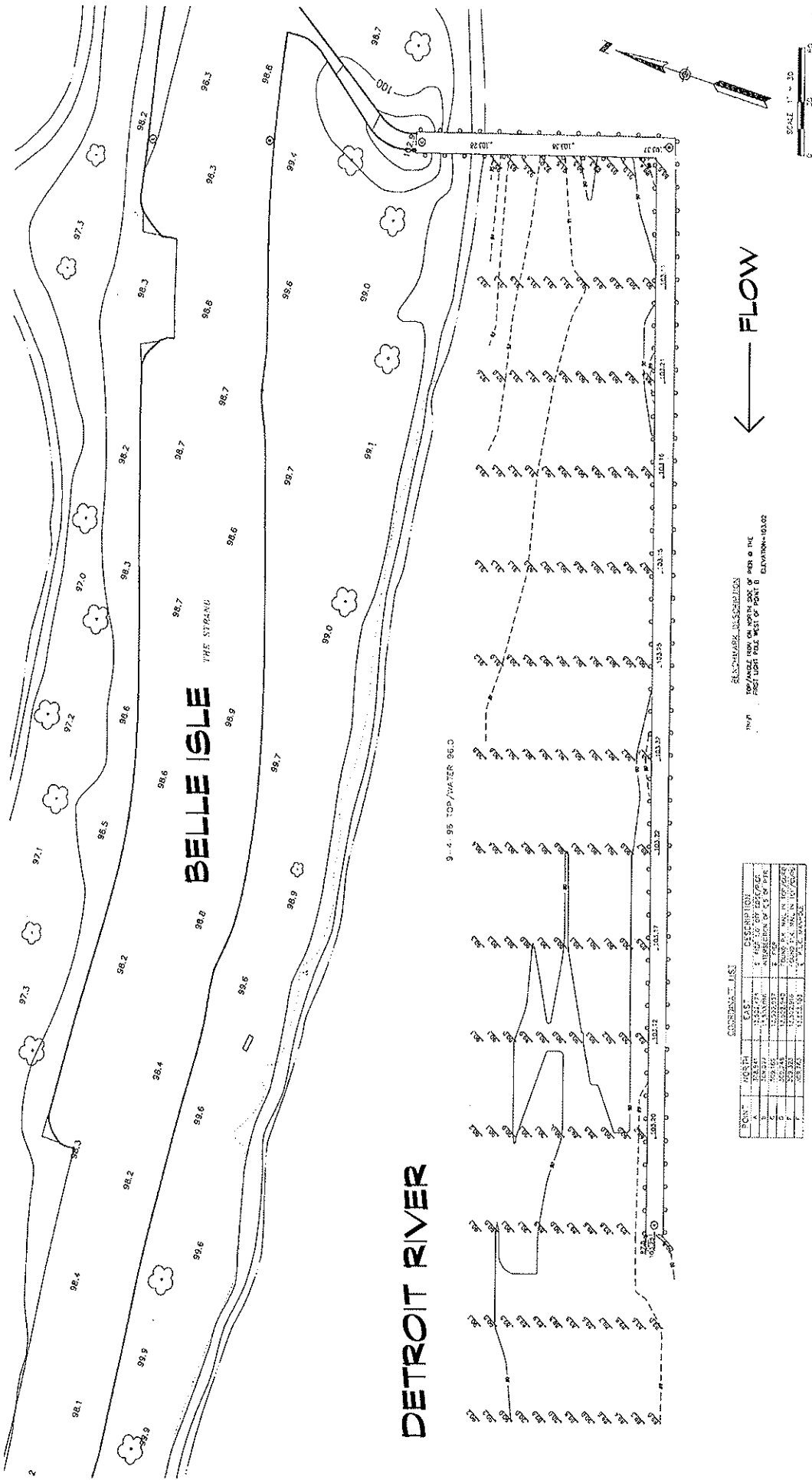


Figure 8
Alternative C

Conceptual Design for Proposed Fishery Habitat along U.S. Coast Guard Fishing Pier - Structural Habitat
Belle Isle Piers Fishery Habitat Enhancement



Survey by Spaulding, DeDecker & Associates
September 1996

Appendix
Detroit River Bottom Elevation Survey - U.S. Coast Guard Fishing Pier
Belle Isle Piers Fishery Habitat Enhancement