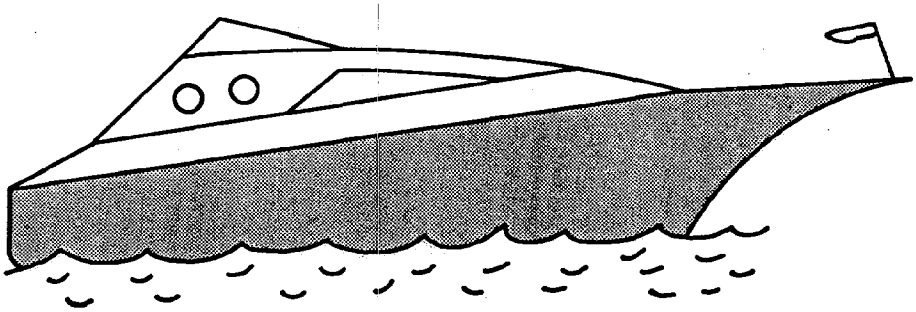
FALLS TOWNSHIP
WATERFRONT PARK
RIVER ACCESS FACILITY
AND
75 BOAT MARINA

ATTACHMENT #10



Coastal Zone

Funded and Coordinated through
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DECEMBER, 1987

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WILLI... MAJOR ASSOCIATES
ENGINEER... ...CTS • PLANNERS • SURVEYORS
BRISTOL, PENNSYLVANIA • BURLINGTON, NEW JERSEY
ASSOC.

QH91.75.PAF35 1987 c.2

FALLS TOWNSHIP WATERFRONT PARK
RIVER ACCESS FACILITY AND 75 BOAT MARINA

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Vice President

18 December 1987

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Bristol, Pennsylvania

WGMA #7017

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PROJECT PARTICIPANTS

The following members of the staff of WILLIAM G. MAJOR ASSOCIATES, INC. have participated in the planning and execution of this report.

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SUMMARY

Falls Township retained William G. Major Associates to evaluate the development and engineer a marina at the Waterfront Park location. This was accomplished through an analysis of:

-background studies on the site,
-river access requirements by the U.S. Corps of Engineers, PA DER and PA Fish Commission,
-data of similar marinas and area trends, and
-related experience with similar projects.

The analysis shows that the Falls Township site has significant advantages for the construction of an in-river marina. There is a strong economic market for the service.

Engineering of the marina will focus on a permanent anchor system with removable docks. Fenced land storage will provide off-season protection for docks and boats. The in-river marina could ultimately service 200 boats although a 75 slip marina is suggested at this time. A recommendation is made to proceed with design of this marina when sufficient funding is obtained.

Estimated costs of the described facilities are $648,000 with annual operating costs of $50,800 per year.

Falls Township Waterfront Park

INTRODUCTION

Project History

Falls Township acquired 15 acres of riverfront property adjacent to the Pennsbury Manor State Historical Park. The intention is to develop this site into a recreational oriented waterfront park utilizing principally the Delaware River and also the adjoining wetlands, fields, picnic areas and proximity to Pennsbury Manor. The site is wedged between Scots Creek (a part of Warner Lakes) and the Delaware River.

Planning for the Waterfront Park began in 1980 with a report by UNIPLAN (1). It called for three phases of development as follows:

I. Passive Recreation- limited to providing site access, open fields and clearing underbrush, parking, picnic areas and pathways.

II. Facilities for Dayboating- extend roadway, install boat launching ramp, access, trailer, parking, a small vending building, gas tanks, and pumps.

III. In-water Marina- provide slips for 100 to 150 boats and land service utilities such as water, sewer, electric, parking and boat storage.

To date, Phase 1 and part of Phase 2 has been completed. The site is open to the public, parking for 52 cars exist, picnic tables are located, fencing along Pennsbury Manor site is complete.

In 1981, the township entered into an agreement with the Pennsylvania Fish Commission to lease 5 acres of the property for a river access facility. Surveys were started and a preliminary plan was prepared by the Fish Commission (2). However, an acceptable design was not obtained and funding was not authorized. Obstacles to development centered on wetland impact and concern with the Pennsbury Manor Historical Park. Development of the in-water marina faced the same problem.

Falls Township received a grant (fiscal 87) from the Pennsylvania Department of Environmental Resources (DER) Office of Coastal Zone Management (CZM) for furthering the marina by obtaining design and engineering funding and coordination services. Accordingly, William G. Major Associates (WGMA) was retained to provide these services. This report presents a compilation of findings and a design for a seasonal in-water marina at the Pennsbury Manor/Falls Township Park site.

SCOPE AND OBJECTIVE

The scope of this study (3) focuses on preparing a preliminary engineering design of the marina complex and a final design of the river access. This was accomplished in a step-wise process as follows:

1. Data Collection
2. Evaluate Data and recommend overall plan
3. Preliminary engineering design
4. Final design of dayboat access area
5. Funding
6. Coordination
7. Report preparation
8. Consultation

MARINA DEVELOPMENT ALTERNATIVES

Site Selection

A marina must have access to the body of water for which water dependent activities can be practiced. Falls Township has a frontage on the Delaware River extending from Tullytown upriver to Morrisville a distance of about 14 miles. The majority of this waterfront is owned by Waste Management Incorporated and USX Corporation.

The Pennsbury Manor State Historical site, (William Penn's home) is waterfront property wedged between the large corporate holdings roughly two (2) miles upstream of Tullytown corporate limits. Falls Township owns a 15 acre parcel adjacent and south of the Pennsbury Manor State site. This was obtained persuant to a study by Economic Research Associates (4).

The Falls Township property is essentially rectangular; being 1000 feet of shoreline and 650 feet inland. From land, it is approached by Pennsbury Road, the principal access to the Manor, and is about 1.4 miles in from Bordentown Road. The land is almost level with a viewing mound exceeding 10 feet in height centrally located. There is a four foot high dike which parallels the shoreline several hundred feet inland. The area between the dike and river contains many large trees and the area inland of the dike is cleared grass fields and/or parking lot.

No other Delaware River waterfront properties are available to the Falls Township for development as a river access or marina complex.

Type of Service

At the present time, there are no marina services at the Falls Township Waterfront Park site. An agreement exists with the Pennsylvania Fish Commission to lease five (5) of the fifteen (15) acres and install a boat ramp, comfort station and parking facilities. These facilities, and any developed for the marina would be oriented to the public recreational boater. Commercial operations would not be compatible for the public support services envisioned at this site.

The recreational boating public in the Delaware River is seasonal in nature. Generally, the season extends from April 1 to October 1. The major types of use include fishing; swimming, skiing and related water contact activities; cruising and sailing; live-a-boards, and racing.

Improved water quality over the past number of years, coupled with an active boating public have raised the level of recreational boating on the Dela-

ware. Above Philadelphia the river has a deep channel maintained by the U.S. Army Corps of Engineers upstream to the Morrisville-Trenton Bridge crossing. Downstream of Philadelphia the Delaware is easily navigable to the Delaware Bay or south via the Chesapeake-Delaware Canal to the inland waterway and Chesapeake Bay.

The type of services needed by the seasonal recreational boater in the navigable portion of the upper Delaware include the following:

1. Inwater slip or mooring facility for "permanent" and transients with corresponding utilities (e.g. electric, water, sewer, telephone).

2. Security from damage by man or the elements and freedom of access for personal use.

3. Land related facilities such as rest rooms, showers, laundry, boat sales and services, ship store, fuel docks, bait, ice, phone, and winter storage.

The degree to which each marina provides its services depends on its ability to capture and retain its market share. Many of the marinas in this area are open year round in order to keep sales, services and response current to user needs. It's not uncommon to find marinas in the Chesapeake area to have swimming pools, social rooms, golf courses, land transportation and similar facilities to attract the transient boaters.

Table 1 presents a list of the services provided by marinas in the market area of Philadelphia and north to Trenton. The "typical"marina in this area provides the following types of service:

TABLE 1 MARINA SERVICES

			LAND STORAGE			LAND SUPPORT SERVICES							
		NO. SLIPS	IN-SIDE	OUT-SIDE	WET STORAGE	FUEL	ELECT.	REPAIRS	SUPPLIES	BOAT SALES	HEAD	ICE BEV. FOOD	
Trenton Marina	1	0	40	20	0					X	X		
Ross Marina	2	17	0	34	0	X	X	X	X	X	X	X	
Curtin	3	90	25	150	3	X	X	X	X	X	X	X	
Jack's	4	0	0	0	0			X		X		X	
Snug Harbor	5	200	0	200	0		X				X		
Eckart's	6	10	0	30	0		X		X		X		
Seyfert & Wright	7	100	0	200	0			X	X	X	X	X	
Jack's Neshaminy	8	200	0	200	0	X	X	X	X	X	X	X	
Neshaminy State	9	160	0	0	0		X				X		
Salem Harbor	10	90	0	90	0		X				X	X	
Dredge Harbor	11	350	288	300	10	X	X	X	X	X	X	X	
G. Winters Sailing	12	200	0	250	60		X	X	X	X	X	X	
Castle Harbor	13	100	0	300	30		X	X	X	X	X	X	
Riverside	14	200	*	*	*	X	X	X	X	X	X	X	sewage pump out
Ran-Del	15	120	0	200	0	X	X	X			X	X	
Art's Rancocas	16	50	0	100	0	X	X	X			X	X	
Eble's	17	58	*	*	58	X				X	X	X	
Big 'D' Valley	18	0	0	60	0	X		X	X	X	X	X	
Glenview	19	0	0	250	0		X		X				
Joe's	20	15	0	10	0	X	X					X	
Penn's Landing	21	56	0	0	0		X				X	X	
Phila. Marine Center	22	300	40	100	300	X	X	X	X	X	X	X	
Pekora's	23	20	30	50	0	X		X	X	X	X	X	
			85		77								
AVERAGE		129		141									

Reference (4)

* - AVAILABIE BUT UNKNOWN

X - AVAILABLE

129 in-water slips (used year round)
228 land storage units (85 under cover)
electric hook ups
supplies (marine)
repair services and boat sales
rest rooms, ice, vending machines

In addition to marinas, the Delaware is peppered with seasonal yacht clubs which provide moorings for recreational boaters. Major clubs in the vicinity of the Falls Township park include Bristol, Bordentown, Florence, Capital City, Anchor, and Pennsylvania yacht clubs. Typically, these clubs have limited dock facilities in the river and numerous mooring locations, sometimes on both sides of the navigable channel. Moored boats do not have the advantage of hook-ups for electricity and water and therefore cost savings can be realized by owners who do not need these services and who do not trailer their boats to access ramps.

The type of services to be considered for the Falls Township Waterfront Park Marina should include in-water docks, moorings, dry storage on land, service building for rest rooms, supplies and parking.

River Access

The Falls Township Waterfront Park property exhibits several development problems with respect to a marina, not the least of which is access to the water. The Delaware River is freshwater tidal in this area and there are generally two tides per day. The normal elevation change from high to low tide is about 6½ feet.

In the past, wetlands were generally viewed as wastelands - places infested with mosquitos, biting flies, and snakes - having little real or economic value (6). Because of the negative view and access to navigable waterways, wetlands were used for commercial development. Falls Township serves witness to this development with its utilization of riverfront for commercial purpose (e.g. USX Corporation, Warner, and GROWS, Inc.).

More recently, wetlands are being recognized as important natural resources with many benefits to society. They are vital habitats for plants, and animals. They help improve water quality and reduce flood damages. They minimize the effects of upland erosion and they are beneficial to the hunting, fishing and tourism industries.

This increased awareness has brought intense regulation toward any type of flood plain development. This has made "perseverance" the keyword to progress with respect to marina development. The problem is crossing the wetlands.

The objective is to minimize the impact on wetlands. The original plans (1) called for separate developments of a boat access ramp and a marina at this site. This would be similar to the Neshaminy State Marina in Croydon which has separate facilities. However, both the access ramp and the marina require impact on the wetlands. An alternative approach is to construct an in-river marina with a common access. In order to do this, it is first necessary to develop an approved access structure.

Numerous alternative river access plans were considered and two basic alternatives were drawn up for further consideration. They are:

Alternative 1- Dredged channel and turning basin with sheet piling and ramp inland.

Alternative 2- Filled in staging area and ramp over wetlands to river.

Both alternatives were presented to various local, state and federal officials to obtain input as to a preferred direction. Appendix Drawing 1 attached presents the compromise position which has been submitted for permitting.

The selected river access design has a raised staging area and driveway to the ramp which projects into the river well below the mean low water level. The structure is open underneath to permit tidal flushing. It is built on wooden pilings with precast concrete decking. The ramp is wide enough for two accesses at once, both using the center floating dock. This center dock will also provide level access to the in-river floating marina that will be connected to the end section.

Other land possibilities planned for the river access site include parking for 58 cars and trailers and a comfort station.

MARINA DESIGN CONSIDERATIONS

Physical Conditions

The river access location at the Falls Township Waterfront Park is shown in Appendix Drawing 1. The access is located 116,000 feet upstream of Allegheny Avenue in Philadelphia in accordance with U.S. Army Corps of Engineer stationing. It is about midway along the Kinkora Range on the opposite side of the channel from the flashing red marker number "72". The terminal pilings of the access ramp are 350 feet from the nearest edge of the Kinkora Range navigable channel. It is within this 350 foot area that the planned marina will be located.

There is not an approved pierhead or bulkhead line in this vicinity that would interfere with the placement of a seasonal marina. A bulkhead does exist in front of the adjoining Pennsbury Manor property. Drawing 2 presents photographs of the proposed site at high and low tide and up and down the river. Clearly, the bulkhead at the Manor is not used for boating purposes but merely to protect the lawn against erosion.

The in-river marina would be subject to conditions not present in a sheltered backwater location. Some conditions would be advantageous and some not so. Table 3 presents a list of considerations in this regard. The advantages are sufficient "as is", but the disadvantages need to be addressed separately.

Ice Flows - The Delaware will occasionally freeze over during the winter, which when coupled with the rise and fall of tides generates large vertical and horizontal forces on any structure. The floating docks will be securely stored on land at this time and the fastening system will need to be protected from these forces.

Runaway - Large commercial ships use the navigational channel with tug escort/power. It is possible that a ship could wander from the channel if lightly loaded and do damage to an in-water marina. A breakwater would prevent this mishap, but the probability of such an event is too small to warrant the cost of such protection. Boat owners insurance would no doubt cover vessel damages and the marina would need a blanket policy for the dockage system.

Floating Debris - It is not uncommon to find floating trees, 55 gallon drums, tires, plastic containers and similar items flowing out with the current. These items rarely have enough impact force to do damage to standing boats or docks. However, they can accumulate and become entrapped around pilings, outdrives, lines, etc. This will present a maintenance requirement which should not be allowed to get out of control.

Table 3 Considerations for an
In-River Marina Location

Advantages

- Lower initial investment
- Close to "the action" for the boater
- Fresher water conditions
- Self cleansing of sediment, pollution
- More scenic
- Less impact on wetlands and land based recreation facilities

Disadvantages

- Subject to off season ice flows
- Run away barge or uncontrolled ship
- Floating debris in river
- Current flows and changes, particularly extreme high and low
- Require "no wake" conditions in river
- Little protection from wind force

Current Changes - Tides are vertical changes in the water elevation and currents are horizontal flows. At the marina location in Falls Township, no current (slack water) and maximum current each normally occur four times per day. From a slack current, the flood current upriver occurs to a maximum rate in about three hours and then subsides to another slack condition three hours later. An ebb flow then increases downriver for about three hours and then subsides to another slack current. This sequence is repeated in the second 12 hours of the day. Vertical motion follows essentially the same cycle but may not peak at the same time as the currents. Vertical motion may be affected by extreme flood flows in the river caused by upland rains rather than by the moon's gravitational effect. For this reason, the marina should be designed for elevations to the 100 year event for the high point and in deep enough water to provide sufficient draft in a low-low tide condition.

"No Wake" Condition - This condition will take a section of the river and remove it from free boating. Boat wakes are waves that can do damage to other boats or docks that are jostled against docks, pilings, bulkheads or other boats. Posted "No Wake" signs are usually sufficient to slow boaters down and prevent this damage. However, this is a straight section of the river which is frequently used by skiers so that the loss will not go unnoticed. Moored boats are usually not as vulnerable to wakes because they do not rub against a fixed object, but they take more space than docked boats, so the trade off of centralizing in-water boat storage may actually increase sections of the river for free boating.

Wind Forces - A sheltered marina would tend to provide protection from hurricane type winds. The design of the in-water marina should consider winds to 100 m.p.h. This force, coupled with maximum flood current and a safety factor should provide a sound basis for securing the dock system. Individual boats will be fastened with lines of sufficient strength to prevent leaving their berths.

Wave forces generated by wind across the water surface will not be a major problem because the prevailing winds will have a relatively short fetch length. This means that large waves will not be produced as might be the case at the edge of a large lake.

Dock System-

There are several major dock manufacturers that will construct systems adequate for this installation. Because the tide change is in excess of 6 feet,it will be necessary to have a floating system, rather than a fixed one. Also, the individual units must be easily disconnected and removed for off-season storage.

Built in utility channels along the main docks should carry as a minimum fresh water (portable hose connections for cleaning, fire protection) and electricity (boat hookups and dock lighting).

Winter Storage

Winterizing boats in this area requires action on hull cleaning, motors, outdrives, pump systems, heads, pressurized water systems, batteries and other temperature affected systems. Once done, the boat is covered from the elements and supported in a manner that insures stability. The boatyard merely has to provide a secure area.

In-water winter storage would not be possible at this location due to the inability to control ice damage.

Secured areas should be as follows:

75 Boats	-	26,000 Sq.Ft.
100 Boats	-	35,000 Sq.Ft.
200 Boats	-	70,000 Sq.Ft.

This maximum area would require about three quarters of the parking area required for the access ramp. Therefore, we consider fencing a portion of the parking area to enable winter storage of docks and boats.

Parking

At present, the Waterfront Park has 52 normal size asphalt parking spots which are used for the picnic area and any other activities (including marina) at the Park. The River Access plan calls for an additional 58 double spots (tow car and trailer). This should be sufficient parking for the initial 75 boat marina and perhaps more depending on use. The most critical time will be the hot Sunday in July when everyone wants to be on or near the water. During these periods, parking on the grass along the entrance drive would be sufficient for an additional 90 cars. This would total 200 cars. At three (3) people per car, this would be a total service population for 600 people.

Water and Sewer Requirements

Men and Women's restrooms will be provided for the River Access phase of this project. The water supply necessary for the marina should service the total user population,i.e.600. At 10 gallons/person per day for 600 people, this represents a flow requirement of 6,000 gallons per day.

The ground water bearing strata in this area is unconsolidated sand, gravel and clay deposits with wells yielding 200 to 3,000 gallons per minute. Water quality is fair.

A holding tank in the order of 5,000 gallons will be sufficient to service the restroom facilities.

Boating Market and Economics

The 1980 ERA report (4) concluded "....market support exists for an additional 100 to 150 slips on the upper Delaware River." The intent here is to determine if conditions have changed to warrant a different conclusion.

Table 2 presents statistical data and trends related to boating registration, population, income, and visitor attendance at Pennsbury Manor. Pennsylvania Boating registration has increased at the rate of 3.9 percent per year. This rate compares favorably with more current data presented by the National Marine Manufacturers Association-(NMMA) (8). They have indicated five straight years of sales gains for the industry with 1987 being about 5 percent better than 1986. Furthermore, their analysis suggests that the boat buying public (35 to 54 year olds) is expanding as the "baby boomers" travel through this group and that this alone will support a 4 to 6 percent annual growth rate for boating through the year 2000.

From 1980 to 1983, the Bucks County population increased at an annual rate of 1.7 percent. The trends of more people with more money available would support the original premise that a market exists.

In 1980, ERA (4) selected 10 marinas in the upper Delaware that were significant in terms of the number of slips available and services offered. These marinas had 1153 slips available in 1980 and these same marinas have 1608 slips available in 1987. This represents an annual average increase in the number of slips in the amount of 7 percent per year. In addition, a major marina on the Neshaminy was not included in the 1980 report, i.e. the Snug Harbor Marina in Croydon which has 200 slips. Another new marina in the City of Philadelphia, the Philadelphia Marine Center has 350 slips that were not included in the 1980 report.

The increase in the number of slips available (7%) is higher than would be indicated from either the increase in Pennsylvania boater registration (+3.9%) or in new boat sales (4 to 6 %). It is interesting to note that the majority of new slips are in New Jersey and that Pennsylvania's rate of increase for new slips is about 0.5% per year.

TABLE 2 BUCKS COUNTY TRENDS

		1980	1981	1982	1983	1984	AVERAGE ANNUAL CHANGE PERCENT
Bucks County Boat Registrations	(1)	7,593	7,718	8,054	8,480	8,864	+3.9
Population	(2)						
1980 Census		479,211					
Estimate			488,787				
Estimate				495,545			+1.7
Potential Buyers	(3)	103,989	106,066	107,533			+1.7
Bucks Co. Income per Capita	(4)	10,534	11,540	12,227	13,012		+7.3
Pennsbury Manor Attendance		35,228	39,340	42,164	42,824	45,483	+6.6

(1) Boat Registrations in PA, Table 217, Page 236

(2) Land Area and Population Table 7, Page 9

(3) Prime Boat Buying Public is 35 to 54 years old which represents 21.7 percent of PA Population Table 2, Page 5

(4) Total Personal Income and Per Capita, Table 78, Page 90

(5) Number of Visitors at Historical Sites, Table 213, Page 232

REFERENCE (7)

The increases in number of slips should have been a negative impact on the cost per slip if there is a weak demand. However, it appears that the seasonal cost per foot of boat has risen from 10$/ft. in 1980 to 40$/ft. in 1987. After adjusting for inflation, this still represents an increase of more than 14 percent per year. Clearly this implies that a strong demand exists for in-water boat docking.

Additional fees would be collected by the marina for electricity and winter storage plus any mark-ups for supplies, food and the like. Winter storage in a secure outdoor area could run from 10 to 20 dollars per foot.

A representative mix of boats in a seasonal marina on the Delaware would be suggested as follows:

	Average length
23' and under- 60 percent	20'
23' to 35' - 30 percent	30'
over 35' - 10 percent	40'

A seasonal marina fully used with the above mix of boats at the average dock and storage fees would realize an annual income of:

75 BOATS	100 BOATS	200 BOATS
$103,000.00	$137,500.00	$275,000.00

In reference to ERA's conclusion that a market exists for a new marina, it is apparent that the boating public is willing to pay for these services. The upper Delaware has had a significant increase in the number of slips over the past seven years and yet the fee per slip has risen dramatically. Perhaps the lack of adequate river access ramps is forcing the boater to stay in the water. Maybe the overcrowded conditions at the Jersey shore, coupled with higher dockage rates ($100/ft) salt water and associated pollution problems are directing the boater to keep the boat closer to home where it can be used more frequently. Maybe the aggressive sales organizations in the vicinity of Croydon, PA, Dredge Harbor, NJ and the Philadelphia Marine Center are selling boats faster that the national average. The improved water quality in the Delaware, the decline in large commercial traffic, the easy access to the upper Chesapeake Bay and the availability of disposable income have all been factors that substantiate the conclusion that a new marina in the Falls Township site would receive strong market support.

MARINA DESIGN

River Access

Figure 1 presents a plan and section view of the proposed river access facility. Drawing A1 shows the land side configuration of driveways, parking, restrooms and holding tank.

Site Photographs

Drawing A2 presents marine photographs in the vicinity of the site during high and low tide conditions.

Design Basis

Table 4 presents a SUMMARY OF DESIGN BASIS for the proposed marina (75 Boats) as well as for two expansion periods. The expansion periods could be exercised by the owner based on market demand, financing and regulatory approvals.

Drawing A3 is a layout of the marina in relation to the river access facility, the property limits and the navigational channel.

FIGURE 1

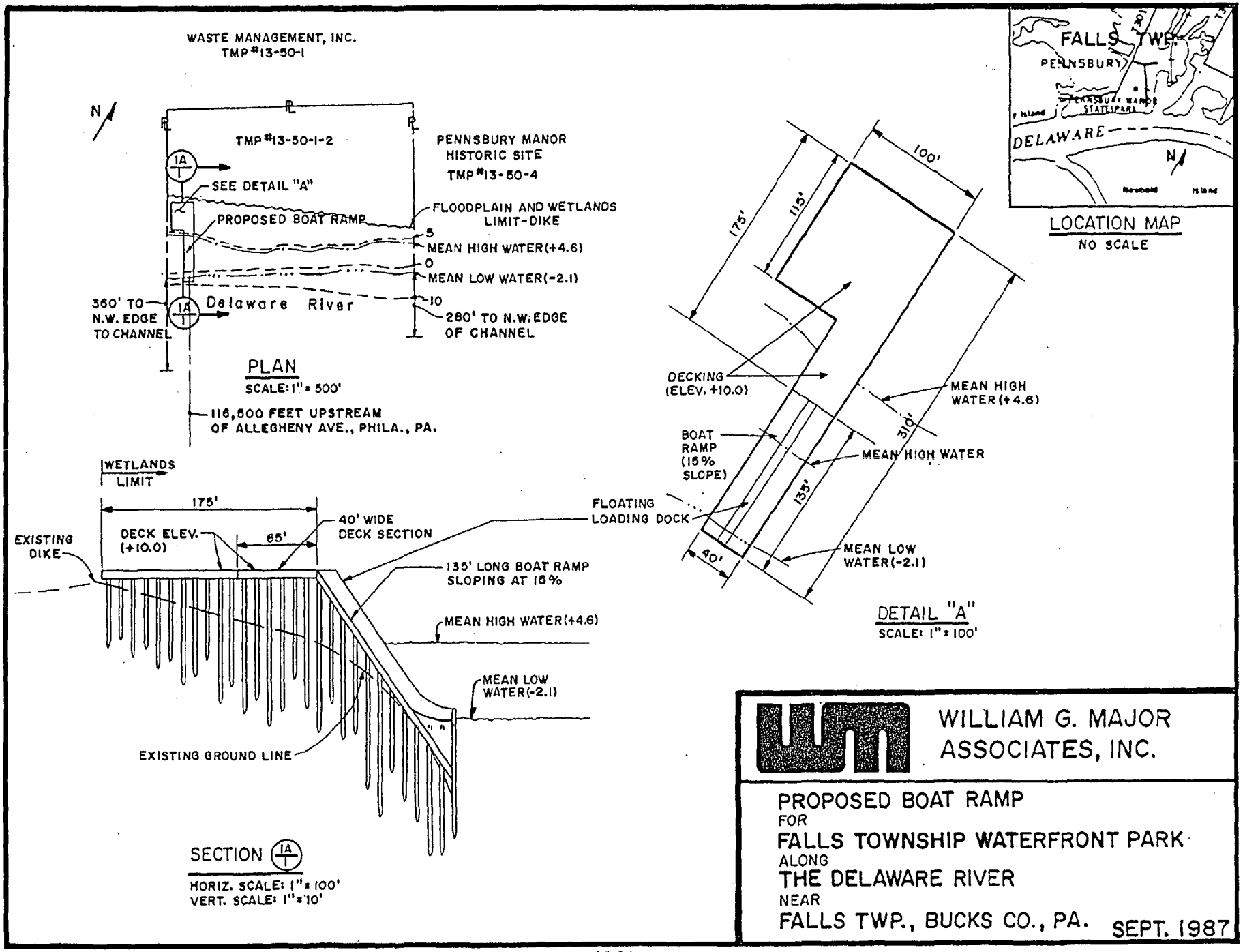

WASTE MANAGEMENT, INC.
TMP #13-50-1
N
TMP #13-50-1-2
PENNSBURY MANOR
HISTORIC SITE
TMP #13-50-4
1A
SEE DETAIL "A"
PROPOSED BOAT RAMP
FLOODPLAIN AND WETLANDS
LIMIT-DIKE
5
MEAN HIGH WATER(+4.6)
0
MEAN LOW WATER(-2.1)
10
360' TO
N.W. EDGE
TO CHANNEL
Delaware River
280' TO N.W. EDGE
OF CHANNEL
PLAN
SCALE: 1" = 500'
116,500 FEET UPSTREAM
OF ALLEGHENY AVE., PHILA., PA.
WETLANDS
LIMIT
175'
DECK ELEV.
(+10.0)
65'
40' WIDE
DECK SECTION
EXISTING
DIKE
135' LONG BOAT RAMP
SLOPING AT 15%
MEAN HIGH WATER(+4.6)
MEAN LOW
WATER(-2.1)
EXISTING GROUND LINE
SECTION 1A
HORIZ. SCALE: 1" = 100'
VERT. SCALE: 1" = 10'
100'
175'
115'
DECKING
(ELEV. +10.0)
MEAN HIGH
WATER(+4.6)
310'
BOAT
RAMP
(15%
SLOPE)
MEAN HIGH WATER
135'
FLOATING
LOADING DOCK
40'
MEAN LOW
WATER(-2.1)
DETAIL "A"
SCALE: 1" = 100'
FALLS TWP.
PENNSBURY
PENNSBURY MANOR
STATE PARK
DELAWARE
N
LOCATION MAP
NO SCALE
WILLIAM G. MAJOR
ASSOCIATES, INC.
PROPOSED BOAT RAMP
FOR
FALLS TOWNSHIP WATERFRONT PARK
ALONG
THE DELAWARE RIVER
NEAR
FALLS TWP., BUCKS CO., PA.
SEPT. 1987
JOB #7017

TABLE 4

SUMMARY OF DESIGN BASIS

WATERSIDE FACILITIES	Present	Expansion 1	Expansion 2
Number of Slips	75	25	100
Number of Moorings	variable	variable	none
Slips for boats 23' and under	45	15	60
Slips for boats 23' to 35'	23	7	30
Slips for boats 35' to 45'	7	3	10
Moorings for boats over 45'	as required		
High water elevation-NGVD	12.0		
Low water-NGVD	-2.0		
Maximum Ebb current	1.5 knots (2.5 feet/sec)		
Maximum flood current	1.3 knots (2.2 feet/sec)		
Maximum wind	78 mph with Ebb current		
Electrical supply-AMPS	1120	330	1500
Fire protection	portable	none	portable
LANDSIDE FACILITIES			
Parking-# of new spaces	none	25	100
Sanitary			
portable head flush out	one	none	one
holding tank-gallons	2500	none	2500
shower	two	none	two
Well system-gpm	100	150	250
Fenced winter storage area-sq.ft.	33,600	none	35,000

Dock System

There are a variety of floating dock systems available for this marina ranging from all wood, to wood and metal or concrete construction. The initial cost of systems depends on the size of members, the extent of utilities (water, electric, lighting, fire protection, cleats, etc.) and the pricing market at time of purchase. Accurate costs for these systems can be obtained through a public bidding process once permit approvals have been obtained. For purpose of estimating project costs at this time, 1988 MEANS Catalog of construction costs has been used which estimates per slip costs ranging from $2,225 to $5,725.

Key factors in the selection of a dock system include durability, appearance, stability for various live load conditions, ease of installation and removal safety for people and boats. See Appendix B - Representative Dock Systems.

Anchor System

The most common anchor system for marinas in the upper Delaware are creosoted wooden pilings. They are in good supply, easy to install and relatively permanent for the marine environment. We have a concern with use of piling for an in-river marina as opposed to the other backwater marinas in the area. This is not related to interruption of river flow, because they will have essentially no daming effect. It is a concern with ice damage which may tend to lift the piles as the tide rises.

This may result in an additional significant operational cost by having to install a percentage of new pilings each spring. Alternative anchorage systems such as large concrete dead weights, telescoping piles, and removable caps may be considered if normal wooden piling is deemed unacceptable. For cost purposes, we have used wooden piling as the preferred anchoring system. The selection of an anchoring system would depend on the type of dock system selected. See Appendix B - Representative Piling System.

Winter Storage

A storage area has been reserved in the land side parking area to permit outside secure boat and dockage off-season storage. The access ramp will be needed in addition to a transport vehicle and storage blocks. Pressurized water cleaning of the hull as the boat comes out of the water eliminates the need for soaps and/or detergents later on. Winterizing of the boats can be done either by the boat owner or a mechanic recommended/retained by the marina. The process of emptying the marina will depend on the availability of manpower and equipment and will generally take from 4 to 6 weeks to remove all boats and docks and to secure them on land. The spring re-entry would be equivalent. Consideration can be given to expanding boat storage by constructing Hi-Dry units in the future. Several marinas in the area are going to this method which has the advantage of year

round protection from the elements and yet relatively easy river access.

Operational Factors

Maintenance and Repair - The marine environment is aggressive to most man-made materials. Metals, wood, fiberglas, plastics and the like are either actively corroded or used as habitats for marine organisms. A marina operator must be vigilant for these conditions and must have the resources to correct problems before they become dangerous or out of control. Annual maintenance and repair operating costs generally vary from 2 to 8 percent depending on whether it is for a permanent non-moving structure or for mobile equipment. For estimating purposes, we have used 4 percent of the pilings, dockage and storage facilities.

Service Building - Shelter is necessary to provide a place for record keeping, to be a base of operations, and to focus a marina-wide security program. Also, it would be necessary if boat sales, repairs, and/or marine supplies were part of the operation. These latter activities require more extensive consideration then is permitted in this report. Therefore, we suggest leasing a portable trailer type office for the first several seasons to provide the basic necessities.

Market Identity - Consideration needs to be given to developing a market identity for the Falls Township Waterfront Park. The available site is by no means "ideal". Within eyesight up river is the large steel making operations of USX Corporation. Just down river on the Jersey side are hulks of the Roebling Steel Company. The Pennsbury Manor Drive to the site can not miss the activities of GROWS, Inc. These views are not easy on the Boater's eyes.

The advantages of the site include proximity to Pennsbury Manor, passage through Penn-Warner Lakes to the site, pleasant wildlife and wetland vegetation along the river, and a gateway for the Bucks County boater to enjoy the river. Capitalizing on an advantage to form a market identity will be important on developing a successful marina. Unlike the Neshaminy State Marina in Croydon which charges essentially one half the normal dockage fee and thereby maintains a five year waiting list, it is suggested that this marina use competitive rates.

Access Road - Pennsbury Manor receives about 50,000 visitors per year. The bulk of these are during the summer months, holidays and the normal vacation periods. If we assume that three quarters of these visitors occur during the period of April 1 to October 1 on Friday, Saturday and Sunday, then the average weekend traffic to the Manor would handle 641 people which, at two people per car would be 320 cars. Most of these cars would be traveling in the period of 10am to 4pm.

The river access site is designed for 58 vehicles and the initial marina for 75 boats. Normal weekend daily usage would be in the order of fifty percent (50%), which would mean 67 vehicles, coupled with an additional 30 cars for the picnic area and Penn Warner Lakes would put a total usage on the Pennsbury Manor access road of 417 vehicles. This rate of use would represent a low volume driveway in accordance with PennDot criteria. We judge the present access is sufficient to handle the required traffic.

Cost Estimates

Preliminary Capital and Annual Operating Cost Estimates are presented in Tables 5 and 6.

Total costs are based on:

1. 75 Slip Marina as previously described.
2. Storage area for initial phase.
3. River access site already developed by others including water, sanitary and a comfort station with holding tanks.
4. Electricity available within 400 feet of site.
5. Layout of docks and anchorage in accordance with Drawing A3.

The Total Capital Costs, including contingency is estimated to be $648,000.

Annual operating costs are based on: (1) initial phase marina as discussed above, and (2) leasing of service building and trailer lift vehicle for moving boats and docks in and out of the water. The annual operating costs are estimated for capital amortization are not included in the annual costs.

The amount of capital that would require amortization would depend on the grant money available from various local and federal sources. If we consider no grants (worst condition) at an interest rate of six percent (6%) for 20 years, the annual amortization rate would be $648,000 X .08718 = $56,400. This figure, when added to the annual operating cost gives a total yearly cost of $107,200. Because the annual revenues are only $103,000(based on current average dockage and storage fees of $55/ft.), there will be a short fall of $4,200 per year until the user fees increase (at a rate of fourteen percent (14%) per year, this would take less than one year), or unless sufficient grant monies can be obtained to reduce the amount of amortization.

TABLE 5

FALLS TOWNSHIP WATERFRONT PARK

SUMMARY OF CAPITAL COSTS

ITEM	DESCRIPTION	TOTAL COST 1987 DOLLARS
Floating Docks	72 Slips	$432,000
Anchor Pilings	22 Pilings	33,000
Dockside Water	44 Slips	35,200
Dockside Electric	32 Slips / Individual Meters	33,400
Site Utilities	Water, Electric, Telephone	42,000
Security Fencing	140' X 340' Plus 4 Gates	11,000
	SUB-TOTAL	$591,600
	ENGINEERING, LEGAL, ADMINISTRATIVE @ 15%	88,700
	SUB-TOTAL	$680,300
	CONSTRUCTION CONTINGENCY @ 10%	67,700
	TOTAL CAPITAL COSTS	$648,000

TABLE 6

FALLS TOWNSHIP WATERFRONT PARK

SUMMARY OF ANNUAL COSTS

OPERATING LABOR		1987 DOLLARS
Site Supervision	26 wks/14 hrs/wk @ $17/hr.	$ 6,200
	12 wks/40 hrs/wk @ $17/hr.	8,200
Helpers (Two)	12 wks/40 hrs/wk @ $ 7/hr.	6,700
MAINTENANCE AND REPAIR		
Three Percent (3%) of $591,600		17,700
EQUIPMENT LEASING		
Forklift & Workboat Allowance		8,000
Office Space Allowance		
	8 mo. @ $500/mo.	4,000
	TOTAL ANNUAL OPERATING COSTS	$50,800

PROJECT PHASING AND FINANCING

Development of a public marina will require a sequential coordination of permitting, engineering and financing. This report will provide a basis for permitting to construct and operate an in-water marina. Pennsylvania has a joint permit process whereby one application (in triplicate) is made to the Pennsylvania Department of Environmental Resources and it is distributed to the Philadelphia District Corps of Engineers and the Pennsylvania Fish Commission. This process can take as little as 45 days, but more likely for this size project it could take 6 months or more.

Detailed engineering of the dock and anchor system will consist of in-water hydrographic surveys, core borings and sizing of docks, utilities and anchor systems. The hydrographic surveys should obtain data on instream velocities, water quality analysis, water depth over the entire proposed area and water flow levels at Trenton during the sampling period. These data in conjunction with tide table, wind charts, current charts and the like will provide the basis for detailed engineering analysis on the structural integrity required for the in-river marina. Once the structural members are designed and the systems are specified, detailed construction cost estimates can be made.

Funding for the marina can be accomplished through a combination of federal, state and local sources. Federal sources include those administered by the Pennsylvania Coastal Zone Management (CZM) Program which receives grants from the U.S. Department of Commerce's National Oceanic and Atmosphere Administration (NOAA). This funding is normally limited to 50,000 dollars per year and requires that the project be designed and engineered before application. Also, there must be at least 30 percent local matching funds and a good indication that permitting will be approved.

A possible source of state funding is the Pennsylvania Fish Commission. However, because the Fish Commission would be involved with construction of the river access site, it is unlikely that large amounts of additional funds might be available for this development. Another possibility for state funding might be the State Park Department. The Neshaminy State Park operates the state marina in Croydon and it operates the Pennsbury Manor next to this site. Perhaps the township could interest the State Park Department to assist with this development.

An alternative idea, based more on private financing would be to approach Penn-Warner recreation club to determine if interest exists in combining the public marina and the Penn-Warner Lakes. The Penn-Warner lakes are a privately operated recreational area which adjoins the site on its south and west boundaries. Electricity, access road, and to a certain extent security, are

shared at present. The lakes are owned by Waste Management, Inc. which operates the nearby GROWS, Inc. Sanitary Landfill.

Start-up funding could be obtained from a general obligation bond to the Township. Under the worst case condition, (i.e. no grants), it would take a year or so before revenue would exceed operating costs depending on level of use, fees, and operating conditions.

Permitting for the River Access Facility was initiated formally by application of a revised Joint Permit on November 2,1987. Notes of the meetings and related documentation is included in Appendix C.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the findings of this report, several conclusions are presented regarding the development of a marina on the Delaware in Falls Township:

1. The existing Waterfront Park presents a site suitable for a marina.

2. The presence of valuable wetlands at the site restrict the options for development while enhancing the boating experience.

3. A river access built over the wetlands to the navigable portion will double as an access for an in-river seasonal marina.

4. User fees for marina slips in the upper Delaware are increasing at a rate (14%) twice as fast as slip availability (+7%) and more than three times faster than boater registration (+3.9%) in Pennsylvania.

5. The marina's anchor system must be designed to withstand winter freezing condition as well as extreme high flows.

6. Winter storage is a service that most marinas in the region provide.

7. A marina does not require a fully dedicated on site service building, but rather a record keeping office.

8. A market identity would help establish a clientele.

9. The Pennsbury Manor access road and existing parking area (including the proposed river access site) are sufficient for the marina development.

10. Construction grant funding would improve the likelihood of self-sustaining economics.

Recommendations

1. Assist and coordinate with the Pennsylvania Fish Commission in the construction of a river access at the Waterfront Park site.

2. Apply for CZM funding for continued design of an in-river seasonal marina.

REFERENCES

1. UNIPLAN REPORT, 1981, by Uniplan Associates, Princeton, N.J.

2. PENNSBURY MANOR ACCESS-LEASE LINE & TOPO SURVEY, 1982, PA Fish Commission, Engineering Division Bellfonte, PA.

3. Proposal for WATERFRONT PARK DEVELOPMENT in FALLS TOWNSHIP, FEB 1987, by William G. Major Associates, Inc. Bristol, PA .

4. Memorandum Report ACCESS SITE and FEASIBILITY STUDY FOR LAUDERBACK ROAD AREA proposed for UNIPLAN, April 1980, by Economic Research Associates, McLean VA.

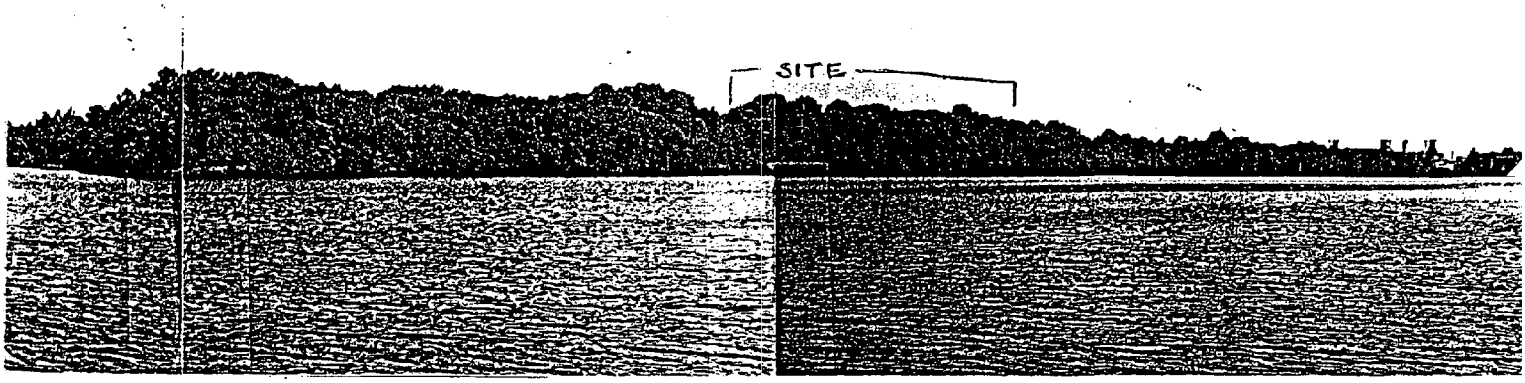
5. BOATING ALMANAC, Vol. 3, 1987, by Boating Almanac Co. Inc., 203 McKinsey Rd. Severna Park, MD 21146.

6. MID-ATLANTIC WETLANDS- A DISAPPEARING NATIONAL TREASURE, June 1987 , by Ralph W. Tiner, Jr. U.S. Fish and Wildlife Service, Fish and Wildlife Enhancement, National Wetlands Inventory Project, One Gateway Center, Suite 700, Newton Corner, MA 02158.

7. 1985 PENNSYLVANIA ABSTRACT- A Statistical Fact Book, 1985, Commonwealth of Pennsylvania, Department of Commerce, Harrisburg, PA.

8. EASTERN BOATING- East Coast's Recreational Boating Newspaper, Vol. 11, No. 10, Oct 1987, 532 Durham Rd. Newtown, PA.

APPENDIX A-2



HEADING UPRIVER IN CHANNEL

SITE AT LOW TIDE

SITE AT HIGH TIDE

APPENDIX B

DOCK AND PILING SYSTEM EXAMPLES

TECHNOMARINE, INC.
SULLIVAN FLOTATION SYSTEMS, INC.
UNITED MC GILL CORPORATION

TECHNOMARINE

Technomarine, Inc. manufactures and installs the finest floating dock systems available in today's world market. Competitively priced and fully warranted for two years after installation, these systems can be adapted to any salt or fresh water application -- from a private boat dock to a fully equipped marina complex.

The Technomarine system uses a modular, adaptable approach to meet the requirements of each specific application. The supporting framework of the system is composed of weather-resistant nickel-aluminum alloy, buoyed by durable polyethylene (Marlex) floats filled with styrofoam. All surface walkways are copper-treated southern pine, which lasts for many years. Water, electrical and cable hook-ups to each slip are easily incorporated (and inspected) by use of utility channels along both sides of every main walkway. All materials and parts are designed for maximum flexibility and low maintenance costs in the event requirements change.

Every system proposal prepared by our engineering team receives exacting attention to detail and technical requirements. Prospective customers are interviewed and asked to fill out a thorough questionnaire that will enable the best product match to the specific application. Once this has occured, an on-site visit, followed by another interview is required. After this process, Technomarine will provide (at no cost to the prospective customer) one or more planned system alternatives.

Technomarine has sold floating dock systems, breakwaters, work barges, fishing and ferry vessels in the United States, Canada, Europe and the Carribean. They are represented in the Middle Atlantic States by Midlantic Marine of Ferndale, Pa. (215) 847-2211.

TECHNOMARINE

MidlanticMarine
Center Hill Road
Ferndale, PA 18921

(215) 847-2211

Pete Brown
Executive Vice-President

TECHNOMARINE

TECHNOMARINE

Midlantic Marine
Center Hill Road
Ferndale, PA 18921

(215) 847-2211

Bob Brown
President

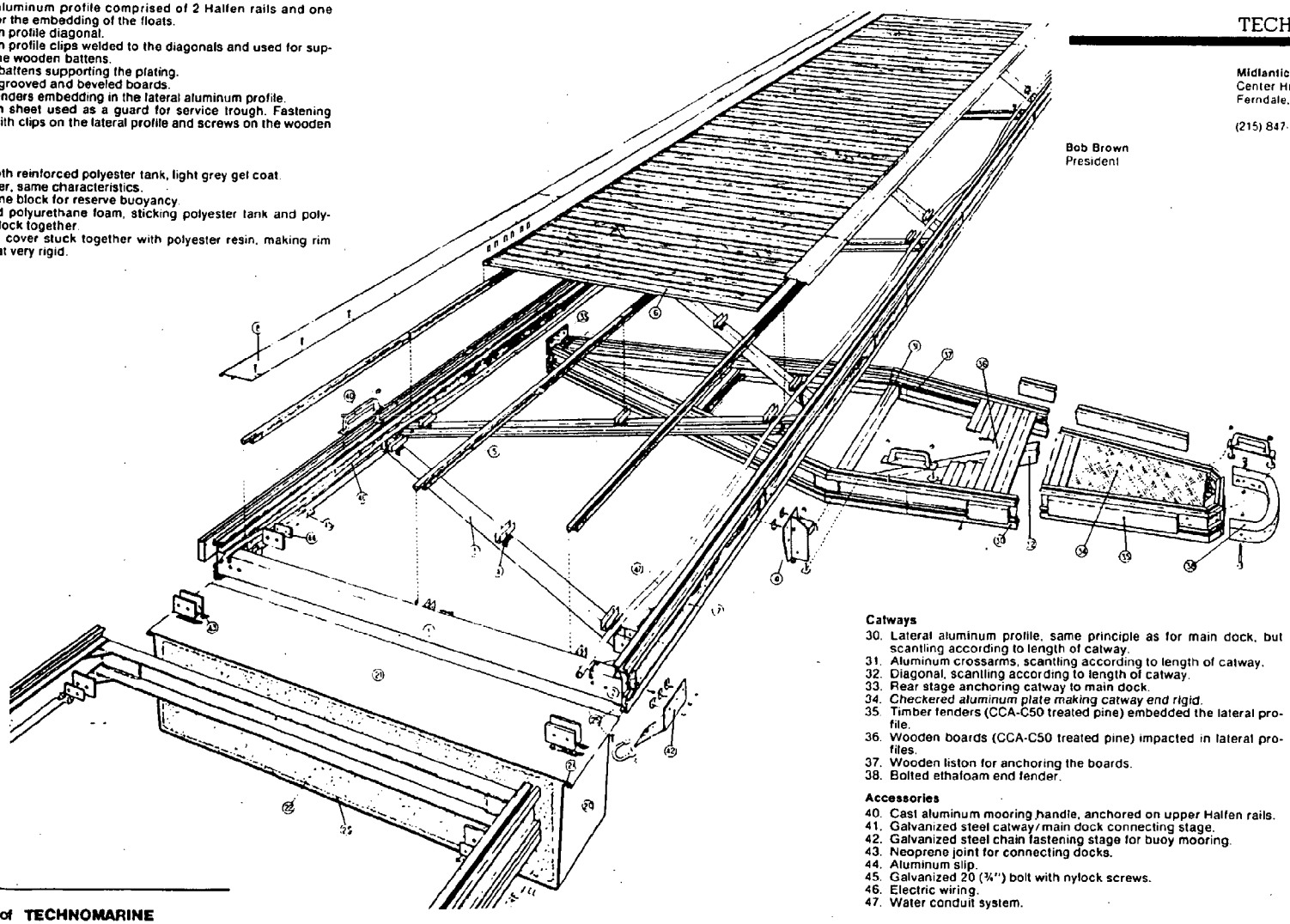
LEGEND

Main Dock Section

1. Aluminum end profile with reinforcement for bolting between floating docks.
2. Lateral aluminum profile comprised of 2 Halfen rails and one groove for the embedding of the floats.
3. Aluminum profile diagonal.
4. Aluminum profile clips welded to the diagonals and used for supporting the wooden battens.
5. Wooden battens supporting the plating.
6. Wooden grooved and beveled boards.
7. Timber fenders embedding in the lateral aluminum profile.
8. Aluminum sheet used as a guard for service trough. Fastening is done with clips on the lateral profile and screws on the wooden boards.

Floats

20. Heavy cloth reinforced polyester tank, light grey gel coat.
21. Tank cover, same characteristics.
22. Polystyrene block for reserve buoyancy.
23. Expanded polyurethane foam, sticking polyester tank and polystyrene block together.
24. Tank and cover stuck together with polyester resin, making rim of the float very rigid.



Catways

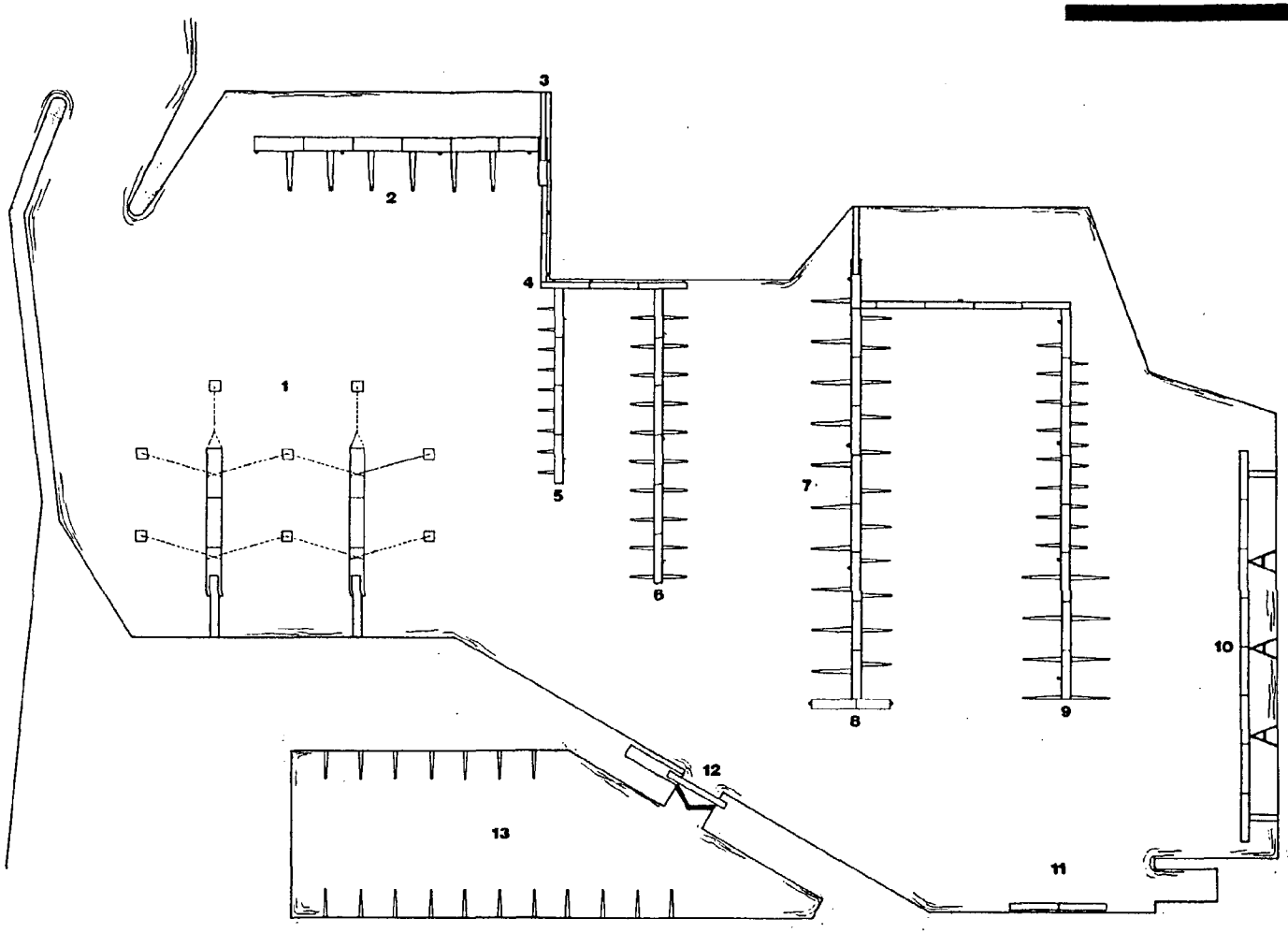
30. Lateral aluminum profile, same principle as for main dock, but scantling according to length of catway.
31. Aluminum crossarms, scantling according to length of catway.
32. Diagonal, scantling according to length of catway.
33. Rear stage anchoring catway to main dock.
34. Checkered aluminum plate making catway end rigid.
35. Timber fenders (CCA-C50 treated pine) embedded the lateral profile.
36. Wooden boards (CCA-C50 treated pine) impacted in lateral profiles.
37. Wooden liston for anchoring the boards.
38. Bolted ethafoam end fender.

Accessories

40. Cast aluminum mooring handle, anchored on upper Halfen rails.
41. Galvanized steel catway/main dock connecting stage.
42. Galvanized steel chain fastening stage for buoy mooring.
43. Neoprene joint for connecting docks.
44. Aluminum slip.
45. Galvanized 20 (¾") bolt with nylock screws.
46. Electric wiring.
47. Water conduit system.

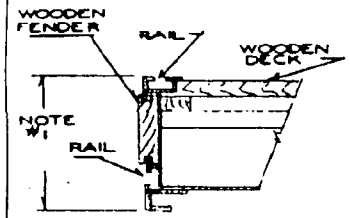
Assembling of TECHNOMARINE system

TECHNOMARINE



1. 3.5 m (11'6") wide dock for boats up to 25 tons. Chain and buoy mooring with footbridge.
2. 3 m wide reinforced (Type T) docks anchored to piles. Unilateral (Type PRU) catways with end piles for boats up to 20 m long (65').
3. Footbridge articulated on the bank and resting on the mooring dock. Possible length up to 30 m (100').
4. 1.5 m (5') wide connecting docks anchored to the guiding H beam vertically fastened to the wall of the pier.
5. Standard 2 m (6'5") wide docks anchored to piles with unilateral PRU 560 (18'6") catways for boats up to 8.3 m (27') long.
6. Standard 2 m (6'5") wide docks anchored to piles with bilateral PRB 700 (23') catways for boats up to 10.20 m (34') long.
7. Standard 2.5 m (8') docks with unilateral PRU 970 (31'6") and PRU 830 (27') unilateral catways for boats up to 15 m (50') and 12.30 m (40') long.
8. Type PCE docks fixed on at end for berthing of large units, with end piles.
9. Standard 2.5 m (8') docks with bilateral PRB 970 (31'6") catways and unilateral PRU 430 (13'6") and PRU 560 (18'6") catways including a bilateral catway at the starboard end for berthing of larger units.
10. Standard 2 m wide mooring dock anchored by mooring arm and articulated footbridges.
11. Small 1.5 m wide waiting dock anchored on guiding H-beam vertically fastened to the wall of the pier.
12. Mobile sliding ramp operated by an electric motor.
13. Basin with constant water level equipped with PRA 830 (27') catways articulated on to the bank.

Various uses of the TECHNOMARINE floating docks system

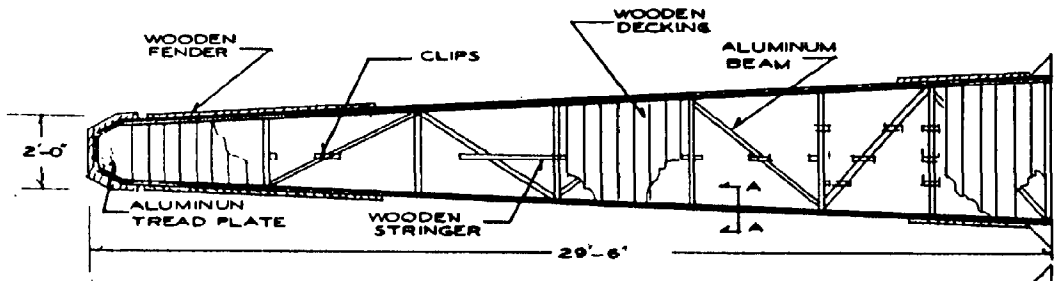


TYPICAL SECTION

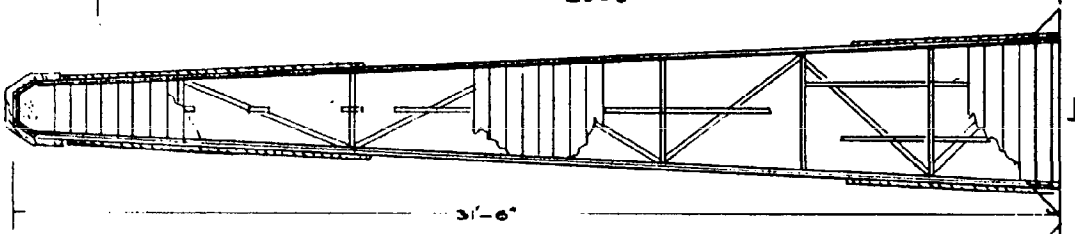
A-A OR B-B

NOTE #1:
SECTION A-A EXTRUSION #83402 FOR CATWAYS PRB 630 to PRB 970. HEIGHT 8".

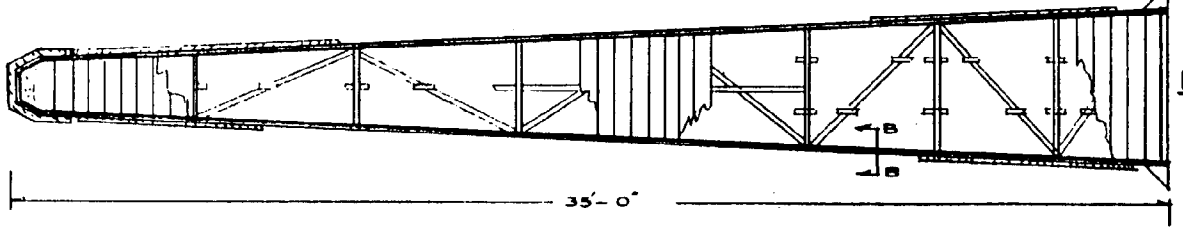
SECTION B-B EXTRUSION #83403 FOR CATWAYS PRB 1070 & 1200 HEIGHT 8 9/16".



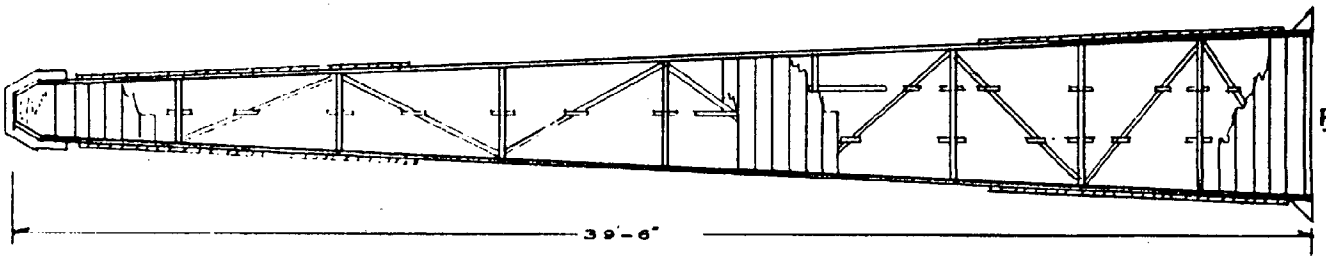
PRB 900



PRB 970



PRB 1070



PRB 1200

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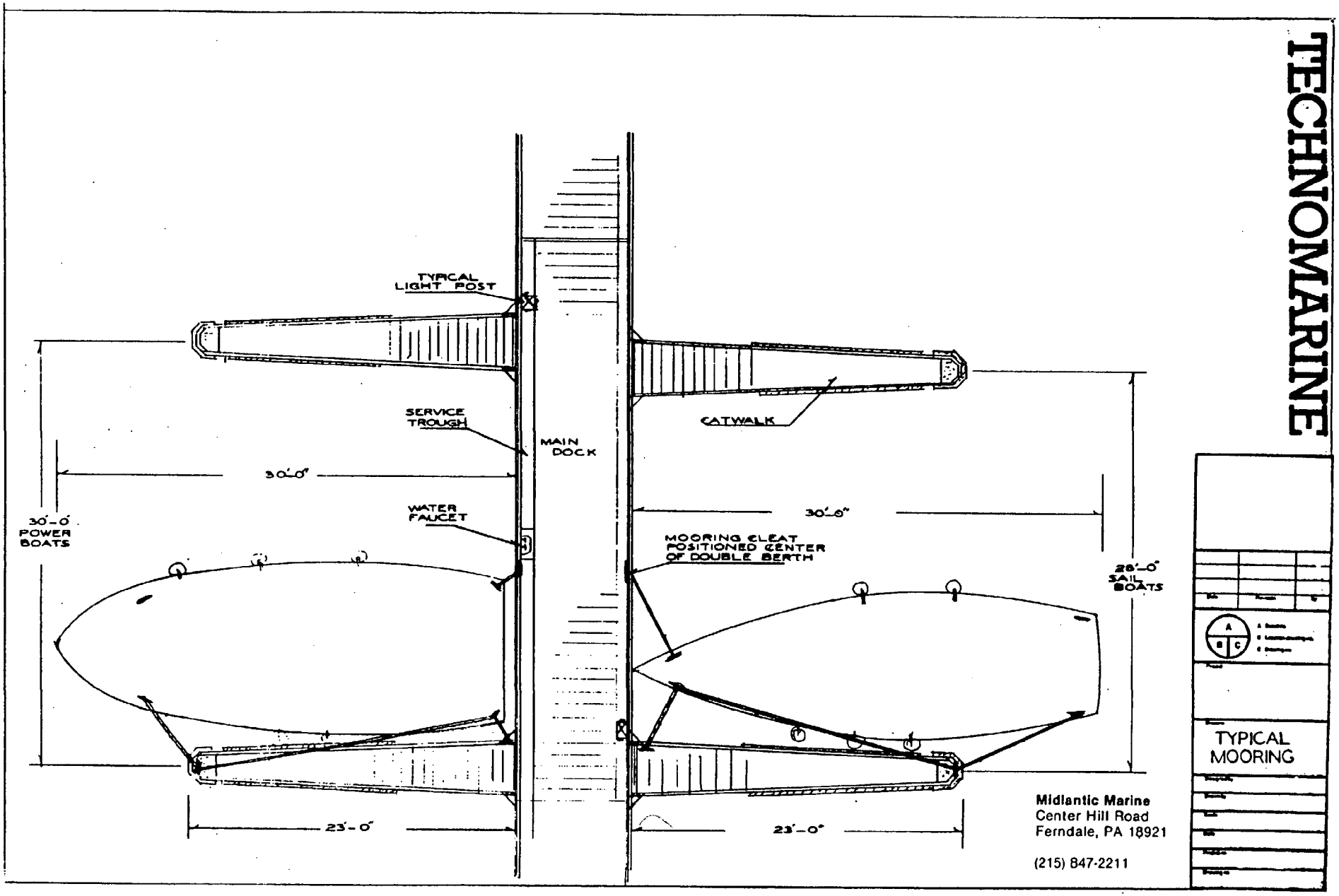
TECHNOMARINE

CATWAYS II



TECHNOMARINE

TYPICAL MOORING

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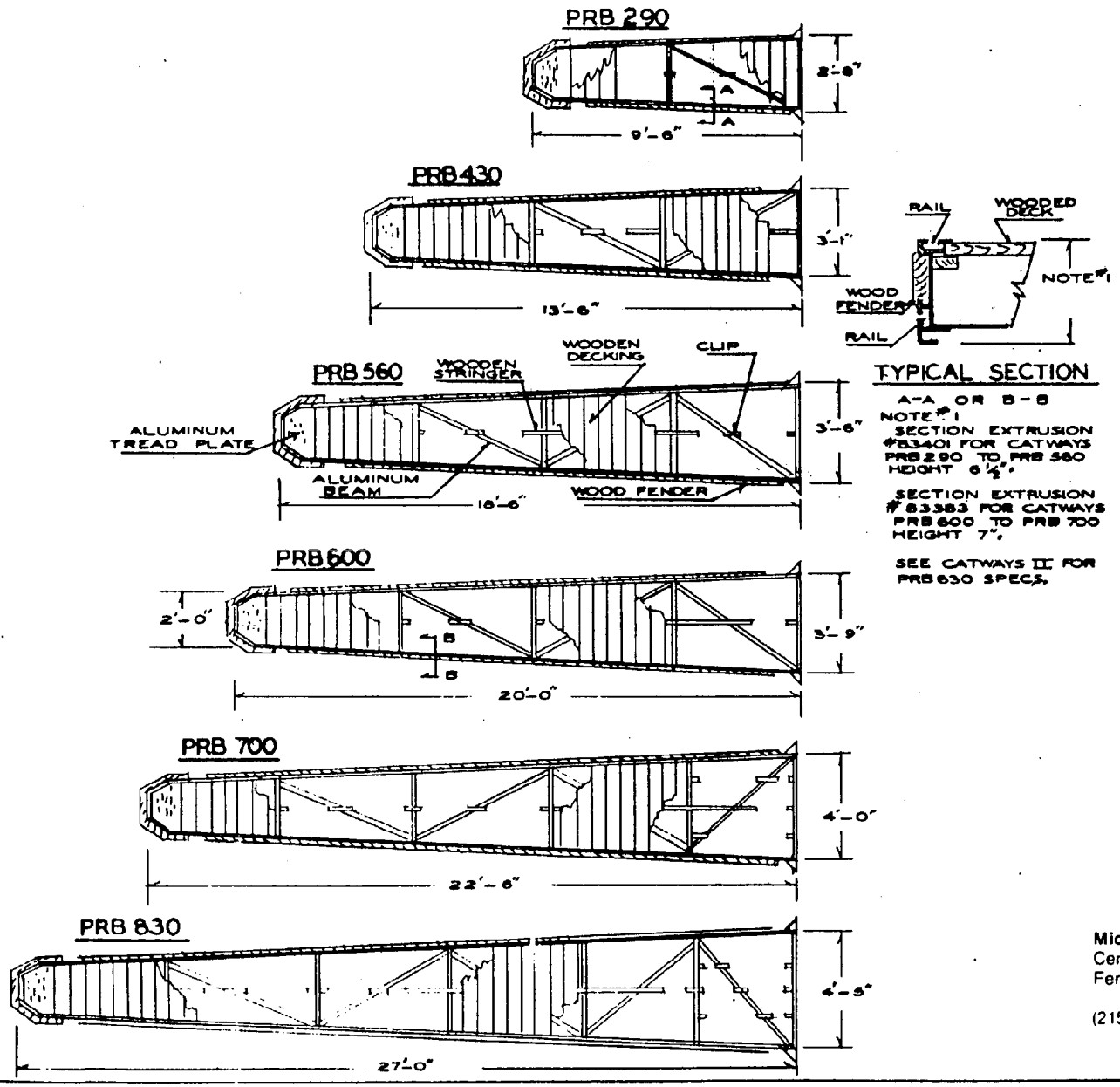

TYPICAL SECTION

A-A OR B-B

NOTE #1

SECTION EXTRUSION #83401 FOR CATWAYS PRB 290 TO PRB 560 HEIGHT 6 1/4".

SECTION EXTRUSION #83383 FOR CATWAYS PRB 600 TO PRB 700 HEIGHT 7".

SEE CATWAYS II FOR PRB 830 SPECS.

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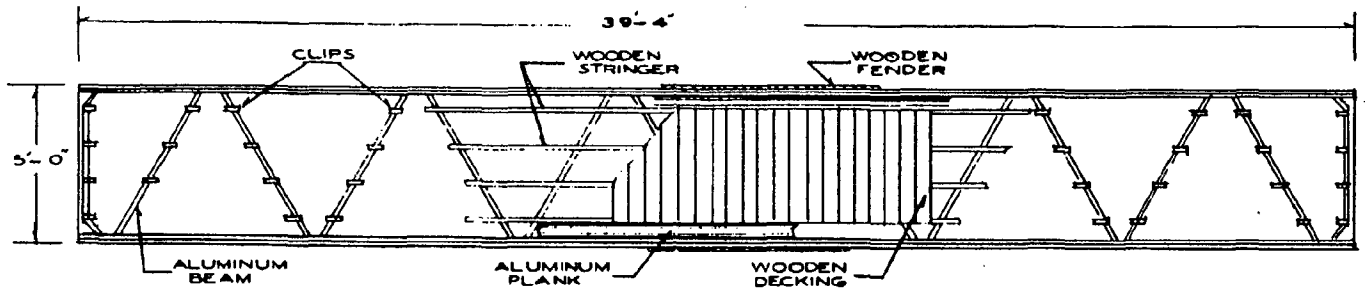
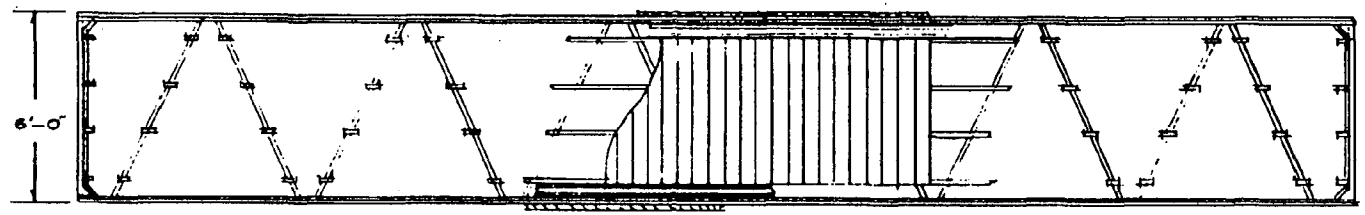
TECHNOMARINE

CATWAYS I

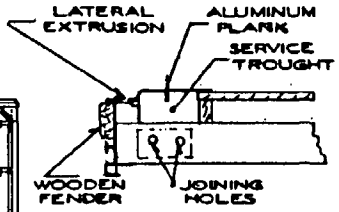


PC150

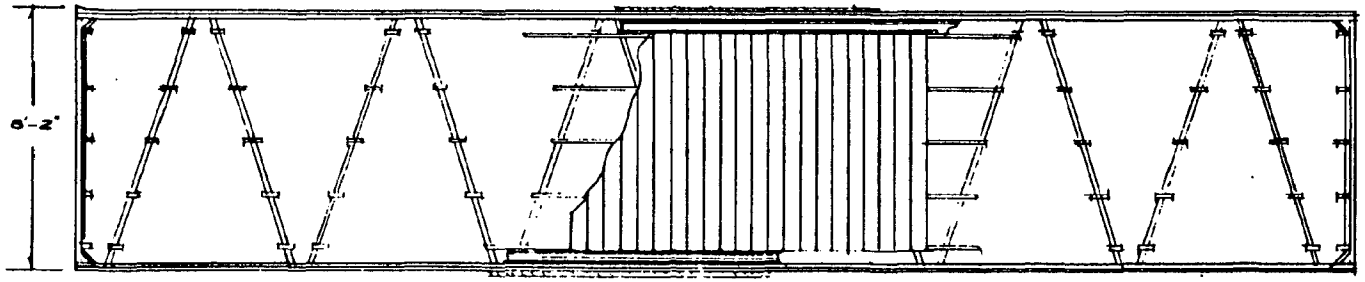
NOTE:
SERVICE TROUGHT DIMENSIONS.
LARGE TROUGHT $4\frac{1}{8}" \times 8\frac{1}{2}"$
SMALL TROUGHT $3\frac{3}{4}" \times 5\frac{1}{4}"$



PC180



END VIEW



PC250

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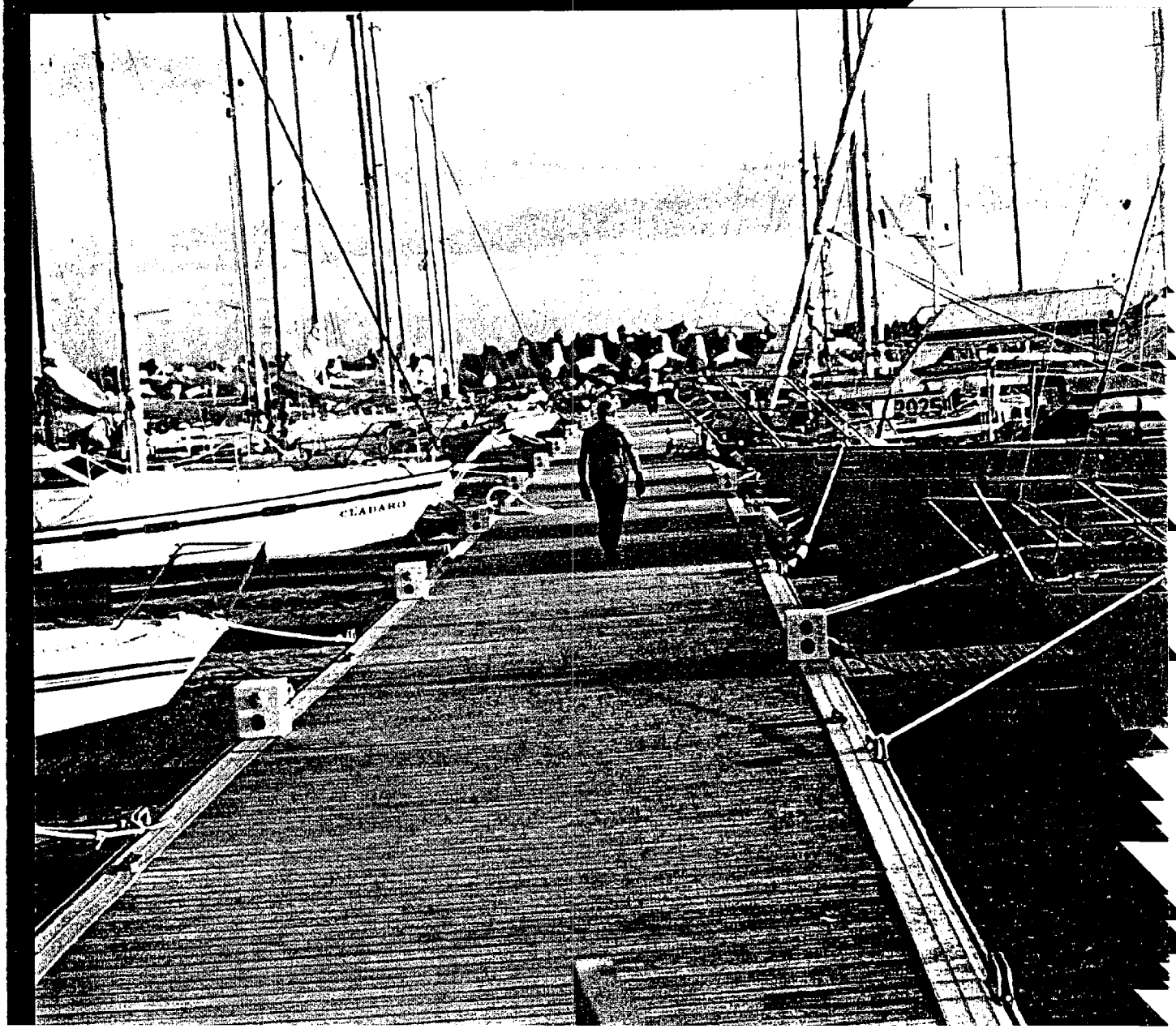
TECHNOMARINE

MAN DOCKS

84

TECHNOMARINE

FIRST QUALITY
FLOATING DOCK SYSTEM



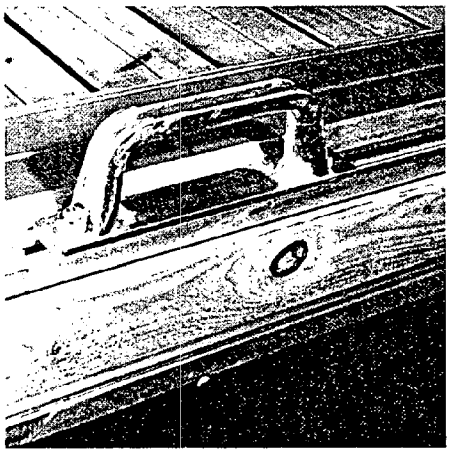
TECHNOMARINE

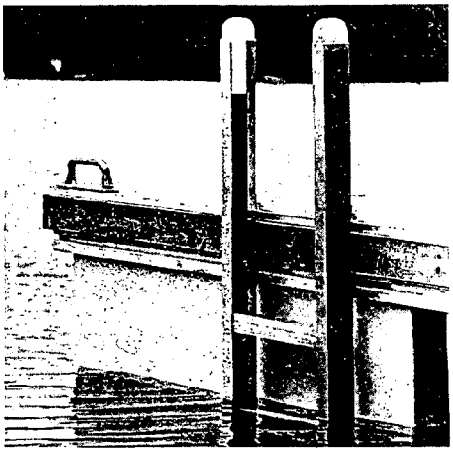
TECHNICAL DESCRIPTION

A WELL ENGINEERED AND INTEGRATED SYSTEM

The main characteristic of the Technomarine system is the functional use of basic materials: aluminium alloy sections, pressure treated pine and aluminum floats filled with styrofoam,

The technomarine docks are made to last for many years and the system constitutes a sure investment for those who want optimal use from their unsinkable floating docks.





Aluminium alloy: 6351-T6/6061-T6 light and strong

The framework of the pontoons is aluminium alloy 6351-T6 capable of bearing all the parts that complete the system: the top and side of each section is fitted with a rail (ALRA) through which Technomarine high tension bolts fix other parts and pieces of equipment; on the side and under part of the aluminium frame moulding to insert wooden or ethafoam defences and the enclosure to hold the floats.

The two aluminium sections are joined to form an aluminium grid which gives each pontoon great strength and flexibility. The Technomarine system allows for differences in the elasticity of aluminium and wood in changes of temperature.

Copper-treated pine: no maintenance for at least 25 years

All wood used in Technomarine docks is impregnated with an arseniate of copper based element. That doesn't mean merely a surface treatment but a penetration of the wood fibres with the chemicals for complete rot-proofing.

This process assures durable protection against insects, decay and other natural deterioration. Pine treated with CCA C-50 is clean, doesn't stain, doesn't irritate the skin and is odour-free. It doesn't have to be painted, with reduces maintenance costs. However, it can be stained or painted following recommended procedures. The treated pine acquires a greenish color which brings out the natural beauty of the wood. The chemical treatment affects neither the wood's strength or its conductability.

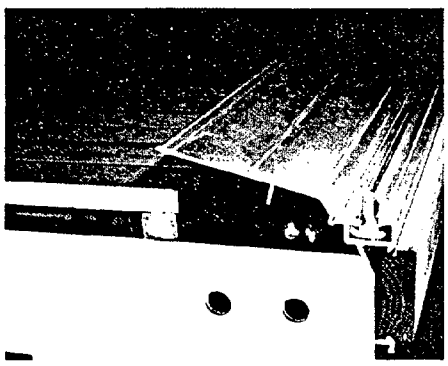
Polystyrene floats sheathed in aluminum: strength and great buoyancy

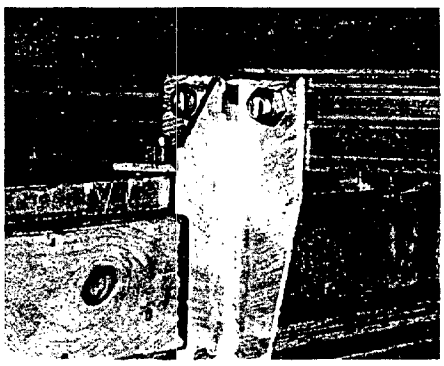
The Technomarine docks are supported by first quality floats. The size of the float is determined according to the buoyancy requirements. The polystyrene foam is moulded to fit into the float.

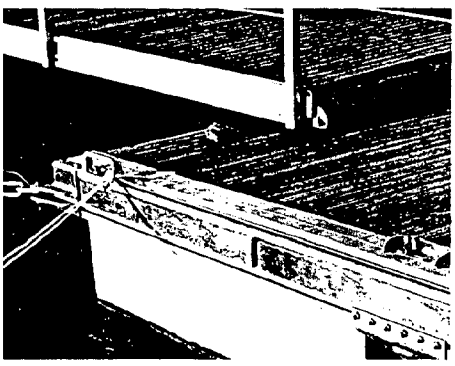
This operation solidifies the float into a homogeneous block, giving the aluminum greater strength, protecting the foam against rats and damage and assures greater watertightness for the polystyrene should the float be pierced by a pointed object in violent collision.

Floats that are not so covered quietly absorb water, are easily attacked by rats and are subject to weathering.

The rate of buoyancy of our floats remains unchanged after several years of use. The design also enhances the appearance of your dock or marina and lends itself to cleaning as needed.







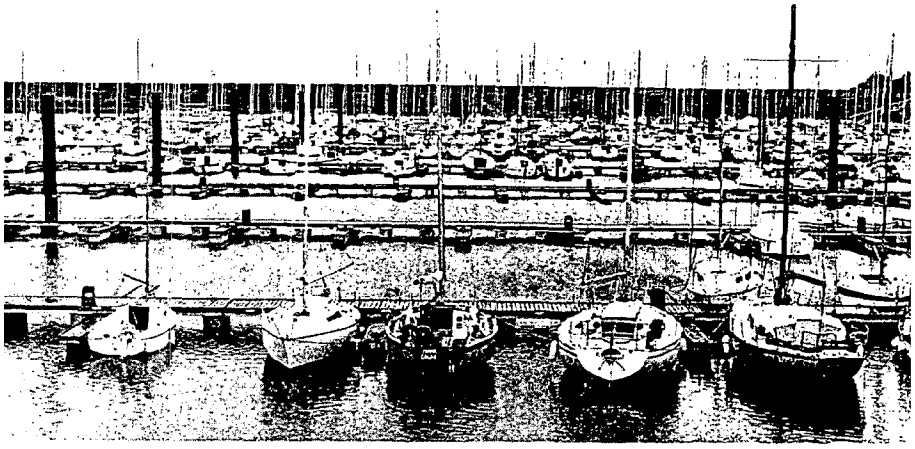
TECHNOMARINE

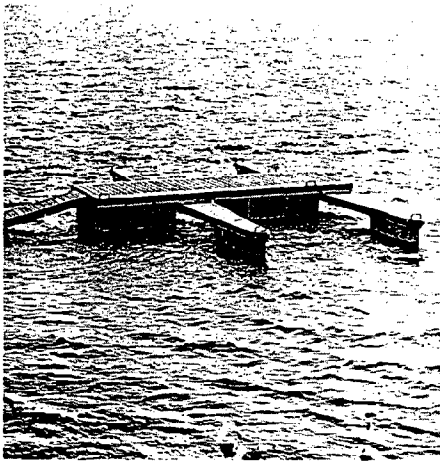
MAIN ELEMENTS OF THE TECHNOMARINE SYSTEM

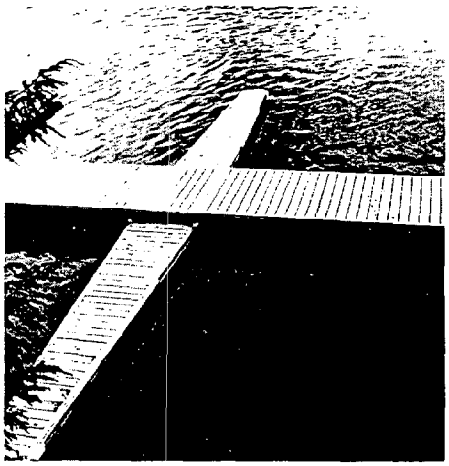
Main walkway

The Technomarine central walkway consists of pontoons measuring 6 metres (about 20 feet) or 12 metres (about 40 feet) joined by a play of bolts and bearings. Docks thus assembled enjoy the flexibility of the aluminium to resist various pressures and acquire a greater stability.

The length of the docks is only limited by the dimensions of the water surface available. A wooden structure of the same dimensions does not offer the same qualities as aluminium.







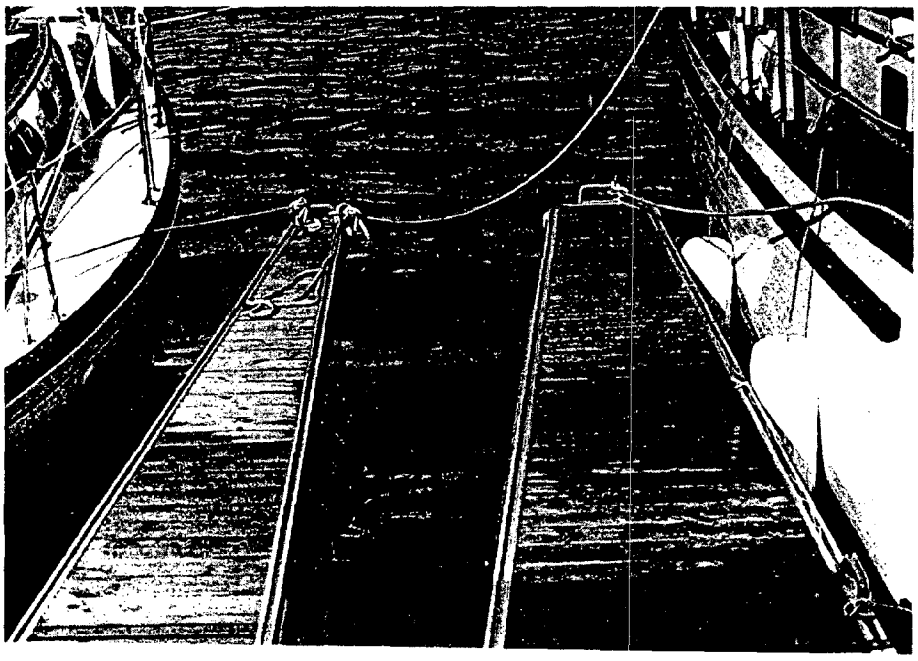
Catwalks: bilateral, unilateral or articulated

In general, the main walkways are equipped with catwalks or bilateral crosswalks in one piece, bolted to the main walkway. The catwalks are provided with floating stabilizers at each end thus contribute to the firmness of the whole structure with their resistance and flexibility to the movement of the water.

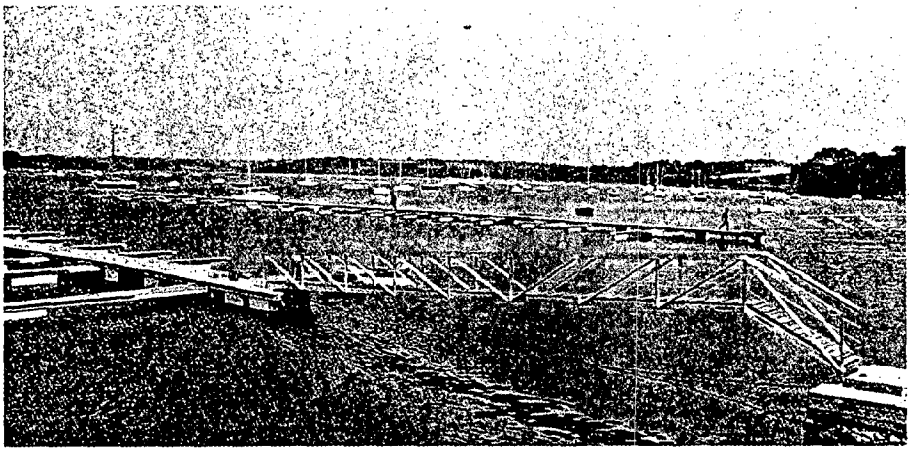
The ends of the catwalks are covered with a pliable protection of ethafoam.

The length (3.6 to 10 metres) and width of the catwalks varies according to the customer's requirements. Each customer is assured of adequate advice from our technical department to complete an estimate of a project. The lateral resistance of a 10-metre catwalk has been calculated depending on the mooring of boats up to 15 metres. Articulated unilateral catwalks are especially designed to be used for the mooring of boats at an already existing dock.

The resistance of each type of catwalk we construct has been studied. They are fixed to the main dock by galvanized steel bolts.



TECHNOMARINE



Access bridges and fastenings

Technomarine offers several types of connecting bridges and fastenings to meet problems arising from tides, changes in water levels and other matters relating to a dock or a marina.

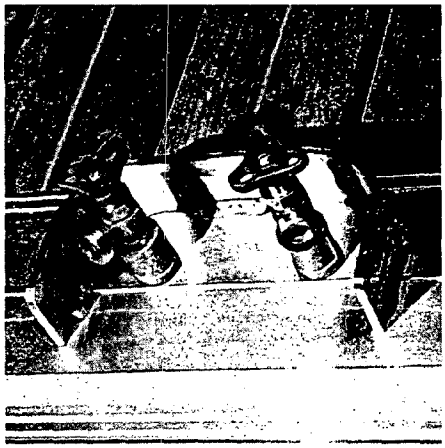
We examine all the conditions and advise our customers accordingly with each order.

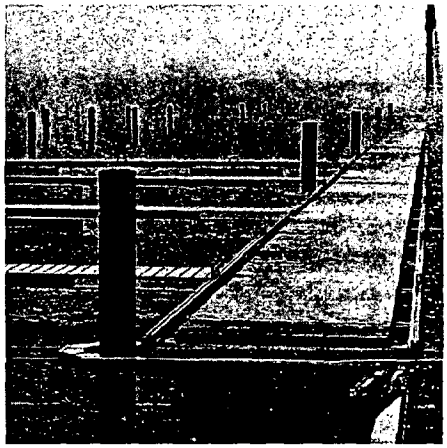
Dead men anchor or piles

The Technomarine system uses four methods of keeping the docks in place: dead men anchor, piles, connecting A-arm and guiding rail. We recommend the method that best suits the conditions of a particular project.

For anchoring, galvanized steel chain is used to join the central passage rail to blocks of concrete whose mass is geared to the conditions of the place.

Where piles are necessary, they are integrated to the central unit and a system of rubber rollers permits vertical movement to adjust to tides and water levels.



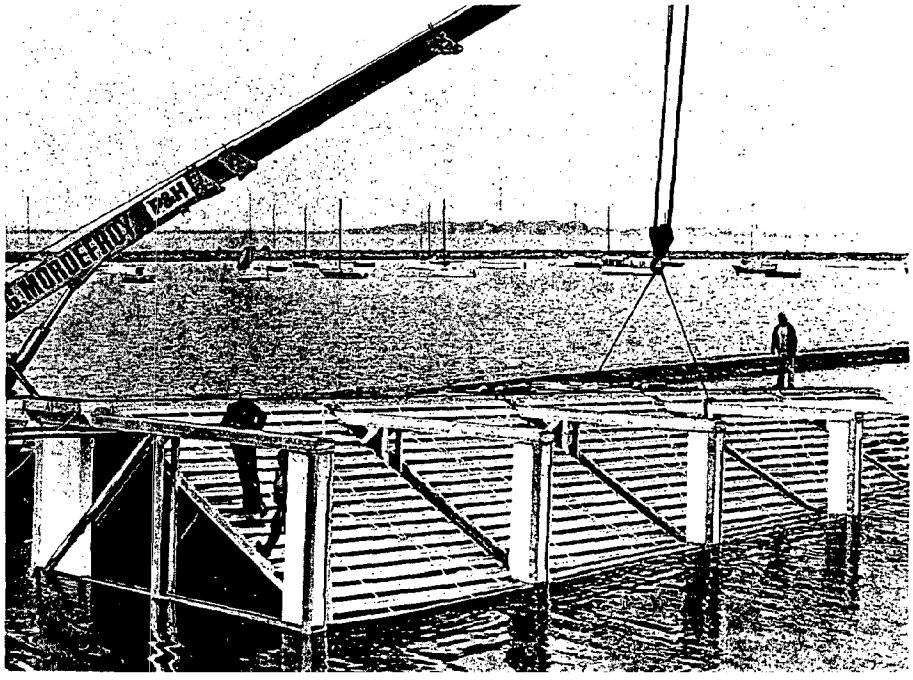


Troughs and fosterings

The Technomarine dock system includes all necessary boat mooring accessories such as stirrups, fenders, water faucets, electric connections, etc.

Utility points can be installed at regular intervals, providing power and lighting outlets. Water faucets are built directly into the planking.

The water and electrical conduits can be placed on either side of the main walkway in a special trough with an aluminium covering.



TECHNOMARINE

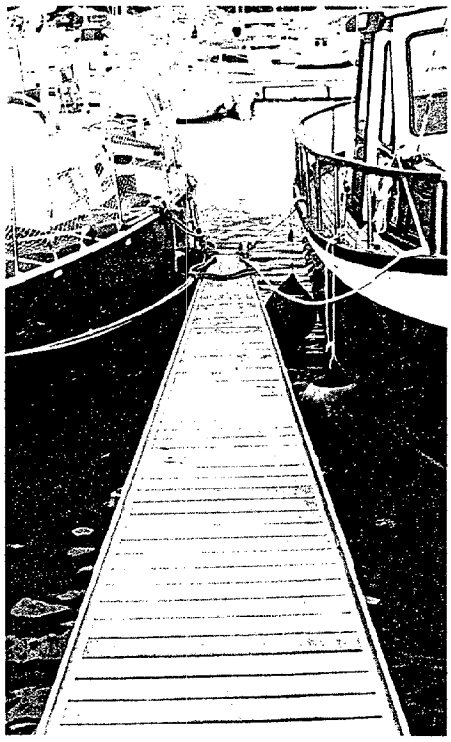
NEW NEEDS, NEW METHODS

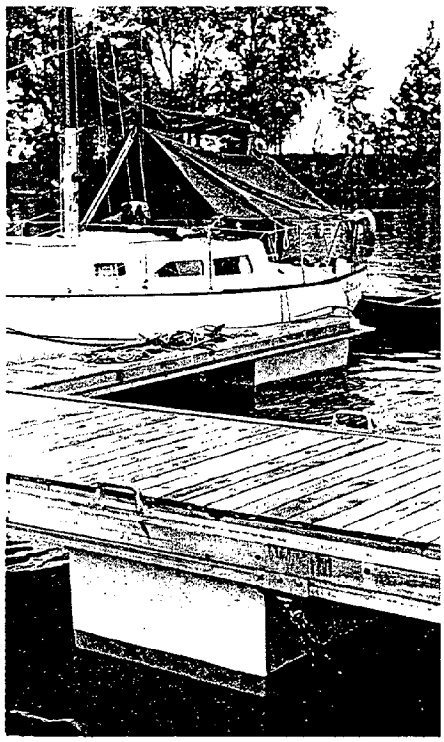
For some years the popularity of recreational activities has demanded that docks be available where there is water and the growing requirements of the groups and invidivuals involved in this field led Technomarine to develop a system of pontoons and floating docks of exceptional quality.

The quality of the materials used, the ingenuity of the Technomarine system, the study of most of the problems encountered in the development of docks for private users or marinas and the expertise of the Technomarine technical team are the best guarantee for exacting customers.

The Technomarine system is durable, flexible, resistant, modular, maintenance free, easily dismantable, much lighter than traditional docks and meets all safety and environmental standards.

During the last dozen years, more than 20 kilometres of docks built with this technique have been installed in Europe, the United States and Canada: on salt water and fresh water, in regions having enormous variations of temperature, on rivers where currents and tides are considerable and on surfaces of water requiring ingenious arrangements.

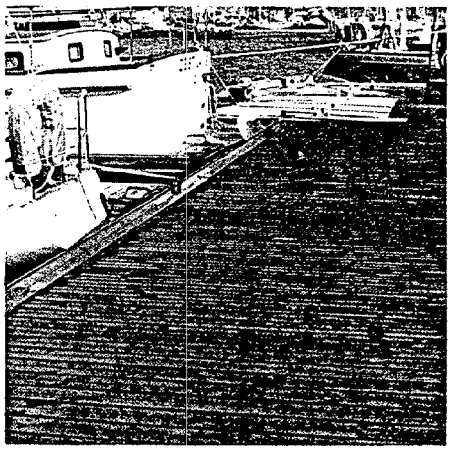


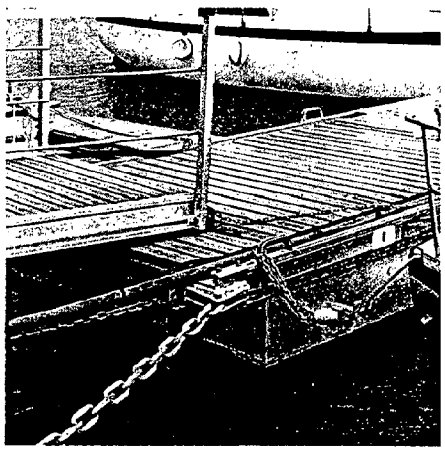


Preliminary studies and technical estimate

The engineers and technical representatives of Technomarine have many years of experience in designing and implementing all kind of marinas.

On request our technical department can study your project, prepare drawings and all necessary recommendations in order to obtain for your floating docks the best technique available.

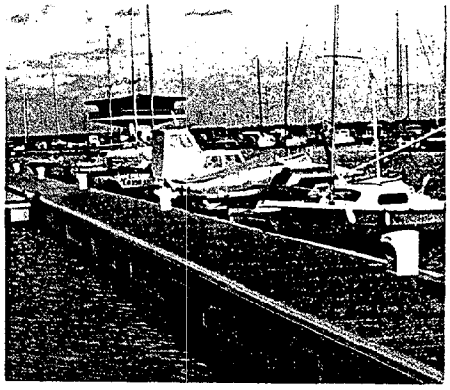




MAJOR CLIENTS

- Bourne Marina, 160 slips (State of Mass. and city project)
- Quebec City, Canada Marina - 423 slips
- Tudhope International Sailing Center, Vermont Marina 150 slips and a breakwater
- Rocky Ledge Shore, NH condominiums
- University of Princeton, NJ
- City of Montreal
- Quebec Government
- Summer camps in 6 states

Charles River Yatch Club, Boston
Thwaites Marina, New York 160 Flips
Norfolk Marina, VA
City of Augusta, Georgie
City of Newton, Mass.



TECHNOMARINE

FIRST QUALITY FLOATING DOCK SYSTEM

Summary of the principal qualities of the Technomarine docks system

- Outstanding stability and high degree of inertia of the whole system.
- Specially suitable where strong currents exist.
- Access to boats made easy by catwalks which are integreted to the main dock.
- The catwalks are rigidly bolted beneath the main dock, giving them superior stability and torsional strength.
- The floats are of small dimension, permitting them to be easily replaced in case of damage.
- The metal frames are of aluminium alloy, known for its resistance to sea air, guaranteeing their long life.
- The timbers are attached by means of hot-galvanized screw-nails, facilitating maintenance (no rethreading, nor pop-rivets).
- The troughs containing water mains and electrical cables can be inspected without taking up planks.
- Mechanical, electrical and plumbing systems are rapidly dismounted for the winter.
- Thanks to the catwalk layout, more boats can be moored per linear foot.
- Full environmental protection.
- No maintenance required.
- 2 to 3 times lighter than timber docks of the same surface.
- Written guarantee for the material and the construction.
- Anchoring: the design gives the possibility to use piles mooring or connecting rods.

References

More than 66,000 linear ft (20.000 linear meters) already in use.

Technomarine Inc. manufactures:

- aluminium floating docks
- footbridges
- floating break-water
- hydraulic travel lift.

Technomarine Inc. equips:

- marinas
- public quays
- seaplane wharfs
- small fishing ports
- recreational areas.

Material

Main Dock and Catwalk

- Aluminium alloy 6351T6
- Main extrusion height: 7" (161 mm) to 8.5" (214 mm)
- M.I.G. welding

Connections

- Stainless steel or hot galvanized bolts.
- Galvanized brackets.

Skids and planking

- Rot-proof CCAC-50 treated pine.

Floats

- Aluminum 5052H32 filled with Styrofoam.

Resistance calculations

Buoyancy reserve:

- Main dock 26 lb/ft² (125 kg/m²) net.
- Catwalks 21 lb/ft² (100 kg/m²) net.

Maximum lateral loading at catwalk extremity:

- Varying from 1320 lb (600 kg) for model 430 catwalks to 5500 lb (2500 kg) for model 970 catwalks.

Maximum lateral strength of the main dock

For the main dock

- varying from 484 lb (220 kg) per linear ft (m) with boats of 48'0" (15 m) to 275 lb (125 kg) per linear ft (m) for boats of 26'0" (8 m).

The **Technomarine** docks are meant to be used in a harbor or a sheltered water stretch. Experience has proven however that they are able to withstand turbulence, without damage, with wave heights of up to 24" (60cm).

Note: These specifications apply only to standard construction. **Technomarine** will gladly study the particular problems of your available water stretch.

TECHNOMARINE INC.
598, rue Leclerc
Boîte Postale 150
Repentigny, Québec
Canada J6A 5H7
Tél.: (514) 585-6114

MANUFACTURERS AND DISTRIBUTORS

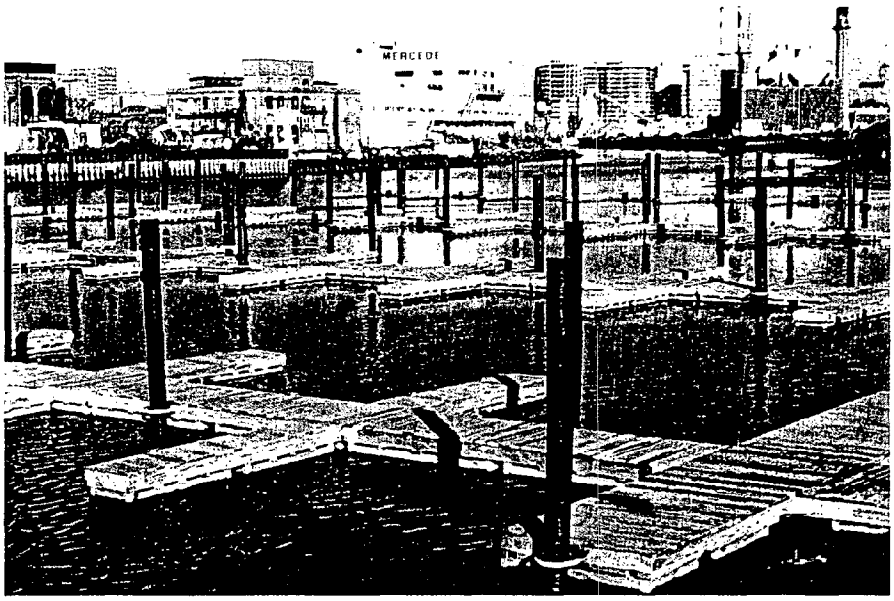
Genergy Inc.
Patrick Melanson
111 Oriole, Parkway 307
Toronto, Ont. M4P 2G9
Tel.: (416) 485-2236

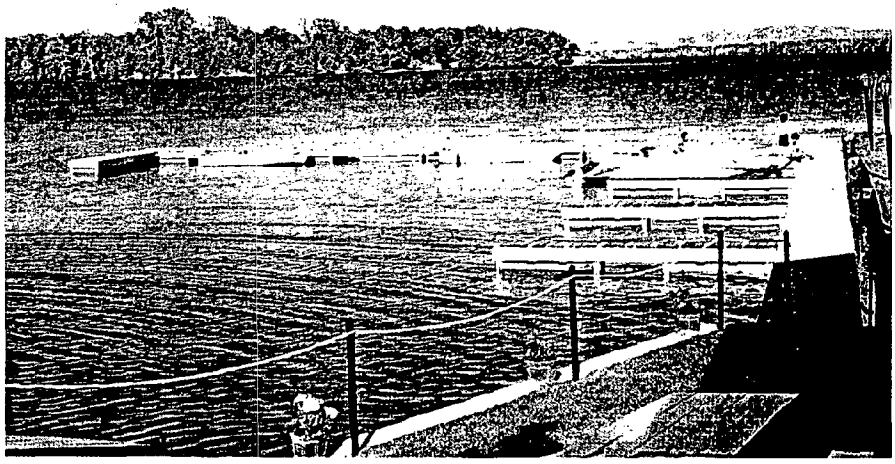
Goodhue Marine
Division of G.E. Marine Inc.
190 Central St. Rt. 12
Leominster, Mass. 01453
Tel.: (617) 537-0058 / 534-4319

Midlantic Marine
Bob Brown
Center Hill Road
Ferndale, PA 18921
Tel.: (215) 847-2211

SFS

SULLIVAN FLOTATION SYSTEMS INC.





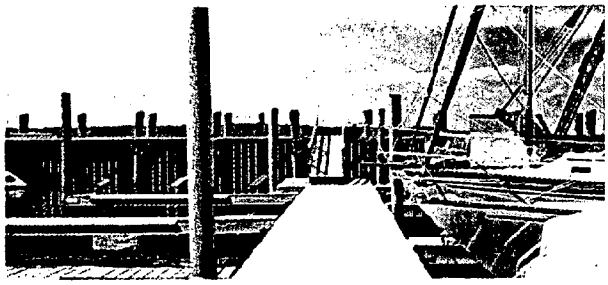
FLOATING DOCK SYSTEMS

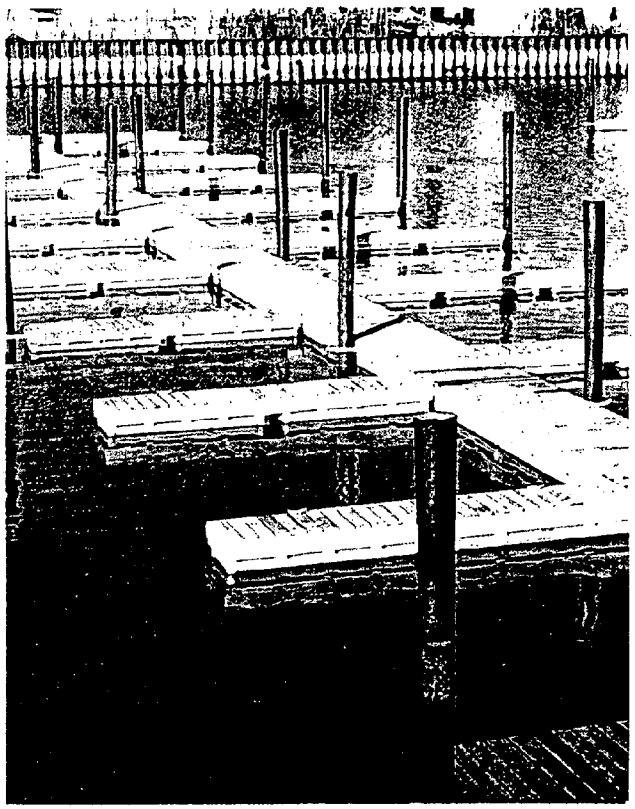
About The Company

Sullivan Flotation Systems, since 1961, has been manufacturing floating dock systems for private/residential, commercial, municipal and industrial use.

Family owned and operated, SFS takes pride in the fact that each project receives close, personal attention from design thru installation. Our trained professional staff are specialists in all phases of marina construction and installation, and our seven acre manufacturing site is equipped to handle projects of any magnitude. SFS works closely with the marina owner/developer to insure a top quality, professional installation that will endure for many years.

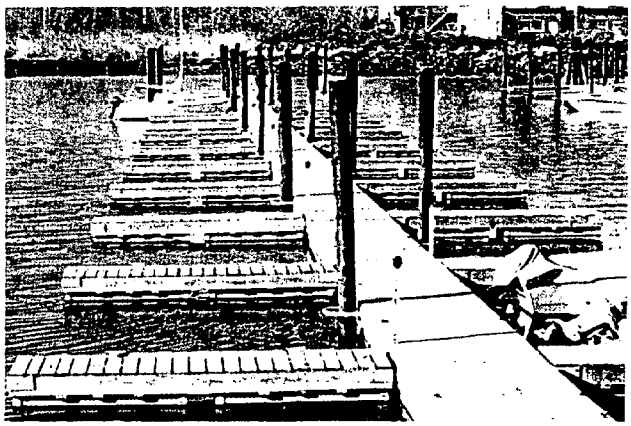
Top quality floating dock systems, personalized customer service, and dependability are practices we have built our reputation on for over 25 years.





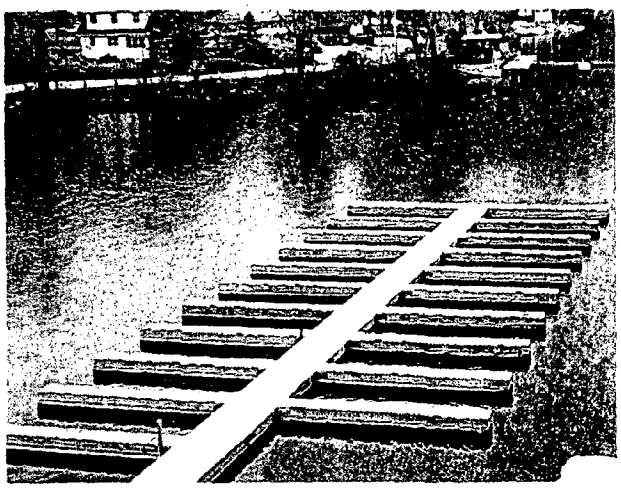
The Natural Beauty & Strength of Wood.

Designed to provide long term maintenance free service in **fresh** or **saltwater,** and time tested at many locations where extreme water conditions prevail, SFS installations have proven the ability to withstand the natural abuse of the elements, while maintaining an estheticly pleasing appearance.

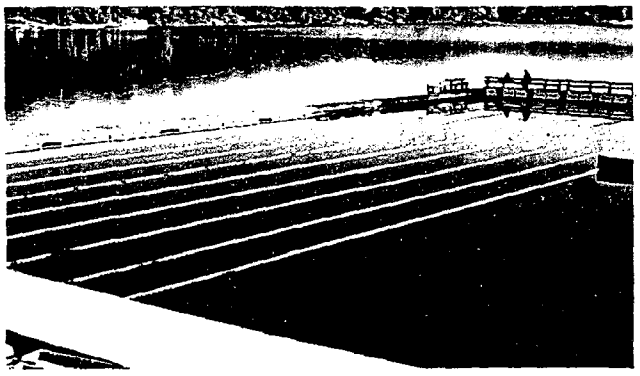


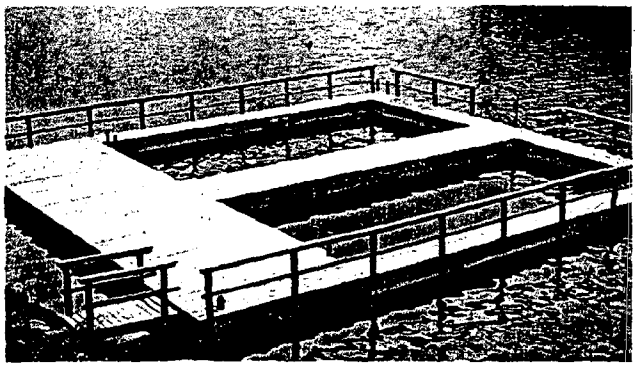
Form And Function

- ☐ **Beauty and Durability**—Clean, quiet, esthetic beauty of wood complements the natural surroundings of the marina site, and enhances even the harshest of waterfront locations.
- ☐ **Maintenance-Free**—Specially treated Southern Yellow Pine eliminates painting and annual staining and sealing. No bolts or thru-rods to continually tighten. Hidden utility channels are clear of people, boats and water.
- ☐ **Unique Wrap Around Connections**—Eliminates loose joints. Creates one long extremely stable floating walkway of any length, yet provides vertical flexibility when and where required—**hurricane proven.** Facilitates fast assembly and disassembly.
- ☐ **Long Lasting Unsinkable Flotation Boxes**—Dow Styrofoam, covered with 20 mil. polyethelene and encased in specially treated (1.0 CCA) yellow pine flotation boxes which are resistant to rot and decay and repel marine organisms. Galvanized steel angles protect the corners of each flotation box from ice, debris and impact. Thru bolting of angles into upper framing create an integral unit and eliminates flotation pullout. Will not sink, crack, distort, or cause electrolysis problems, and is unaffected by ultraviolet rays.



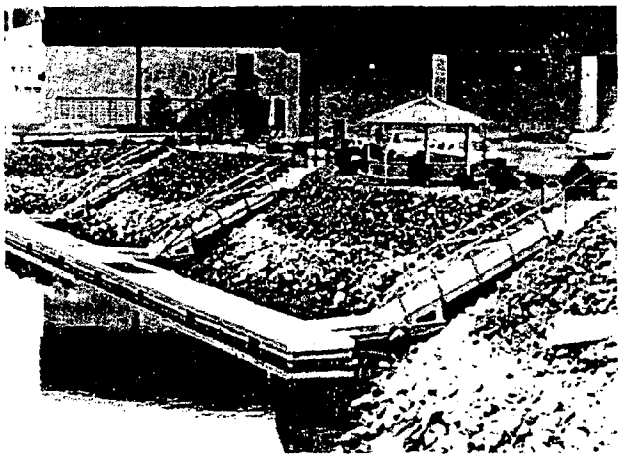
. . Durable - Versatile - Time Proven





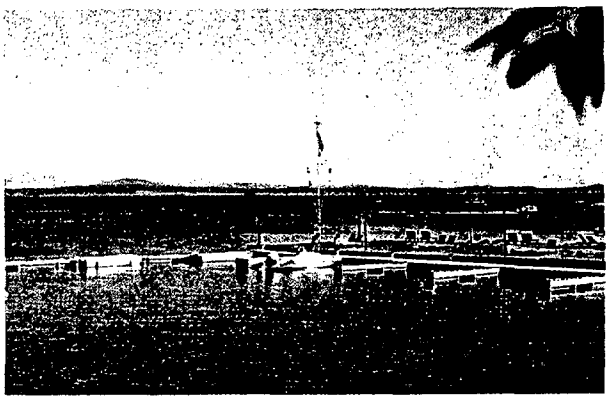
Flexibility—Light, medium or heavy duty use. Whether a small private dock, a large commercial marina or a floating wave breaking system, SFS can meet your exact requirements and specifications.

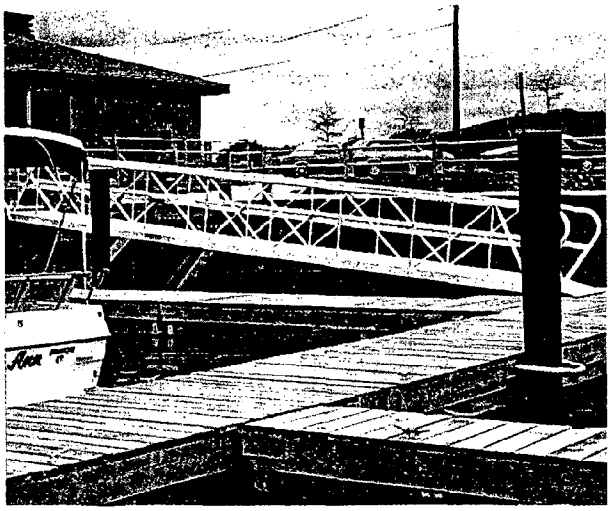
Due to modular design most SFS dock units are shipped to the project site complete and ready for installation. SFS units are easily assembled and disassembled, can be readily attached to existing structures and can form any size or configuration.



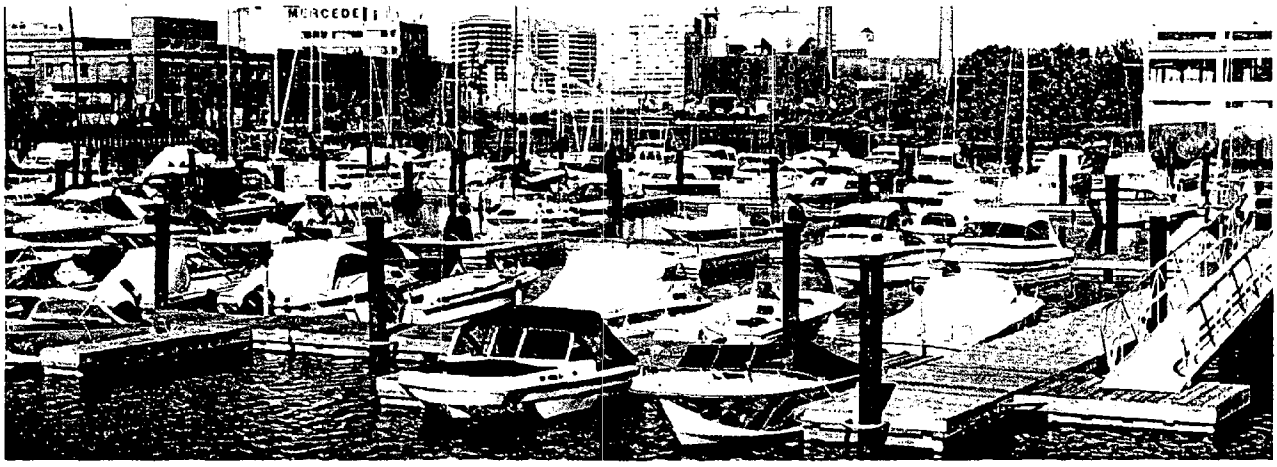
Options—Accessories—Services

Installation—Sullivan Flotation can provide on site supervision, installation, or the system can be owner installed.
Gangways—Marine grade aluminum or pressure treated wood gangways and ramps are available in all sizes.
Anchoring Hardware—Heavy eye type or below surface plate attachments to accept chain, cable, or dacron ropes from various anchoring systems.





Power Centers—SFS can supply several different types of power centers complete with meters, television and telephone hook-ups.
Dockbumper—Marine grade white rubber or vinyl.
Corner Gussets—Available as an option, or may be required depending upon design criteria.
Articulated or Fixed Connections—Dock to dock connections can either be hinged or fixed or a combination of both. Determined by design criteria and site exposure.
Turnkey Installations—SFS can complete your project from conceptual phase thru installation. Consulting services available.



• Private/Residential • Commercial Marinas • Municipal Marinas • Condo/"Dockominiums"
• Yacht Clubs • Floating Breakwaters • Fuel Docks • Specialized Use/Industrial

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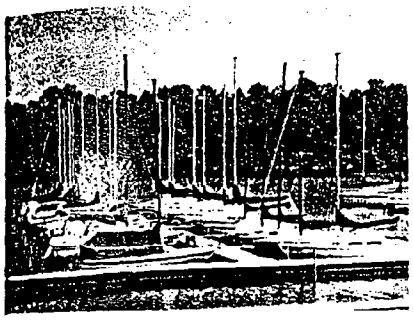
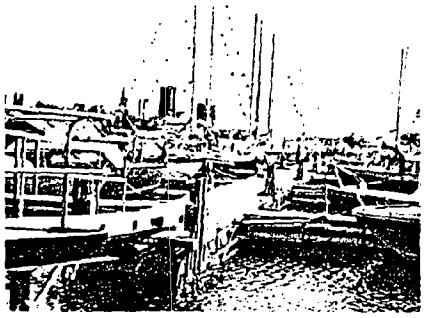
United McGill Corporation

Call us before you proceed, chances are we've already built to your requirements.

Recreational, Commercial and Industrial Floating Structures


Sailboat Docks

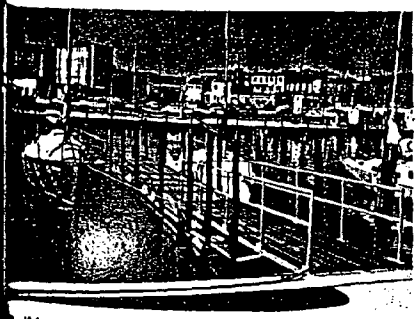

Private Yacht Clubs

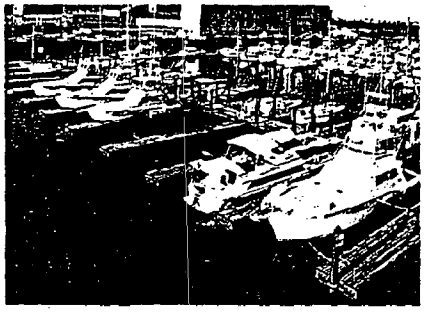
Large Boat Docks

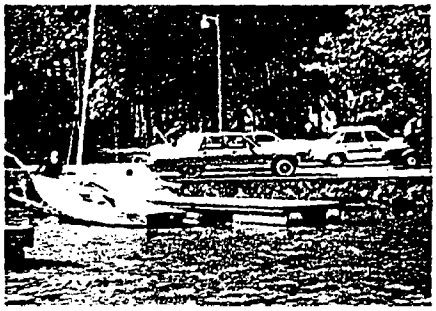
Docks with Full Utilities

Fishing and Access Docks

Government Owned Marinas

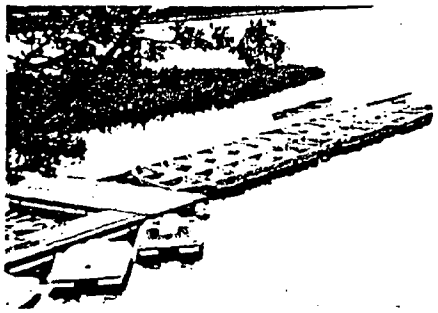

Bulkhead Docks


Courtesy Docks


Launch Docks

Condominium Docks

Excursion Boat Docks


Rental and Small Boat Docks

United McGill Corporation Designs, Manufacturers, Installs and Guarantees Its Floating Structures.

Philosophy

United McGill designs to the specific needs of the customer using proven standards and materials to meet your budget and life span requirements.

Experience and Capabilities

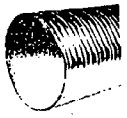
We have been building floating structures since the middle 1960's and have well over 1,000 installations. Our 185,000 sq. ft. plant in Columbus, Ohio, features the most modern fabrication equipment. All welding is done by certified welders.

United McGill's Columbus, Ohio, manufacturing facility

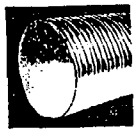
Flotation Pontoons

We offer a choice of pontoon shell materials for fresh water, salt water or industrial ponds. All pontoons are filled with expanded-in-place polystyrene. The continuous pontoon adds beam strength and torsional resistance to the dock structures.

High Density Polyethylene



Galvanized Steel



Aluminum or Stainless Steel

Aluminum Coated Steel

Engineering

Each and every project is designed by United McGill's in-house staff of Registered Professional Engineers. A few considerations which must be reviewed are:

- Boat width and length
- Water type and quality
- Freeboard requirements
- Wind and wave action
- Fetch and reach
- Wind profile
- Water depths
- Bottom conditions
- Tides and water fluctuation
- Live and concentrated loads
- Deck and flotation loads

Material and design choices will be made from some of the listings shown. Low maintenance costs are always a prime consideration.

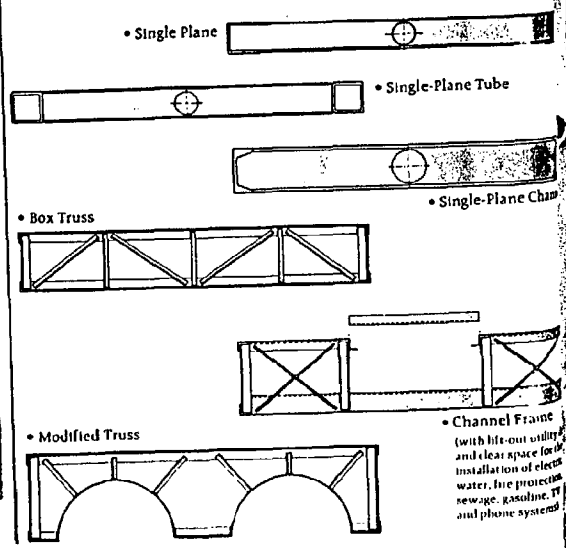
Slip lengths and widths vary with boat sizes. Walkway widths are available in 6-inch increments and in lengths up to the maximum shippable length (usually 60 ft.)

Warranty

United McGill provides the strongest warranty available. We were the first to warrant for more than one year and the first to offer warranty bonds for one to five years.

Structural Frame Construction

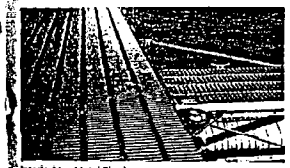
United McGill offers a variety of standard and special frame designs in both galvanized steel and aluminum. The structural frame sits above the waterline with no underwater bracing required. Inspection and maintenance (if required) are easily done.



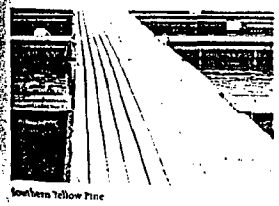
Decking Materials

We give you the choice of any decking material but usually recommend one of those shown below.

- Interlocking planks available with a solid, anti-skid or slotted-grip surface in galvanized steel or aluminum
- Pressure treated southern yellow pine



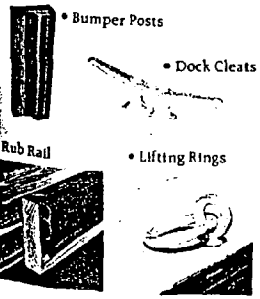
Interlocking Metal Planks



Southern Yellow Pine

Accessories

United McGill can provide any accessory you need for boat protection, tie-up or dock handling. We also feature a heavy-duty Unilex bumper.



Anchorage Systems

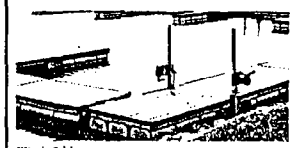
United McGill uses the best and most economical anchorage system for your application and site conditions.

Round Piles

"H" Piles

Fixed Spuds

Telescoping Spuds



Winch-Cable

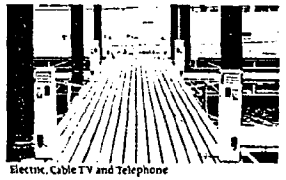
Stiff Arms

Bridges and Ramps

These can be specified in any width, length and deck type in galvanized steel, aluminum or whatever the customer requires.

Utilities

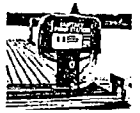
United McGill will design and/or install any utility system required. Much of the work can be done in our plant for overall cost savings.



Electric, Cable TV and Telephone

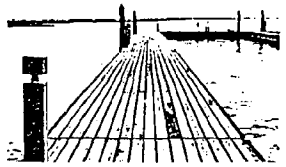
Water

Fire Protection



Sewage Disposal

Gasoline/Diesel Service



Lighting

Structural Connectors

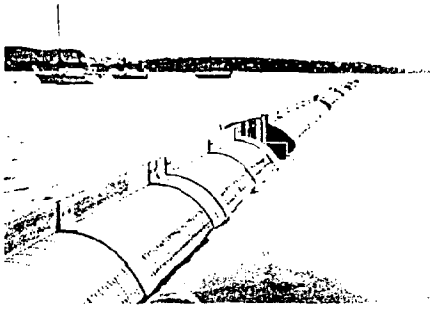
We feature the many advantages of flexible connections between dock units using two high strength bolts with self-locking nuts.

Form No. FS-SWTS Rev 2 8 86

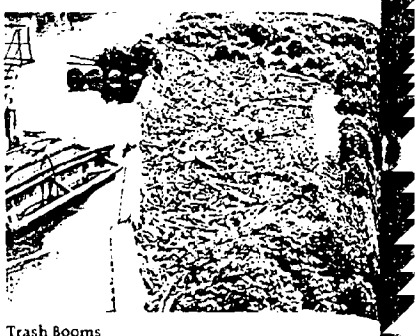
Litho in

United McGill Corporation

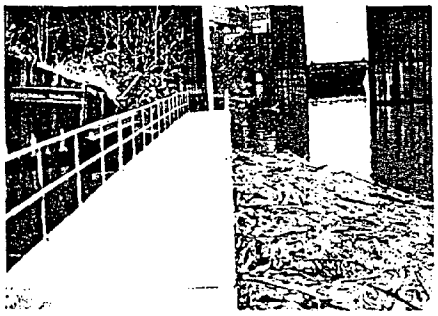
2400 Fairwood Avenue, P.O. Box 820
Columbus, Ohio 43216
Telex: 245-384
Phone:
614/443-0192



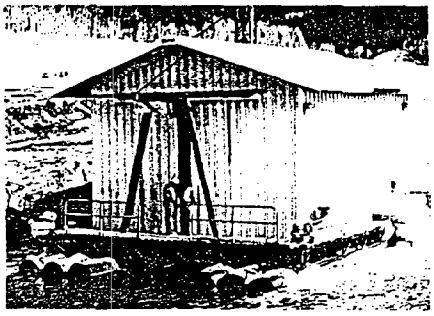
Floating Breakwaters



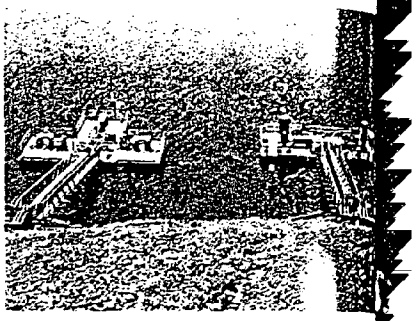
Trash Booms



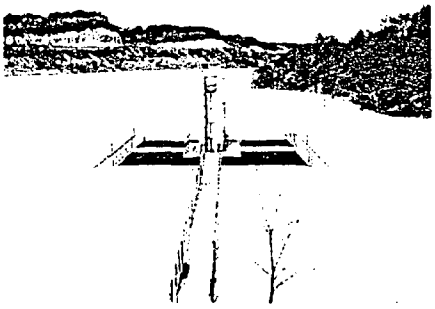
Trash Skimmers



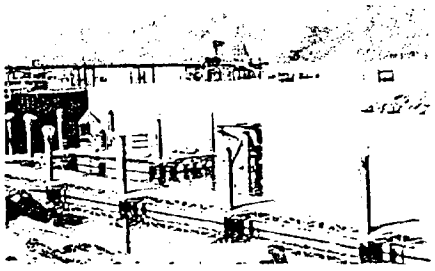
Floating Platforms with Buildings



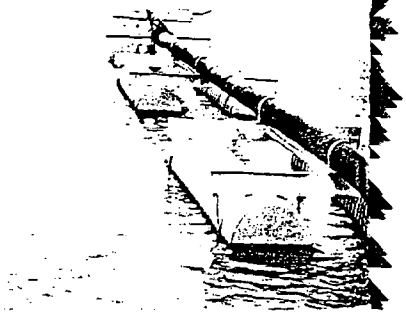
Pump Platforms



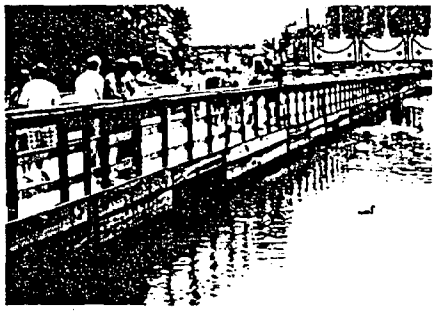
Fly Ash Skimmers



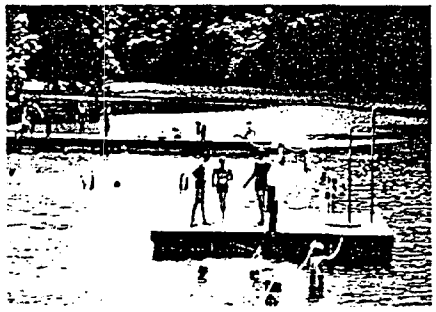
Heavy-Duty Industrial Dockage



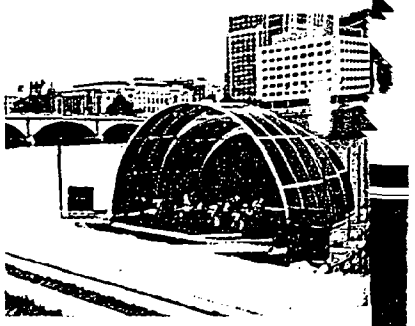
Pipeline and Dredgeline Floats



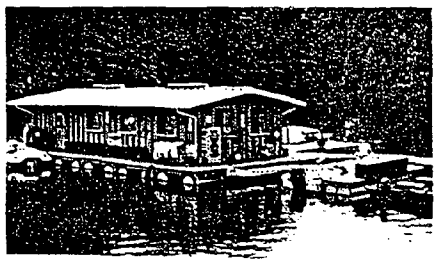
Floating Walkways

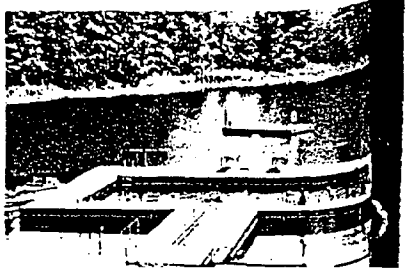


Swim/Dive Platforms



Floating Amphitheaters





APPENDIX C

PERMITTING DOCUMENTATION / RIVER ACCESS FACILITY

for file

LETTER OF TRANSMITTAL

[illegible] & MACK ASSOCIATES, INC.
116 Mill Street
P.O. Box 603
Bristol, PA 19007
(215) 785-3288

5 East Broad Street
P.O. Box 530
Burlington, NJ 08016
(609) 386-4438

11/2/87 Rec.

DATE 10/23/87 JOB NO 7017

ATTENTION Permit Officer

RE: DER WATER OBSTRUCTION PERMIT
for
Delaware River Access Site
Waterfront Park
Falls Township, Bucks County

TO DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF DAMS AND WATERWAY MGMT
PO BOX 2357, ROOM 116, EXECTIVE HS
HARRISBURG, PA 17120

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
3	10/19/87	5 pgs	JOINT PERMIT APPLICATION FORM - 4 pages plus Sketch Plan
3	10/13/87	2 drwgs	PLAN OF WATERFRONT PARK / S&E CONTROL PLAN
3	10/15/87	1 + rcpt	NOTIFICATION TO COUNTY & CERTIFIED RECEIPT
3	10/15/87	1 + rcpt	NOTIFICATION TO FALLS TOWNSHIP & CERTIFIED RECEIPT
~~3~~	~~10/14/87~~	~~2 pgs~~	~~TRANSMITTAL & APPLICATION FOR E&S CONTROL REVIEW~~ *
3	1970 Rev.	1 pg	PORTION OF USGS QUAD - TRENTON WEST
3	10/23/87	1 pg	LETTER OF APPROVAL - E&S PLAN

THESE ARE TRANSMITTED as checked below:

☒ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☒ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

~~* THE REVIEW LETTER WILL BE FORWARDED UPON ARRIVAL.~~

SEE SHEET 2 of 2 DRAWING FOR EROSION & SEDIMENT CONTROL PLAN

OCT 26 1987

COPY TO _____

SIGNED: Thomas E. Cadwallader

WILLIAM G. MAJOR ASSOCIATES, INC.

Notes of Meeting
Falls Township Project W.G.M.A. No. 7017

Date and Place of Meeting: October 16, 1987 @ PA Fish Commission Office-Bellfonte, PA

Attendees: Eric Conrad-Coastal Zone Management
Jim Young, John O'Brien, Tom Snyder, PA Fish Commission
T. Cadwallader, W.G.M.A.

The prupose of the meeting was to review the current plans and costs of the proposed river access at Falls Township Waterfront Park. A summary of the major discussion items is as follows:

1) Eric presented a background of CZM funding for this project and the subsequent marina development.

2) Tom presented the original alternatives and rationale for development of the current plan. This plan calls for wooden pilings with an elevated deck leading to the ramp which extends over the wetlands to the river. A floating center dock is used to enable to accesses at once.

3) Project cost estimate of $397,500 was distributed. This is about $6800 per parking space which is well above that typically constructed by the Fish Commission.

4) A question was raised as to keeping pilings stable during winter freezing when there is a tendency toward upward pressure.

5) Funding source was raised. PA Fish Commission has bulk of 87-88 dollars budgeted. Ed Miller and the Commission Members would have to redirect budgets to permit funding this year. Jim Young is to meet with Mr. Miller next week and will discuss the project. Re-programming access/marina projects is not impossible.

6) Normally the PA Fish Commission constructs its own access ramps. A 400,000 dollar ramp would be one of the largest undertaken to date. They subcontract piling work.

7) Cash awards can be made by the PA Fish Commission although they normally contribute through work services.

TEC:lcm

RECEIVED
SEP 21 1987
WM. G. MAJOR ASSOC.

September 16, 1987

Thomas E. Cadwallader
William G. Major Associates, Inc.
108-110 Mill Street
Bristol, PA 19007

Dear Mr. Cadwallader

I surveyed the site of the proposed boat launching facility along the Delaware River just south of the Falls Township Park on September 5, 1987. The following description applies to the area designated by stakes in the ground.

The bank of the Delaware River consists of a 60 - 75 foot wide fresh water tidal marsh. The marsh shows zonation typical of this habitat. The lower two-thirds is dominated by Nuphar advena with an understory of Sagittaria subulata. There are scattered small patches of Scirpus americanus and Eleocharis sp.

The upper one-third of the tidal marsh consists of Nuphar advena, Pontederia cordata and Zizania aquatica as co-dominants with occasional patches of Sagittaria subulata and Eleocharis sp.

On logs and stumps at the high tide line additional herbaceous species are found including: Lythrum salicaria, Eupatorium perfoliatum, Vernonia noveboracensis, Polygonum punctatum, Pilea pumila, Juncus tenuis, Panicum virgatum and Lycopus americanus.

Adjacent to the river bank is a floodplain forest dominated by Fraxinus americana and Acer negundo. Other canopy trees include Quercus bicolor, Ulmus americana and Prunus serotina. A single large specimen each of Liriodendron tulipifera and Acer saccharinum also occurs in this area. Shrub species include Lindera benzoin and Viburnum prunifolium. The herbaceous layer of this forest contains scattered clumps of Asarum canadense and Arisaema triphyllum. Dried stalks of Alliaria officinalis are also present.

Of the species listed above, Sagittaria subulata and Zizania aquatica are included in the Pennsylvania Plants of Special Concern list where both are classified as Rare. Not found at this site, but noted nearby are Biden bidentoides (listed as Threatened in PA) and Amaranthus canabinus (listed as Rare in PA.)

Sincerely,

A. Rhoads

Ann F. Rhoads, PhD

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA FISH COMMISSION
Engineering & Architectural Division
450 Robinson Lane
Bellefonte, PA 16823-9616

(814) 359-5127

August 20, 1987

RECEIVED
AUG 25 1987
WM. G. MAJOR ASSOC.

William G. Major Associates, Inc.
Executive Offices
110 Mill Street
P.O. Box 603
Bristol, Pennsylvania 19007

Dear Mr. Cadwallader:

In response to your letter dated July 17, 1987, I want to apologize for not responding before August 15, and to thank you for your patience with the Fish Commission.

After reviewing the notes of the meetings with DER, the Corps of Engineers, and Coastal Zone Management, and after reading the comments from our own people, it is very apparent that everyone agrees that Alternate Plan 1 is preferable. It is recommended by the Fish Commission that the turning basin be eliminated and the matter of "who will do the dredging" will have to be resolved. Also, before this project can be put on any construction schedule, the money for the project will have to be budgeted so it is imperative that a cost estimate be furnished as soon as possible.

It is also recommended that any further inquiries be addressed to the following gentlemen as they are the ones who are instrumental in budget decisions:

Mr. James Young, P.E., Acting Director
Bureau of Property & Facilities Management
Pennsylvania Fish Commission
450 Robinson Lane
Bellefonte, PA 16823

1 pm 16th
1 pm 19th

Edward R. Miller, Executive Director
Pennsylvania Fish Commission
3532 Walnut Street
P.O. Box 1673
Harrisburg, PA 17017

Sincerely,

Thomas Snyder

Thomas Snyder
Access Area Branch

cc: J. Young, R. Weis, J. O'Brien, R. Tibbott, E. Miller

August 11, 1987

SUBJECT: Pennsbury Manor Access Area
Bucks County

TO: Tom Snyder
Access Area Branch

FROM: Ron Tibbott, Hyd. Eng. Tech. RT
Division of Fisheries Environmental Services

In response to your July 31, 1987 memo, as you noted, the Pennsbury Manor ramp development is certainly complicated by the Delaware's tidal influence at that location. The two schemes presented by William G. Major Associates appear to overcome the "mud flat" problem and would allow boat launching and retrieval at various tide stages, but each presents several negative features.

From an environmental standpoint, both plans involve fill and/or excavation of tidal wetlands and shallow water river habitat and would obviously require DER and COE permitting. As you know, these regulatory agencies and the other commenting groups carefully evaluate these types of activities, particularly in terms of potential cumulative impacts to the resource. Based on past experience, it is expected that the applicant, in this case the consultant, will have to provide detailed analysis of all available alternatives, including possible development at other sites. Water dependency is certainly satisfied by the nature of the project, and the public benefit aspect also would contribute to positive recommendations from the review agencies.

Assuming it can be reasonably demonstrated that no feasible alternatives exist, permit issuance, possibly with mitigation requirements, would be likely for either design, with Alternative 1 being the most acceptable because of the minimal fill required. As discussed, fill associated with this plan would mainly consist of riprap necessary to protect the sheet pile seawalls, and could be considered a fisheries enhancement.

William G. Majors Associates has also presented both proposals to DER for preliminary review, and Khervin Smith advises that he discussed the above considerations with their representative and also indicated a preference for Alternative 1--possibly with a reduced or eliminated turning basin pending a requested wetland assessment of the wooded area between the dike and the high water line.

Thanks for the opportunity for early input, and let me know if you need anything else.

RRT:dms

cc: J. Miller

STD-501 1-84

COMMONWEALTH OF PENNSYLVANIA

August 11, 1987

SUBJECT: Preliminary Proposals
Pennsbury Manor, Bucks County

TO: Jim Young, Acting Director
Bureau of Engineering

FROM: K. Ronald Weis, Chief
Engineering & Architectural Division

I wish to begin by expressing my real concern that we, the Pennsylvania Fish Commission, are getting backed into a corner if we allow this process to continue. It is true that we do have an agreement with Falls Township to construct an access area at this location, however, we must have sufficient monies budgeted to cover the cost of construction or we will again have pressure from legislators. We entered into this agreement without the full knowledge of the difficult physical problems that exists with this site. This was due completely to the Commission's negligence by not thoroughly investigating the site.

In my review of the two alternatives submitted, both contain a common major problem which I can see no acceptable solution for. This problem is that both schemes create obstruction to the free flow of water in the Delaware River which poses two situations: (a) By forming an impediment to the flow of high water, a build up of back water could possible create flooding problems for the operators of the Pennsbury Manor Historical site. (b) The structure also will be highly susceptible to ice damage during spring flows.

Specific comments on the two alternatives are:

> Alternative one - in my opinion, is the preferable plan. The major difficulties are the projection of the metal pile channel into the river and the resulting maintenance dredging.
>
> Alternative two - in addition to projecting into the river, this provides a much more difficult launch situation because of a required 180° turn of vehicles and trailers, a long backing requirement, and launching into the current.

In addition I have attached a copy of our agreement as well as a memorandum of May 12, 1980. My review of the agreement yields no discussion of an obligation for dredging on either party.

jm

cc: T. Snyder, J. O'Brien, J. Miller

WILLIAM G. MAJOR ASSOCIATES, INC.

cc John O'Brien
8/12

NOTES OF MEETING

PLACE AND DATE: Coastal Zone Management, DER Library
Harrisburg, Pennsylvania - August 5, 1987

ATTENDEES: Larry Toth
Eric Conrad
T. Cadwallader

PURPOSE: Pre-application review for river access area
Falls Township Waterfront Park

We presented photo display of existing waterfront facilities/ location and described Alternatives 1 and 2. The following are major comments from the discussions:

1. Don't like the fill in Wetlands - it will be difficult to gain approval - where will the spoils be disposed of?

2. Rationale for the fill might include:

   a. prevent future dredging/maintenance considerations.

   b. promote public access/use to the river.

3. Need to coordinate with Ron Wise @ PA Fish Commission in Belfonte.

4. CZM funding - Earliest availability would be October 1, 1988 design and engineering must be done before application - $50,000.00 limit based on 30 percent matching local - need permits in hand or at least a good indication of availability.

5. Aerial photos of the site and Pennsbury Manor were obtained from CZM files - April 1987.

6. Larry indicated the UWAG meeting for August has been cancelled.

7. Can a holding tank be placed in flood plain?

TEC/cs

WILLIAM G. MAJOR ASSOCIATES, INC.

cc John Obrien
8/12

NOTES OF MEETING

PLACE AND DATE: Dams and Waterway Management, DER
Harrisburg, Pennsylvania - August 5, 1987

ATTENDEES: Khervin Smith
T.E. Cadwallader

PURPOSE: Pre-application review for river access area
Falls Township Waterfront Park

We presented photo display of existing waterfront facilities/ location and described Alternatives 1 and 2. The following are major comments from the discussion:

1. The application should identify the wetlands and the presence and/or absence of rare and endangered spieces. Mr. Smith recommended contact with the Morris Arboretum. NOTE: Dr. Rhoads - 247-5777 Ext. 9144 Meadowbrook (who is on vacation until August 10)

2. The fill Alternative would be less desirable than the dredging because the later would increase wet areas, but consideration should be given to maintenance dredging for future use. The permit will include this requirement.

3. Sheet pile dredging would be preferrable to open dredging.

4. A pile supported structure would be OK because it would allow flow of water under and on wetlands.

5. Mitigation will require a one for one replacement of any wetlands removed.

6. The Environmental Review Group meets the last Thursday of every month and would be a forum for input to the project. This months meeting will be in Erie, PA

7. Permitting should take from 60 to 90 days to complete.

TEC/cs

WILLIAM G. MAJOR ASSOCIATES, INC.

cc John Obrien
8/12

NOTES OF MEETING

WGMA #7017

PLACE AND DATE: Philadelphia District Corps of Engineers
July 23, 1987

ATTENDEES: Richard Hassel/Thomas Cadwallader

PURPOSE: Pre-application review for river access area
Falls Township Waterfront Park

We presented a description of the existing facilities at the Falls Township Waterfront Park. Pictures from the water showing up and down stream as well as high and low tide were discussed. Two alternative plans were reviewed including - 1) A dredged channel and turning basin, and 2) A filled ramp into the river. Comments and observations are as follows:

1. Preference for the open or dredged plan over the fill because of less impact on wetlands.

2. The dredged plan may not need sheet piling because the substrate may be stable enough to maintain slope independently.

3. Perhaps a partially dredged channel and floating dock closer to shore would be a preferable alternative.

4. The dredged turning basin is discouraged unless there is a flushing stream to help water quality. Tidal changes alone might not be sufficient.

5. Does the Township own any other lands that would have less impact on the wetlands? Not for this purpose.

6. Is there any feedback from the State Office of Historical Preservation? Yes, we are coordinating with Pennsbury Manor.

7. What is the proximity of similiar facilities in PA? Next one downstream in Bristol - none upstream.

8. The plan could be coordinated with all adjacent property owners, i.e. Penn Warner/GROWS.

9. Suggest meeting with Kervin Smith at DER (717-787-6827) since the permit system is now a joint effort starting at Kervin's office. (Note: I called and he is on vacation this week. I'll try to meet with him next week) Received a new Joint Application Form - disregard the previous two forms sent by the Corps.

10. If fill is necessary a 401 certification will be required from the Norristown office of DER.

11. Smith's office has an Environmental Review Committee which may be helpful in getting input.

12. Delaware Valley Regional Planning Authority has an Urban Waterfront Action Group (UWAG) which meets monthly if necessary. Keith Harrington (592-1800 ext. 137) can arrange a meeting (Note: I called and set up our presentation for 10 a.m., Aug. 11)

13. An aerial photo showing extent of wetlands would be a helpful addition to the submission application. All drawings for the permit must be at 8 1/2 X 11 size for public notice purposes.

14. Depths of water should be referenced to mean low water. A channel depth of 5ft. would be preferable to 8 feet because of less impact on wetlands.

15. It maybe necessary to provide a 1 for 1 replacement of wetlands - perhaps by excavating a shoreline area to enable wetlands to develop.

16. The final permit will come from Corps of Engineers.

TEC/lb

cc: Susan Patton, Falls Township

WILLIAM G. MAJOR ASSOCIATES, INC.

File

NOTES OF MEETING

DATE OF MEETING: 9 June 1987, 1 p.m.

PLACE: Waterfront Park, Falls Township #7017

ATTENDEES: Charles Chimera, Falls Township Supervisor
Susan Patton, Falls Township Administrator
Thomas E. Cadwallader, P.E.,
William G. Major Associates, Inc.
John R. O'Brien, P.E., Chief PA Fish Commission
Thomas M. Snyder, Designer, PA Fish Commission

PURPOSE: Review Plans for the proposed river access area.

The following is a summary of the major discussion items:

1) A layout prepared by William G. Major Associates, Inc. was reviewed and problems noted as follows;
   a. The turning basin and channel would require significant interuption in the wetland area.
   b. An alternative consisting of a built up access area leading directly to the river was offered.
   c. Minimum maintanence would be desirable from the Fish Commission viewpoint. Regular dredging would not be acceptable.
   d. Inland parking and roadways looked fine-river access is the main concern.
2) William G. Major's study would lead to the design of the access ramp. As such it should focus on obtaining core data, permitting and confirming survey information.
3) Fish Commission will check on datum of survey data transmittal (Project No. F.C. 328A).
4) Fish Commission will check on status of Construction Funding to be used for River Access area.

TEC/lb

cc: Attendees
WGM

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