Fort Point Channel
Watersheet Activation Plan

Marine Infrastructure
Design and Costs

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APPENDIX A

Marine Infrastructure
Design and Costs

CONTENTS

A. GENERAL CONDITIONS

Design considerations for waterfront facilities must consider the climatic conditions of the area. The wind and wave climate of the harbor is dictated by the wind conditions reaching the site predominately from the east. In general, the predominate wind conditions of the fall/winter are from the northeast, and the predominate wind conditions from the spring/summer are from the southwest. This results in the site being relatively sheltered. Water agitation from vessel wake is limited at this site; however, construction of the passenger ferry terminal and expanded watersheet use will increase such wave action.

The constricted conditions limit the wave fetch for the site. Typical waves generated by westerly winds are in the order of 1.5 feet. The major wave condition of the site is generated by vessel wake, which is estimated to be in the order of 1 to 3 feet for this area.

The construction of fixed bridges has restricted the size vessel that can use the Channel. The water usages anticipated under the Watersheet Activation Plan require less water depth than the large vessels that once used Fort Point Channel to access South Bay. In most locations within the Channel water depths are generally sufficient for the proposed uses. The clear exception is along the seawalls where shoaled conditions limit draft.

B. FACILITY CRITERIA

1. General

Waterfront facilities providing land to water access are generally comprised of a fixed pier or bulkhead structure with accompanying gangway and floats which extends to water deep enough to accommodate the vessel. Review of local fleets and potential vessels that could utilize the water area indicate drafts in the order of 2 feet for recreational vessels to 9 feet for ferry type vessels. The depth of water must additionally consider extreme tide conditions and wave action in determining suitable depth to prevent the vessel from bottoming out under such conditions. A depth of 12 feet generally accounts for all such conditions within the water study area for the anticipated vessel users. Pedestrian floats typically require 3 to 4 feet of draft to minimize bottoming of float during extreme tide events.

The boarding float freeboard needs to be compatible with the variety of vessels that could utilize the site. Planning and design of the various floats should take into consideration the wide variety of vessels that could possibly use the site,

establishing several common freeboards to accommodate the major anticipated users. Variations to these freeboards for boarding floats are generally achieved by providing additional ramps or transition plates for specific vessels.

Also assumed for this study, it is that main passenger floats, walkway floats, and specialized barges will need to remain in service throughout the entire year. Year round structures must be more durable than removable structures.

2. Universal Access Standards- Multiple Freeboard

The State, within the 1998 Ferry Study and the City within the 2000 BRA Boston Harbor Passenger Water Transportation Plan, recommends that transportation facilities utilize universal access standards to increase the ability of the public to readily adapt to water transportation throughout the Commonwealth. The design of marine access structures at the Fort Point Channel should consider other similar water transportation facilities throughout Boston Harbor and the State, trying to integrate common positive features.

The multi-freeboard berthing levels proposed for this study include water taxi, recreational vessels, and sailing vessels considering freeboards in the order of 24 inches. Water ferry services consider 48-inch freeboard for portside loading shuttle and ferry vessels; and the potential for 84-inch freeboard with a bow-loading cradle for high loading ferry vessels that could use the facility.

3. Handicap Requirements

Handicap accessibility is a critical technical aspect for water access and water transportation facility. The Massachusetts Architectural Access Board (AAB), in compliance with 521 CMR, has established requirements for Transportation and Recreational Terminals, whereby unassisted access is required for docks and/or piers that service waterborne passenger vessels with a vessel length of 40 feet or greater (Tier 1). Failure to meet all of the AAB standards requires the applicant to file a variance for those portions of the project, which do not meet these standards. It is understood that the new proposed facilities at the Fort Point Channel should be fully handicap accessible, without the need for a variance.

Handicap requirements and considerations are an integral part of access structure design. Through meeting code requirements, the structure should provide safe and user friendly accommodations for all users. Factors such as climatic conditions, the need for the carrying of supplies, and the unfamiliarity of the facility for new users can result in inherent access difficulties. Providing the wide gangways with the gentle slopes used to address handicap accessibility requirement will result in a more appropriate and operational solution for all users.

In general, AAB standards aim at providing a maximum slope of 1V:12H, with the maximum gangway length of 30 feet, having an associated 5-foot landing. All structures with a steeper slope then 1V:20H will require handrails and handgrips in conformance with AAB standards. Common non-handicap gangway standards generally call for a maximum slope of 1V:4H for the extreme tide condition.

There are generally two methods for achieving AAB standards from the gangway to a berthing float. The first considers a large float, in the order of 30 feet by 100 feet, which typically is accessed by two ramps. One ramp is typically a long length ramp landing directly on the float, which is used by the majority of the non-handicap users over the tidal cycle. The other ramp is typically shorter (in the order of 30 feet long), which leads to a series of platforms. This type of system has been used in a variety of Boston Harbor sites where the size of the single float is not an issue. Examples of this type of facility include the Boston Rowe's and Lovejoy Wharves and the Massport system at the East Boston Community Sailing facility.

The second type of system considers using a series of narrower floats, having different deck freeboards, which are connected by ramps in a longitudinal manner to achieve AAB standards. This type of system is more adaptable at areas where the size of the float can impact the navigable waters. These systems result in narrower floats in the order of 20 feet wide. This series arrangement results in a facility that is handicap accessible, with the added feature of having the facility accessible for multiple freeboard vessels. Examples of this type of facility are at the Logan Water Transportation Improvement project in East Boston, and the Boston facility at the World Trade Center.

For access within specialized areas, mechanical systems can provide a dedicated mechanical gangway or elevator type system, which can be adapted for the different tidal condition levels. This type of system results in the other facility ramps not needing to meet full slope requirements. The negative features include typical low capacity throughput, and the loss of a second direction high activity gangway from normal operational conditions. The potential for infrequent use and potential maintenance requirements are negative features for a relatively low volume site. Local examples of mechanical systems are the elevator unit at the World Trade Center and the proposed use of an articulated dedicated ramp ("Ramp Rider") at the Federal Courthouse in South Boston.

4. Boarding Float Features

The floats used for the berthing and loading/unloading of passenger and recreational vessels can be subject to a multitude of user and environmental loadings. Such loadings include vessel mooring and docking loads, wind and

wave loads, live loads due to passenger usage and dead loads due to ramp and platform structures and other appurtenances. In addition, the float must accommodate the harsh climatic effects of the marine climate, such as salt water, ice, snow, immersion, corrosion, and constant movement due to tidal action and waves.

The float system should be designed to meet the required vessel deck freeboard elevations, and to have sufficient stability so as not to be too active or jumpy under normal wave load conditions. Larger floats with deeper drafts typically tend to exhibit lesser motion due to waves, but these also have a higher initial cost.

Typically, a water taxi or recreational vessel float has in the order of two-foot freeboard that is achieved with a timber or concrete float. Ferry vessels with four-foot and over freeboard are typically achieved with a deeper compartmented float, which are generally of concrete or steel construction. Ballasting of these deeper floats may be accomplished with water in the corner compartments or with concrete or sand placed on the bottom of the float hull.

The larger steel floats should be coated with an epoxy coating to inhibit corrosion, and the float decks are typically provided with a non-slip coating or timber decking to improve traction in slippery weather. Additional corrosion protection is often provided by means of zinc anodes welded to the underwater component of the hull.

The fixed ramps and gangways placed on the float for handicap accessibility are typically fabricated out of aluminum and then bolted to the float deck. The ramps are typically thirty feet in length, in order to maximize the vertical rise as prescribed by the ADA regulations. Ramps typically end in five foot wide (minimum) level platforms. The aluminum ramps and platforms are lighter than steel and provide good durability in the marine climate. High activity areas should consider wide gangways having greater then 4 feet clear width.

The boarding floats should be provided with handrails and detectable warning strips at designated landing areas. Handrails and handgrips should be compliant with AAB and building code requirements. The State Building Code requires handrails to have a form of infill balusters resulting in a four inch (minimum) spacing at areas where the vertical drop is more than 4 feet.

The boarding floats should be provided with suitable fendering to accommodate potential vessels that could utilize the float. The floats shall be designed for year round service. Boarding floats are typically anchored by timber or steel mooring piles as described below in Section 6.

5. Floating Walkway Features

The use of a floating dock as a public walkway will require a system that can provide a comfortable and safe environment for the users. Floats that are lightweight and subject to movement under low level wave action will not provide a comfortable user experience. The floating walkway float must have a sufficient width to allow pedestrians to pass freely, and also to provide adequate clearance around gangway landings and float service pedestals.

The width of float considered for use in the Fort Point Channel by this study has been assumed 12 feet wide. This width should allow for sufficient clearance and freedom of movement.

The walkway float has been assumed to be constructed of reinforced concrete, filled with styrofoam. This type of float typically has greater stability to wave action and requires less frequent maintenance than floats constructed out of timber or aluminum. Steel floats are inherently more expensive then concrete, and are not considered cost effective for extended walkway use, within a relatively sheltered area.

The floats should be designed to carry a live loading in the order of 100 pounds per square foot, with zero freeboard at full load capacity. Additional flotation would be provided at gangway landings to ensure uniform freeboard throughout the float length. The typical freeboard for a floating walkway of this type is in the order of 16 to 24 inches.

Fendering of the walkway floats will depend on the potential for vessels to be moored against the float. Typically, a timber wale and/or rubber section used to connect the floats will generally provide sufficient fender for the side docking of most small craft. The floats should be designed for year round service, typically anchored by timber or steel mooring piles, as further described below.

6. Mooring/Anchoring Systems

Floats used for access boarding or as a walkway structure should be held in a fixed horizontal position over the full tide range. Guide piles driven into the seabed are normally used for this purpose, as they keep the float on a vertical "track" and provide the necessary lateral resistance to keep the float in place. Cantilever piles have the added benefit of absorbing energy in deflection especially during extreme events, which reduces shock and wear to the float itself.

The float is attached to the guide piles through the use of pile collars. These pile collars are either bolted to the exterior of the float, which can be easily removed for float maintenance, or may be placed within the structure of the float. Internal

guides can increase useable berthage space but typically require removal of the piles for movement of the float. The pile collars are typically provided with UHMW plastic rub strips which reduces friction and wear on the moving guide and pile contact areas.

C. DESCRIPION OF FORT POINT CHANNEL FACILITIES

1. Access Structures and Area Uses

a. Area 1 – Hub of the Channel

This is the major area for providing waterside connections for the Channel. The 500 Atlantic Avenue water transportation terminal, soon to be under construction on the west side of the Channel, can provide a link with other major water transportation terminals in the Harbor. The access system will include fully handicap accessible ramps to a float, which is capable of servicing ferries and water taxis. The facility will have the ability to connect the South Station, Fort Point and Financial District areas to the major City intermodal stations including North Station through Lovejoy Wharf and the Logan Water Transportation Terminal in East Boston. It can also serve as a takeoff point connecting water taxis to possible sites including the local Federal Courthouse, Rowe's Wharf, Long Wharf, the World Trade Center and the Children's Museum.

The remainder of the uses of the west side of the waterfront are envisioned to include floating public walkways and floats to accommodate visiting boats and link Russia Wharf to facilities within 470 Atlantic Avenue. The floating walkways are assumed to be 12 feet wide. The floats would have utility services including water, electricity, and cable service. The entire walkway area would have lighting for safety.

The east side of the Hub of the Channel area is comprised of the Children's Wharf with its waterside facilities, and the restaurant and marina facilities associated with the Barking Crab. Plans include the potential extension of floating walkways to connect the Barking Crab marina floats and the Children's Museum Wharf under the Evelyn Moakley Bridge. Other area-based facilities include the floating classroom, the "Barge of Good Ideas" and docking floats for visiting boats.

The shore to water access facilities as indicated, includes a fully handicap access float system from the southern area adjacent to the Congress Street Bridge. The floating docks would generally have a freeboard of 2 feet, which is assumed sufficient for the general type of visiting boat traffic envisioned. There would be one dedicated water taxi docking area along Children's Wharf, which could have a somewhat higher freeboard of 30 inches to accommodate these vessels.

The handicap access float should provide Massachusetts Architectural Access Board compliant access during the full normal tide range. It is assumed that the float would be in the order of 30 feet wide by approximately 100 feet long,

constructed of steel or concrete. The float would be provided with a series of switchback aluminum ramps designed to meet the required slopes. Gangways would be either anchored to the shore by a freestanding platform or from a structure connected to the stone seawall and wharf structure. The float may be anchored using steel guide piles driven into the Channel bottom.

The Barge of Good Ideas is envisioned to be a deck barge that would assume different locations within the basin depending on the specific usage. The barge should have handrails and a dedicated loading area for the public and for servicing exhibits. It is assumed that the barge would be anchored by "spud piles" contained within the barge.

The floating classroom is assumed to be an expansion on the floating walkway, with an estimated area of 50 feet by 50 feet. A light shade structure or tent structure can be located on this steel or concrete float with handrails and designated seating.

b. Area 2 – Art Basin

The Summer Street and Congress Street Bridges introduce restrictions within this area, whereby connections to adjacent water areas are limited. With these restrictions in place, the area is instead envisioned to provide a series of floating art exhibits that can be viewed from the landside shoreline access structures, and serviced by water.

The existing basin area would be cleaned up to provide a neater appearance from what presently exists. The existing water line and timber pile supports, as well as deteriorated and abandoned timber piles will be removed as part of the Congress Street Bridge reconstruction project that will commence in 2002. Water blasting may improve the appearance of old and moss-covered seawalls and other existing structures. The removal of the old piles, waterline and other miscellaneous debris will provide a much more aesthetically pleasing basin.

The existing cantilevered walkway on the east side of the Channel is presently approximately 6 to 8 feet wide. A newer, wider fixed walkway could be constructed out of timber and steel, fastened to the existing seawall. Any replacement walkway would be assumed to have a width of 12 feet wide, with handrails and lookout viewing areas.

c. Area 3 - Seawall Basin

The Seawall Basin provides an ideal setting for small boat operations and events. Handicap access floats are envisioned initially from the east side of the Channel only, because of limited water depths against the seawall on the west side of the

Channel. Floats will provide access to the water surface from the shore structure in accordance with AAB requirements.

The west side of the Channel is not initially envisioned to have any dedicated water access structures, although the feasibility of accommodating water taxi service should be explored with the possibility of accommodating water transit service here over the longer term with a new generation of vessels capable of negotiating the restrictions posed by existing Channel bridges.

Point of interest exhibits could be located along the west side of the Channel, with exhibits constructed on floats or marker buoys. These structures are envisioned to be movable to be anchored either near the shore or 80 to 100 feet out from the shore. Floats or marker buoys could be bottom anchored and move in accordance with the tide. These exhibits would not be accessible from land.

In addition to exhibits, a moveable art barge, refreshment float and floating island structures could be created within the Seawall Basin water plane. These structures would be accessible from the waterside only, and would be bottom anchored to moorings or by utilizing steel spud piles. These structures are anticipated to support seasonal use only. The moveable art barge is anticipated to be larger than the floating island and refreshment float, and can be provided with a versatile setup and staging design. The float has been assumed approximately 30 feet wide by 120 feet long, and has self-sufficient power and motor capability. The refreshment float and floating island are envisioned to have a light shade structure or building, with minimal electrical or water services.

The east side of the Channel consists of several water access points and features including the handicap access float, a multi-use small boat facility and a model boat area. The north end of the east side of the Channel is envisioned to be provided with a handicap access float, providing full handicap access to the waterplane. This point of access should serve the handicap needs along the entire length of this side of the basin.

The small boat rowing facility is assumed to consist of a central main float providing laydown and staging for rowboats and paddleboats. This main float would be connected to the handicap access float from the east side. The main float would provide an area of about 6,000 square feet (assumed 60 feet by 100 feet) for the small boat programs. A single story building, assumed to be 30 feet by 40 feet, could be constructed on the float to provide shelter and support for the programs. The building should be a light structure, and services are assumed to be limited to electrical and water supply.

The model boat area would be accessed from the east side handicap access float by a 12 foot wide floating walkway. The model boat area is envisioned to be comprised of a 12 foot wide floating walkway and a 30-foot by 30-foot area float.

Handrails and seating shall be provided with these structures. The area float would be accessed from land by a 50-foot long gangway, which is not envisioned to be handicap accessible. Lighting and electrical service is envisioned for this area.

A landside support building shall be required to support the small boat program requirements including storage, washroom and shower facilities, and security.

The east side of the Seawall Basin will also include a water access float and light pavilion. A 50-foot long gangway and a 30-foot by 30-foot access float were assumed to be provided to support to the Barge of Good Ideas, and the moveable art barge. This system could also provide an additional access point to the water adjacent to Mt. Washington Street. The float would be similar to the walkway floats, with a provision for an electrical shore power service. This water access would not be handicap accessible.

d. Area 4 – South Bay Urban Industrial Wild

The South Bay Urban Industrial Wild area of the Fort Point Channel offers a riparian oasis amidst an industrial setting. Development of aquatic vegetation and special exhibits may provide a point of destination and education for small boat users.

Access to the water from land in this area could consist of a gangway and a timber or concrete float of minimal dimensions of 20 by 20 feet. The float shall be similar to the walkways, with a lower freeboard to enable ease of launching and hauling small craft. This water access would not be handicap accessible.

2. Utilities – Lighting – Signage

The provision of utilities and services at the site would be in keeping with other similar sites in and around Boston Harbor. Ready available sources for water and electrical services can be provided to support the various facilities uses. Electrical services can be provided along the pier and gangway to service pedestals located along the floats. Flexible electrical cables and conduit would be run from the shoreline to points on and along the floats.

An underwater power supply cable would be directed to the Barge of Good Ideas having a separate service with a panel enclosure located on shore.

Site lighting is usually provided at approximate 50 to 100-foot pole intervals, with the float being illuminated from the pier.

Site signage will be provided to direct pedestrian traffic as well as to indicate which gangway is to be used during which tide cycle. Signs, which indicate

relative tide levels, have previously been used with success on similar installations.

D. COST ESTIMATES

1. Overview

Table 1 below provides a breakdown of waterfront construction elements required for the proposed facility. The costs indicated were obtained based on canvassed unit costs received from bidding from previous similar projects. A contingency of 20 percent was assumed for this level of design. The proposed waterfront work includes the installation of a timber pier, fabrication of steel float barges, installation of steel guide piles, fabrication and installation of aluminum ramps, platforms, and gangways, and concrete floats.

The fabrication of the aluminum ramps and gangways as well as the fabrication of the float are specialized marine contractor items, with a limited number of contractors who are experienced in this type of work. As such, the cost estimates for these items are very dependent upon the current work load and availability of these contractors. Long lead times are often associated with the aluminum and float fabrications, and these tasks require a large amount of management, coordination, and cost outlay for these critical path items.

2. Maintenance of Marine Facilities

Marine structures and facilities require routine maintenance and periodic repairs due to the harsh marine environment and service conditions to which they are subjected.

A proper marine maintenance program involves regular and constant repair of damage and deterioration as they occur. Structural members or facility components which are in a weakened condition (due to wear or extreme events) are more likely to contribute to a greater cumulative damage during an extreme event.

Good design practice, which considers the marine environment and has a forecasted minimum maintenance schedule, will greatly improve the likelihood of a long structure life. To this end, overdesign of certain elements of marine infrastructure is common in waterfront design, and a thorough design will allow for expected deterioration.

Average marine industry annual maintenance costs vary from site to site due to such variable factors as facility type, vessel or topside usage, exposure to wind and waves, physical site conditions and processes. In general, marine structures are subjected to relatively rapid rates of deterioration due to wind, waves, tides, extreme water levels, salt water, freeze and thaw cycles, ice, corrosion, physical and chemical attack, biodeterioration, and also general wear and fatigue due to moving parts, high loads and accidental damage. Accelerated deterioration may also be attributed to slight design, poor material selection or poor installation and workmanship.

Published formulae for maintenance programs are relatively rare, likely due to the high degree of variability in maintenance requirements from one location to another. The following annual maintenance costs as a percentage of initial construction costs were taken from "Port Development: A Handbook for Planners in Developing Countries" by UNCTAD, 1985:

Steel Sheet Pile Structures	0.3%
Concrete Deck on Concrete Piles	0.75%
Concrete Deck on Steel Piles	1.0%
Rubber Fender Systems	1.0%

In keeping with experience with the local marine climate, physical site characteristics and knowledge of current construction materials and methods, Table 2 considers the proposed infrastructure items and associated estimated annual maintenance cost requirements. These estimated annual maintenance costs are based on a typical heavy marine design and moderate site exposure.

TABLE 1

CONSTRUCTION C O S T E S T I M A T E
FORT POINT CHANNEL WATERSHEET ACTIVATION PLAN

	Item	Quantity		Unit Cost	Amount
	AREA 1 - HUB OF THE CHANNEL				
A	*CONNECT TO BARKING CRAB*				
	12 Ft wide Floating Docks	350	LF	$ 900	$ 315,000
B	*CHANNEL WALK EAST*				
	12 ft wide Floating Docks	650	LF	$ 900	$ 585,000
	Handicap Access Float	2,700	SF	$ 125	$ 337,500
	Aluminum Ramps	1	LS	$ 150,000	$ 150,000
	Shore Connection	1	LS	$ 20,000	$ 20,000
	Guide Piles, Install	1	LS	$ 50,000	$ 50,000
	Premium for Terminal	2	LS	$ 350,000	$ 700,000
	Floating Classroom	3,220	SF	$ 75	$ 241,500
	Finger Floats 12 Ft wide	1,920	SF	$ 75	$ 144,000
	Barge of Good Ideas (30x90)	2,700	SF	$ 125	$ 337,500
	Electrical, Amenities	1	LS	$ 300,000	$ 300,000
C	*CHANNEL WALK WEST*				
	12 ft wide Floating Docks	650	LF	$ 900	$ 585,000
	Gangway Access	1	LS	$ 50,000	$ 50,000
	Finger Piers 12 Ft. Wide	5,040	SF	$ 75	$ 378,000
	AREA 2 - ART BASIN				
	Cantilevered Walkway	1,440	SF	$ 120	$ 172,800
	Demolition and Removal	1	LS	$ 75,000	$ 75,000
	AREA 3 - SEAWALL BASIN				
A	*SMALL BOAT PROGRAM*				
	Handicap Access Float	2,700	SF	$ 125	$ 337,500
	Aluminum Ramps	1	LS	$ 150,000	$ 150,000
	Shore Connection	1	LS	$ 20,000	$ 20,000
	Guide Piles, Install	1	LS	$ 50,000	$ 50,000
	Area Float 60Ft x 100 Ft	6,000	SF	$ 75	$ 450,000
	Small Building 30Ft x 40Ft	1,200	SF	$ 150	$ 180,000

	Item	Quantity		Unit Cost	Amount
B	*Model Boat Area/Floating Walkway*				
	12 Ft wide Floating Docks	500	LF	$ 900	$ 450,000
	Area Float 30Ft x 30Ft	900	SF	$ 75	$ 67,500
C	*Landside Support Building*				
	Boat Storage, Lockers, Showers	1	LS	$ 400,000	$ 400,000
D	*Moveable Art Barge*	1	LS	$ 500,000	$ 500,000
E	*Gangway with 30 x 30*				
	Landing Float	1	LS	$ 50,000	$ 50,000
	Access Platform	1	LS	$ 50,000	$ 50,000
F	Floating Island	1600	SF	$ 100	$ 160,000
G	Refreshment Float	400	SF	$ 100	$ 40,000
	AREA 4 - SOUTH BAY URBAN INDUSTRIAL WILD				
A	*Canoe/Kayak Launch*				
	Gangway with 20x20 Float	1	LS	$ 50,000.00	$ 50,000.00

TABLE 2

MAINTENANCE C O S T E S T I M A T E

FORT POINT CHANNEL WATERSHEET ACTIVATION PLAN

	Item	Quantity	Unit Cost	Amount	Annual Maintenance Cost as %
	AREA 1 - HUB OF THE CHANNEL				
A	*CONNECT TO BARKING CRAB*				
	12 Ft wide Floating Docks	350 LF	$ 900	$ 315,000	2%
B	*CHANNEL WALK EAST*				
	12 ft wide Floating Docks	650 LF	$ 900	$ 585,000	2%
	Handicap Access Float	2,700 SF	$ 125	$ 337,500	1%
	Aluminum Ramps	1 LS	$ 150,000	$ 150,000	1%
	Shore Connection	1 LS	$ 20,000	$ 20,000	
	Guide Piles, Install	1 LS	$ 50,000	$ 50,000	
	Premium for Terminal	2 LS	$ 350,000	$ 700,000	1%
	Floating Classroom	3,220 SF	$ 75	$ 241,500	2%
	Finger Floats 12 Ft wide	1,920 SF	$ 75	$ 144,000	2%
	Barge of Good Ideas (30x90)	2,700 SF	$ 125	$ 337,500	1%
	Electrical, Amenities	1 LS	$ 300,000	$ 300,000	1%
C	*CHANNEL WALK WEST*				
	12 ft wide Floating Docks	650 LF	$ 900	$ 585,000	2%
	Gangway Access	1 LS	$ 50,000	$ 50,000	1%
	Finger Piers 12 Ft. Wide	5,040 SF	$ 75	$ 378,000	2%
	AREA 2 - ART BASIN				
	Cantilevered Walkway	1,440 SF	$ 120	$ 172,800	1%
	Demolition and Removal	1 LS	$ 75,000	$ 75,000	
	AREA 3 - SEAWALL BASIN				
A	*SMALL BOAT PROGRAM*				
	Handicap Access Float	2,700 SF	$ 125	$ 337,500	1%
	Aluminum Ramps	1 LS	$ 150,000	$ 150,000	1%
	Shore Connection	1 LS	$ 20,000	$ 20,000	
	Guide Piles, Install	1 LS	$ 50,000	$ 50,000	
	Area Float 60Ft x 100 Ft	6,000 SF	$ 75	$ 450,000	2%
	Small Building 30Ft x 40Ft	1,200 SF	$ 150	$ 180,000	3%

	Item	Quantity	Unit Cost	Amount	Annual Maintenance Cost as %
B	*Model Boat Area/Floating Walkway*				
	12 Ft wide Floating Docks	500 LF	$ 900	$ 450,000	2%
	Area Float 30Ft x 30Ft	900 SF	$ 75	$ 67,500	2%
C	*Landside Support Building*				
	Boat Storage, Lockers, Showers	1 LS	$ 400,000	$ 400,000	1%
D	*Moveable Art Barge*	1 LS	$ 500,000	$ 500,000	1%
E	*Gangway with 30 x 30*				
	Landing Float	1 LS	$ 50,000	$ 50,000	2%
	Access Platform	1 LS	$ 50,000	$ 50,000	2%
F	Floating Island	1600 SF	$ 100	$ 160,000	2%
G	Refreshment Float	400 SF	$ 100	$ 40,000	2%
	AREA 4 - SOUTH BAY URBAN INDUSTRIAL WILD				
A	*Canoe/Kayak Launch*				
	Gangway with 20x20 Float	1 LS	$ 50,000.00	$ 50,000.00	2%
	TOTAL ANNUAL MAINTENANCE				

Annual Maintenance Cost	
$	6,300
$	11,700
$	3,375
$	1,500
$	-
$	-
$	7,000
$	4,830
$	2,880
$	3,375
$	3,000
$	11,700
$	500
$	7,560
$	1,728
$	-
$	-
$	-
$	-
$	3,375
$	1,500
$	-
$	-
$	9,000
$	5,400

Annual Maintenance Cost	
$	9,000
$	1,350
$	4,000
$	5,000
$	1,000
$	1,000
$	3,200
$	800
$	1,000
$	**111,073**