DESIGN CONCEPTS AND STANDARDS FOR CHICAGO LAKEFRONT RECREATIONAL BOATING FACILITIES

1979

The preparation of this report was financed, in part, by the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, through the State of Illinois, Department of Transportation, Division of Water Resources

City of Chicago
Michael A. Bilandic
or

Department of Planning,
City and Community Development
Thomas Kapsalis, Commissioner

PREFACE

Under the rules of the Lake Michigan and Chicago Lake-Front Protection Ordinance, the Department of Planning, City, and Community Development has a responsibility to review development proposals within the lakefront protection district. Concurrent with that function, the Department has been charged with the implementation of the 1972 Lakefront Plan of Chicago. In order to better fulfill these responsibilities, which in part relate to the construction of new and improved boating facilities, the Department has prepared a Series of documents related to urban recreational boating. This series includes: the Chicago Lakefront Recreational Boating Survey Report; Strategies for Recreational Boating Development on the Chicago Lakefront; and this report.

This particular report represents an effort to assemble design concepts and principles which can assist in enforcing the Lakefront Ordinance and in implementing the Lakefront Plan. "Design" within the context of a crowded and highly regulated urban environment entails considerably more than would be the case at an undeveloped shoreland area. New boating facilities must fit within the present infrastructure of recreational activities along the Lakefront. In addition, recreational boating facilities must be able to withstand the forces of Lake Michigan while conforming to a complex web of local, State, and Federal statutory requirements. It is anticipated that this report will be modified as more is learned.

ACKNOWLEDGEMENTS

In the process of compiling information for this report, the following organizations and individuals were contacted. Without their assistance, this study would have been more difficult, if not impossible to complete. Their assistance is greatly appreciated.

CHICAGO PARK DISTRICT

Gerald Reynolds	Structural Engineer
Edward McCallum	Structural Engineer
Gerald Pfeiffer	Director, Marine Division

BOATING INDUSTRY ASSOCIATION

David D. Beach	Mgr., Engineering Services

ILLINOIS DEPARTMENT OF TRANSPORTATION

Mark Muggler	Acting Program Manager

CONULTANTS

Thor M. Strong	Private Consultant
Peter C. Ryner	Private Consultant

TABLE OF CONTENTS

Title	Page
Preface	i
Acknowledgements	ii
Table of Contents	iii
CHAPTER ONE: INTRODUCTION	1
CHAPTER TWO: DESIGN CONCEPTS AND PRINCIPLES	5
A. Establishing Protected Waters	5
Breakwaters	5
Floating Breakwaters	8
B. Achieving Necessary Water Depth	10
Dredging	10
Lake Level Fluctuations	11
C. Land Stabilization	12
Revetments	12
Bulkheads	13
D. Channel Design	14
Channel Width	15
Depth	15
E. Service Piers or Floats	16
F. Boat Berthage Design	17
Determining Berthage types	17
Slips	18
Floating vs. Stationary Fingerpiers	20
Moorings	24
Dry Storage	26
Dry Stack Storage	26
Fairways	28
Berthing Layout	29

G. Boat Handling Equipment	30
Cranes	30
Hoists	31
Forklifts	31
H. Boat Launching Ramps	33
Width	33
Length	33
Slope	33
Material	34
Armor	34
Bulkheads/Breakwaters	34
Parking and Circulation	35
Launching Fairways	36
Boarding Float	36
Ancillary Ramp Services	36
I. Ancillary Services and Facilities	37
Determining Demand	37
Restrooms	40
Restaurants	40
Repair Service	41
Boat Supplies	42
Groceries	43
Winter Storage	43
Fishing Supplies	44
Storage Lockers	45
Other Facilities	45
J. Landscaping	46
K. Security Planning	49
Use of Barriers	49
Enhance Visibility	50
Coordination with Police	50
Fire Protection	50
L. Parking and Roadways	52
Parking	52

Roadways 54
Emergency Vehicles 54

CHAPTER THREE: THE DESIGN PROCESS 55

A. Determine Principal Elements 55

B. Identify Site Characteristics 56

C. Establish User Requirements 57

D. Identify Design Constraints 58

E. Preliminary Design Alternatives 58

F. Preliminary Design Approval 59

G. Preliminary Site Plan 59

H. Site Plan Review 59

I. Final Schematic Design 60

References 62

Appendices

Appendix A: Chicago Lakefront Reports

Appendix B: Lakefront Plan Policy Statements

Appendix C: Taxonomy of Environmental Concerns

Appendix D: Review Guidelines for Harbors

Appendix E: Reveiw Guidelines for Boat Ramps

CHAPTER I

INTRODUCTION

The Chicago Lakefront

The 30-mile long Chicago lakefront, is a complex system serving a variety of needs for the City, State, and the Great Lakes Region. It is the major public access point to Lake Michigan for the entire State of Illinois, representing 80% of all public Lake Michigan shoreline in the State.

Aside from extensive recreational boating activities, the lakefront accommodates fishing, swimming, sunbathing, and sports. Approximately 28 million people utilized its 30 beaches in 1977. Two lakefront filtration plants treat more than one billion gallons of Lake Michigan water each day, and Chicago port facilities handled some 3.3 million tons of cargo. It is within this context that recreational boating facilities must be considered; as part of an interconnected urban maritime complex.

Recreational Boating in Chicago

The quality of Lake Michigan waters adjacent to Chicago is high, and since the late 1800's the City has used landfill to create a system of recreational boating harbors. For these reasons, recreational boating is a major Chicago lakefront activity.

Within the six-county Chicago Metropolitan area there are more than 84,000 boat owners. Use of Lake Michigan for recreational boating is largely restricted to larger craft, but the Chicago lakefront system in addition to Lake Michigan

access provides large areas of sheltered water which are intensively used by small boats.

The lakefront presently includes seven recreational boating harbors which provde berthing for more than 4,000 boats, and 24 launching ramps. In addition to these public facilities, the private sector operates a variety of boating services and facilities along the Chicago and Calumet Rivers, and at private yacht clubs within the lakefront harbors.

It would be inappropriate to speak of Chicago Park District boating facilities as marinas; few ancillary facilities exist in any of them. Users of these facilities must look elsewhere for such services as haul-out and winter storage, repair services, boating hardware, or convenience stores, etc. For the most part, these ancillary services are provided by private boat yards along the north and south branches of the Chicago River. Lakefront services offered include fueling and pumpout, hoist launching for dry-moored sailaboats at some harbors, restrooms, administrative offices, and dinghy storage. Private yacht clubs exist at most harbors and these provide members with additional services and facilities not offered by the Park District. Such services include restaurants, showers and lockers, and taxi service to moorings.

A wide range of boats are berthed in Chicago lakefront harbors, from less than 15 feet to well over 50 feet in length. Lakefront berthing spaces are used predominantly by large boats, and boats of 26 feet or greater length presently account for 61% of all boats in Chicago lakefront harbors.

Boats from 16 to 25 feet account for 38% of the total, and boats of 15 feet or less account for only 1%. Sailboats, which constitute only 13% of the total 6 county boat fleet, account for 55% of the boats currently berthed in Chicago Park District (CPD) facilities.

The Design Process in an Urban Setting

Chicago's lakefront is a unique site in which to construct recreational boating facilities. During the late 1800's an image was conceived of extensive recreational facilities and open space adjacent to the central City area. The recreational facilities which are so intensively used today were created in whole from extensive landfill operations.

As a result of these past concepts and landfill projects, the City of Chicago presently enjoys a 25+mile long open space and high-quality recreational facility, used by tens of millions of people each year. Any future recreational boating facilities of necessity must fit within the present visual and activity patterns, placing considerable constraints and challenges upon the boating facility designer. The demands of recreational boaters, and accepted standards for the design and engineering of boating facilities must be reconciled with the high visual quality, stringent environmental constraints, and multiple-purpose nature of the lakefront. It would be far easier to construct a boating complex in an undeveloped rural area than to successfully construct one that really "fits", in this comprehensive sense, within the lakefront park system.

In the discussion which follows an effort is made to identify the major design elements of a large boating complex, such as might be developed if additional lakefront expansion were to occur, as suggested in the Chicago Lakefront Plan. This is an initial effort to develop a series of design concepts and principles which can best meet the objectives of the Lakefront Plan and the historic patterns of attractive development for recreation and open space. But the design concepts and principles are but part of the complexities involved in actually planning and constructing future recreational boating facilities. The concluding section of this report emphasizes the need to synthesize these principles with environmental assessment, detailed site studies, local, state and federal regulations, and the policies and objectives of the City of Chicago.

CHAPTER II

DESIGN CONCEPTS AND PRINCIPLES

A. Establishing Protected Waters

For the safe launching, hauling, and berthing of boats, it is necessary to provide areas of water and shore which are protected from the often severe open-water conditions of Lake Michigan. In addition, if small boats, especially those of fifteen feet long or less, are to use the lakefront safely, then relatively large sheltered water areas for actual boating must also be provided. The system of breakwaters and harbors comprising the existing Chicago lakefront provides both protected berthing/launch areas and sheltered water boating areas.

Once a decision has been made, as discussed in Part Two, as to whether to utilize infill or landfill strategies, it is then necessary to determine if additional protected waters are required, and if so, how they are to be established. The two principal means of achieving additional protection are through the use of landfill or breakwaters. Design considerations associated with landfills are beyond the scope of this report, and are part of on-going studies being conducted by the City of Chicago (see Additional Information section at end of this report for further sources)

Breakwaters

There are a wide variety of structures which can be utilized to reduce wave action and provide a calm protected water area for boating or other purposes. In general, the

type and actual design of needed breakwaters will depend upon a number of factors, including the degree of wave reduction needed, the wave forces that will be encountered at the site, the type and costs of available materials, the depth of water at the site area, bottom soil conditions and topography, ice conditions, currents, and sediment loads. Generally, berthing areas should experience waves of no more than 1 to 1½ feet. (Although moored boats can withstand worse wave conditions). Donald Adie (1977; 176) suggests several problems that can arise if breakwaters are improperly placed or designed.

- Encouragement of Pollution: The placement and design of a breakwater can either block or encourage the flow of oil, floating debris and silt into the harbor or sheltered water area.
- Ineffective Wave Attenuation: In designing for recreational boating, certain wave and current conditions are designed. If a breakwater is improperly placed or designed, it may not achieve the desired conditions, no matter how large or costly.
- Structural Failure: Breakwaters can be destroyed by severe Lake Michigan conditions, especially if they are designed so as to absorb the full energy of storn systems, rather than reflect and modify them.
- Promotion of Siltation and Erosion: If a breakwater is improperly designed, it is not uncommon that it will cause or intensify siltation or erosion or both, not only near the breakwater but also for considerable distances.
- Interior Harbor Conditions: Unpleasant or dangerous currents or chop conditions can be created by improperly designed breakwaters.

To determine if a breakwater can be successfully utilized at a particular site, and if so, to determine the exact design of an appropriate breakwater, extensive geophysical analyses will be required, as well as detailed engineering

studies.

1. Rubble-Mound (rip-rap Breakwaters

This is the most common type of breakwater for ocean or large lake situations, although the material used in its construction may differ widely. The core of this type of breakwater is usually of small material such as sand or gravel, with larger material added on the top and sides. The provision of a dense central core helps to control the porosity of the structure and improve its resistance to wave action. Rubble-mound breakwaters off the Chicago lakefront (e.g., Monroe Harbor) are capped with concrete for added durability and increased usability as an activity platform, such as for fishing.

2. Vertical Face Breakwaters

The other most common type of permanent breakwater is of the vertical face variety. These range from large-diameter steel cylinders with concrete fill to small concrete or steel sheet pilings. Vertical faced breakwaters have been used most commonly in deep water, or where rubble material is not available.

Recommendation

To the extent that permanent offshore breakwaters are employed, it is suggested that they be of the rubble-mound or rip-rap type, for the following reasons:

- The sloped sides of a rubble-mound breakwater limit problems of wave reflection and ice pressure.
- They are more attractive, less obtrusive than vertical walls.

- They dissipate rather than reflect wave energy.
- They would be more compatible with existing breakwaters and the general lakefront character.
- Material for their construction should be readily available.

Floating Breakwaters

In recent years, considerable attention has been given to the possible use of floating breakwaters to attenuate wave action. A type receiving particular attention in recent years is constructed of old automobile or truck tires, anchored to the bottom so that it stays at or near the surface. Its buoyancy is enhanced through the use of various buoyant materials, such as urethane foam. Various types of steel pontoon construction are also used.

Generally floating breakwaters are less effective at wave attenuation than permanent types, and are most effective in controlling steep short period waves, or "chop" conditions. They may also be effective incontrolling surge or swell conditions within a sheltered or protected water area. Floating breakwaters have several advantageous characteristics which suggest that they may be used more frequently in the future.

- They can be used temporarily, such as during construction.
- They can be relocated.
- Of particular importance, they are relatively inexpensive.
- They can be used in deep water, where permanent breakwaters would be too expensive or otherwise infeasible.
- They allow a basically unimpeeded flow of the natural current.
- While not as effective as permanent breakwaters, they have been demonstrated to be effective in

attenuating waves up to five feet in height.

The Chicago Park District has deployed one floating tire breakwater, to attenuate waves in the channel of Diversey Harbor.

Recommendations

Further study of the effectiveness of these systems should be undertaken, in order to determine under which, if any, conditions they might be utilized along the Chicago lakefront. A review of various publications suggests the following preliminary design standards.

- They should be used to protect against waves of short period (less than 3 seconds)
- Width of breakwater in direction of wave approach must be greater than one-half the design wave-length and preferably as wide as wave length.
- The breakwater should extend downward a distance equivalent to one half the depth of the water column of the breakwater site.
- Must be moored with both lee-ward and wind-ward ties.
- Enough floatation should be used so that breakwater breaks the water surface.
- Truck tires instead of auto tires should be used.
- Navigational aids must be present on any floating breakwater so as to reduce accidental collision.
- Lights should be located at each end of the break-water.
- Flags should placed intermittently along length of breakwater.
- Mooring lines should consist of wire cable or anchor chain.
- Cable anchors should be placed at a horizontal distance from the point of attachment to the breakwater so that the slope of the cable will be approximately 2 feet to every 1 foot.

B. Achieving Necessary Water Depth

It will often be necessary to modify the Lake bottom in order to provide sufficient depth for channels, fairways, and berths. This will entail dredging and bulkhead construction. Since these activities may comprise the largest percentage of development costs, as well as having the potential for environmental disruption, it is important to minimize the amount of dredging whenever possible.

Dredging

The amount which must be dredged, and associated costs, can to some degree be controlled through careful design of the various boating components. An obvious example would be to arrange the berthing pattern of shallow draft and deep draft boats to conform as much as possible to existing depths. The disposal of spoil can also add to the costs of dredging. If the spoil is suitable for construction purposes, it might be utilized in the formation of desired land area. Design considerations must include regulatory standards and environmental protection objectives of the Lakefront Plan.

Maintenance Dredging

In many instances, periodic dredging may be required to maintain desired water depth. If facilities are designed with this fact in mind, the frequency, cost, and difficulty of maintenance dredging can to some degree be controlled. In some instances, design of breakwaters, channel areas and basin configuration can retard the rate of siltation and

shoaling, thus reducing the need for maintenance dredging. But another basic concern is that dredging machinery be able to gain access to various boating areas once breakwaters, bulkheads, or piers have been constructed. Thus, the capacity of boating areas should reflect not only the recreational boats which will use it, but also maintenance equipment and other vessels, such as fire boats or coast guard cutters, that might require access.

Level Fluctuations and Navigation Depth

In Lake Michigan, the fluctuation of lake levels can periodically render a channel or basin less navigable by larger draft boats. This is the current situation at Jackson Park Harbor, where larger draft sailboats have been forced to berth elsewhere because the harbor entrance channel can no longer accommodate them. The planning of new boat harbors or marinas along the Chicago lakefront must take into account both seasonal and long term fluctuations.

Seasonal fluctuations occur in Lake Michigan with July having the highest average water level and February having the lowest average level. This seasonal fluctuation usually poses no major design problems for harbor channels and basins. The average seasonal fluctuation is only 1.1 feet. Combined with long term fluxes, however, the effect can be considered, even within a short time period. In the seven months preceding February, 1977, Lake Michigan water levels dropped approximately 2.5 feet, and this trend is undoubtedly responsible for the problems now being experienced at Jackson Park Harbor.

The maximum and minimum record lake levels occurred within the 10 years time between 1964 and 1974. Because of the certainty that fluctuations will continue, only through the use of a suitable low base water level in calculating necessary channel depths will this problem be avoided.

C. Land Stabilization

The stabilization of the land-water interface within a harbor basin or boating area generally takes one of two forms; a vertical bulkhead wall or a sloped revetment. The most appropriate form will depend on wave and current patterns; soil and water table characteristics, the functions and activities associated with the perimeter, and cost considerations. In many instances, the perimeter will be a combination of sloping and vertical banks with a variety of armoring techniques.

Revetments

These consist of armored sloping banks, normally with a layer of heavy stone or concrete over finer gravel. The slope of the bank generally does not exceed 1/2. The size of the stone armor is a function of wave action - heavier stone being used in areas of increased wave action. The armor should extend at least 2 feet above extreme high water and 3 feet below extreme low water level. *A layer of filter cloth underneath the stone will guard against the loss

*Extreme high water and extreme low water should be defined as the lowest and highest recorded lake levels between 1900-1977. Thus, -1.4 feet and +4.2 feet (I.G.L.D.)

of fine material from behind the armor and the resultant cave-in of armor. This filter cloth is necessary for any sloped or vertical wall. Revetted slopes are in general much less costly than bulkhead walls.

Bulkheads

Vertical walls, constructed from a variety of materials, are used to stabilize the land-water edge. Bulkheads have some serious disadvantages when compared with revetments, the most important of which is cost. Also, since vertical walls will not dampen incident waves, the use of bulkheads in water areas of any significant wave action is likely to lead to further disruptive wave conditions. One of the major positive design aspects of bulkheads is that they allow the positioning of piers and walkways closer to shore, and if the vertical portion of the wall is carried to great enough depth, and wave/current conditions allow, the bulkhead itself can be used for dockage space.

- Concrete Walls: Are more economical than sheet piling if the area can be dewatered and concrete poured in-place, or if poured on land and then the area between wall and water is dredged out. Various types of wall (gravity-section, L-section, counterfort section) are used depending upon soil and substrate conditions.
- Sheet Pile Walls: Can be constructed of steel, timber or concrete. Pilings must be driven deep into substrate in order to resist outward thrust. Steel is probably best suited to Lake Michigan use because it is easiest to drive and has a fairly long life in fresh water.

In cases where a bulkhead wall will be used for berthing by boats, whether seasonally or only temporarily while the boater is making a shore excursion, there are additional

design considerations.

- First, the depth of the water adjacent to the bulkhead wall must accommodate the draft of the boats that will frequent the harbor including a provision for water level fluctuations.
- Second, the outer face of the bulkhead should be as free of protrusions as possible, so as to avoid damage to boats. Specifically, there should be no protruding pipes or other pieces of wood, iron, or concrete either above or below the water which could cause damage.
- Third, overhangs at the top of the bulkhead should be avoided when possible. There is a danger that such overhangs might entrap the gunwales of a boat. There are incidences along the Chicago lakefront where cement cap overhangs on top of steel sheet piling have caused severe damage to boats during rough weather or during a temporary drop in water level.
- Fourth, consideration should be given to the incorporation of a durable and effective fender onto the face of the bulkhead, although it may be difficult to place a fender system so as to insure protection to all boats in all conditions.

D. Channel Design

Whenever protected or sheltered waters have been established for recreational boating, there is also a need to design a watercourse by which boats can pass from the protected area to the open waters of Lake Michigan. It is particularly important that such channels be designed so as to afford a safe transition from the protected to often rough waters of the open lake.

Along the Chicago lakefront, due to prevailing winds and fetch, harbor and entrance channel protection is most necessary against waves from the northeast. Entrance channels therefore should be oriented toward the southeast or south wherever possible. In designing the entrance channel,

consideration should be given to "worst-weather" conditions; and the effect that incoming waves will have on boats entering the channel during this rough weather. The channel should be protected in such a way that the condition is not worsened by the reflection of waves and so that incoming boats do not have to turn broadside to oncoming waves while entering the channel. Outer harbor breakwaters or jetties can often serve as protection for the channel entrance.

Channel Width

The width of the entrance channel will depend foremost upon the size, type, and number of boats expected to use it. Extra width must be provided for sailboat tacking, and if the channel area is to serve as a temporary harbor of refuge during sudden storm conditions or boating emergencies, then even additional space should be considered. A minimum width of 100 feet of usable water space appears appropriate for Chicago lakefront channels, although it exceeds the common standard minimum. This is suggested because of the heavy boating traffic currently using the lakefront.

Depth

The minimum depth should be 3 feet below deepest draft of vessel. In harbor planning, the role of a specific harbor must be analyzed. For instance, although a certain harbor may not be designed to berth boats over a given length, it could serve as a harbor of refuge for big boats if the channel and basin will accommodate their draft. The largest sailaboats identified by the CRBS were approximately 50 feet,

which would draft approximately 72 inches (six feet) of water. This would require a channel depth of 9 feet. The potential for siltation within the channel and for water level fluctuation must be considered in a final decision as to channel depth.

E. Service Piers or Floats

Service piers, whether fixed or floating, function as platforms for fueling and pump-out services.

Size: Each service pier or float should be large enough to provide broadside moorage for two boats, or about 50 to 60 feet in length. One such facility should be provided for each 100 seasonal boats.

Location: The service pier should be located so that traffic through the berthing area to the service pier is kept to a minimum. This will generally require that it be located between the main berthing areas and the harbor entrance, since transient boaters will not have to enter berthing areas to receive service. If more than one service area is present in a harbor, the second facility may be located at the interior end of berthing area. Any fueling area should be set apart from berthing areas due to the fire danger.

The fueling pump and the pump-out mechanism should be located on the pier so that they could be used jointly on one boat or separately on two. The service pier or float should be distinctively painted to remind users that gasoline is present and to indicate the facility's purpose to approaching boaters.

Present law requires that the pump-out facility be connected to the City sewage treatment system. Since the cost of such connections is considerable, it will be essential to minimize the required length of connector lines whenever possible, and this consideration should be reflected in the

design and location of service piers.

F. Boat Berthage Design

Determining Berthage Types

In designing a boating facility, it is important to insure that the type or types of berthing space fit not only the physical characteristics of the facility site, but also meet the actual needs of the boating public.

The Chicago lakefront is an area of intensive recreational boating activity. However, the open-water conditions of Lake Michigan favor the use of large boats. Recent increases in recreational fish stocks have attracted a growing number of smaller boats, but their use is largely confined to sheltered waters or calm days. The Chicago Recreational Boating Survey (CRBS) indicates that only 11% of the small boats (0-15 feet) of the six-county region used Lake Michigan in 1978. In contrast, 40% of medium size boats (16-25 feet) and 79% of the region's large boats (26 + feet) used the lake.

The Chicago lakefront harbors currently have berthing space for approximately 4,000 boats at slips and moorings. The CRBS analysis indicates that this berthing space is predominantly used by larger boats.

The present pattern of lakefront berthing space rental is as follows:

	(0-15 ft.)	(16-25 ft.)	(26 ft. +)
Slip	1%	13%	52%
Wet Mooring	1%	6%	32%
Dry Morring	4%	9%	3%
Did Not Rent	94%	72%	13%
	100%	100%	100%

However, the CRBS analysis also suggests that if additional sheltered water areas were created through lakefront expansion that there might also be considerable additional demand for ramps and berthages for small boats.

Therefore, it is difficult to specify at this time what mixture of berthing space types and capacities should be provided, without also considering a broad spectrum of City recreational needs and future lakefront expansion possibilities. Additional discussion of recreational boating demand is contained in the Lakefront Recreational Demand Study (1979).

Slips

The most popular form of berthing is that created by placing a number of finger piers adjacent to each other, leaving sufficient space between them for one or two boats. Slips can be directly connected to breakwaters or to the shore using walkways, or they can be free-floating, requiring a launch or dinghy to reach them from shore. They are perhaps the most convenient and stable form of berthage, but both construction costs and subsequent rental fees are very high.

Length

The minimum length of a finger pier should exceed the length of the boat which shall be berthed in it by a minimum of 2 feet. For boats 30 feet and over, the length of the finger pier should exceed boat length by 3 feet; boats 40 feet and over by 4 feet; boats 50 feet and over by 5 feet.

Width

The proper width of a single slip will depend upon slip

(fingerpier) length, and is determined by the following formula:

W_S = minimum width, single slip

L_S = length of finger pier

$$W_S = \frac{L_S}{3} + 4.5$$

For slips longer than 30 feet the width may be reduced 1 foot for each additional 10 feet of slip length beyond 30 feet. Double slips should be twice the width that would be required of a single slip of the same length.

Boat Length (Ft.)	Slip Length (Ft.)	Slip Width (Ft.)
20	22	11.83
25	27	13.50
30	33	15.50
35	38	17.25
40	44	18.25
45	49	19.83
50	55	20.83

Walkway Dimensions

- Finger floats should be at least 2.5 feet wide for slips less than 20 feet in length.
- Fingerfloats should be at least 3 feet wide for slips between 20 and 35 feet long.
- Fingerfloats should be at least 4 feet wide for slips in excess of 35 feet.
- Main walkways (walkways running perpendicular and providing access to fingerfloats) should be at least 6 feet wide.

- Marginal walkways (walkways which run parallel to shore or pier and which connect main walkways should be at least 8 feet wide.

Floating vs. Stationary Fingerpiers and Walkways

The Stationary walkway and fingerpier, built on top of piles which are driven into the basin subsoil is the traditional method of providing slip space. However, with technological advancements in concrete, plastics, fibreglass and other materials, floating systems have become widely used. In many cases, a floating system is the only method compatible with physical conditions.

Fixed Piers

Fixed piers, walkways, and fingerpiers are open to a wide range of construction methods and materials. Concrete, steel, and timber piles are all used, but certain materials are more suited to specific situations than others. Timber may be the preferred material for pilings in small craft harbors due to its flexibility. If bumped by a boat, a timber pile will cause less damage than will a concrete or steel pile.

Fixed piers will in most cases be less expensive than a floating system, but their use is limited to conditions where tidal and other water level fluctuations are limited to a range of 2 to 4 feet. Fixed piers are also less suitable in deep water situations where the use of long piles will drive up costs. A standard deck elevation for a fixed pier is 1 foot above extreme high water. As in the case of bulkhead walls, some form of fendering system is necessary to

prevent gunwales from catching under decking during rough water. Utility lines and water lines may positioned below the deck yet near the edge so that the lines are protected yet accessible for inspection and maintenance.

Fixed piers are currently used at several Chicago lakefront harbors, serving primarily large motor craft. Both timber and aluminum construction is used. The water level fluctuations that do occur in Lake Michigan are not of such magnitude that the use of fixed structures is precluded. The seasonal fluctuations that occur in no way affect the use of piers since boats are only in the water for the five months of the year when water levels are at a maximum. The average water level during these months is approximately 1.75 feet above chart datum. and the average seasonal variation in water level is only one foot. The long range fluctuations may impact to a greater degree the use of fixed piers in Chicago harbors. The maximum and minimum levels recorded during the five boating months vary by over 5 feet. This degree of variation, if it occurred on a daily basis as with tides, would severely limit the use of fixed structures. However, since this fluctuation is long term in nature and can be anticipated through lake level forecasting, the utilization of fixed piers can be maintained through all but possibly the most extreme water levels through proper operation and management decisions. Low water levels may prevent deep draft sailboats from using slip space, for example, and redistribution of slips and mooring space may be necessary. Periods of high water will not cause major problems

if anticipated. Currently, Chicago lakefront harbor fixed slips are set at approximately 3.5 feet above chart datum. Set at this level, slips are functional even at highest water levels, although their use by small boats may not always be feasible.

Floating Piers

A number of technological and design advances have increased the reliability and reduced the cost of floating berthing systems. They offer the advantage of providing a constant level between the boat and walkways regardless of Lake levels. They are also less costly in deep water conditions and can be relocated relatively easily. A major limitation is that they can only accommodate boats of up to approximately 30 feet in length. Chicago lakefront harbors now employ two types of floating structures; fingerfloats, which attach to a shore bulkhead, and stardocks, a set of fingerpiers which radiate out from a united point. Stardocks may either be connected to shore by a ramp or are anchored off-shore and must be reached by dinghy.

Load Bearing Capacity

Floating piers must maintain an acceptable level of freeboard when under live load stress. An accepted minimum live load capacity for floating piers is 20 pounds per square foot. This bearing capacity must be applied over the full length of a finger pier, recognizing that people generally board open-cabin boats at the stern. Freeboard, the distance above water that the deck of a floating pier rides,

should be between 15-20 inches with no live load; with minimum (20 lbs) live load, freeboard should be a minimum of 8 inches.

Wind Loads

With a boat tied to a floating pier, the wind can exert a substantial lateral force which must be countered by structural framing within the pier itself and generally by either anchor piles or lines.

Durability in Ice

Stardocks are usually left in place during the winter, on the premise that because they are not fixed that ice damage will be minimal. This saves a considerable amount of removal and replacement time and money, but may require a certain amount of additional annual maintenance to deal with whatever ice damage is experienced. Additional information is needed to determine the cost-effectiveness of the floating versus fixed design in terms of ice conditions.

Density of Slips

The number of slips that may be accommodated by a given water area will depend largely upon the size of the boats to be berthed. Boating literature makes estimates of slip density, including necessary fairway areas, of from 25 to 65 slips per acre. Using the preceding specifications for single slips, an estimated 48 boats per acre averaging 20 feet in length can be accommodated and 20 boats per acre averaging 40 feet in length can be accommodated. The number of slips may be increased marginally through the use of double slips. For 20 foot boats, an additional 4 boats

could be accommodated, and for 40 foot boats an additional 2-3 boats might be accommodated through the use of double slips. If star docks are used 42 boats per acre averaging 20 feet in length and 35 boats per acre averaging 28 feet in length can be accommodated.

Moorings

A mooring is simply a free-swinging can or float anchored to the bottom, to which a boat may be secured. The weight or type of anchor to be used will depend upon the size of boat (due to wind loading) and the type of bottom soil. Soft mucky soil will afford a better purchase and hold the anchor down by suction, allowing the use of less weight than in sandy soil where relatively more weight will be needed.

Because of the nature of moorings, boats berthed there can withstand somewhat higher wave heights than those at slips; and thus the moorings can be located in a less protected water area. Because boats using this berthing system may be subjected to greater rolling and movement, they appear to be more appropriate for large boats, especially sailboats having keels and thus greater stability. Sailboats currently comprise 77% of those boats using moorings in Chicago area harbors.

Cost

Moorings are as much as five times less expensive than slips. While it may cost as little as $600 to provide a mooring for a 30 foot boat, it may cost more than $2,500

to provide a double slip space for the same boat, without considering the cost of services often associated with slips such as electricity or water. Some additional ancillary mooring expense is involved in the need to provide dinghy storage areas or a water taxi service, yet the general cost differences remain quite substantial.

Density

If one of the major advantages of moorings is their relatively low cost, one of the major disadvantages is that they require six times more water area than slips. Within the context of the Chicago lakefront, where all water berthing space must be artificially constructed at considerable expense, the number of boats which a particular berthing strategy can accommodate within a limited protected water area is of major concern. Chicago lakefront harbor mooring areas currently accommodate from 8 to 10 boats per acre of surface water. Respondents to the CRBS survey indicated that this density may be too high, since they have experienced rudder and line entanglement and a general sense of crowding. When compared to the 25 to 65 boats per acre achieveable through the use of slips, the magnitude of variance becomes apparent.

Recommendation

Further cost-effectiveness evaluations should be undertaken to refine berthing strategies for future lakefront recreational boating development. The relative costs and performance characteristics of the two berthing techniques need to be more carefully measured and weighed against the

per acre costs of providing protected berthing waters within the lakefront environment. With such information, it will be easier to obtain precise calculations of the costs of alternative design strategies.

4. Dry Storage

Smaller boats are often stored on trailers or cradles in special storage areas. These boats are generally put into the water by crane or forklift each time the owner wishes to use it, and then removed from the water at the end of the outing. The majority of small boats using this system on the Chicago lakefront are sailboats, reflecting the boating conditions of the open waters of Lake Michigan. This 'dry sailing' storage system allows the storage of a large number of boats in a small space, and relatively inexpensive lifting equipment is needed, given the light weight of the boats.

Dry Stack Storage

A specialized type of dry storage is provided by stacking boats vertically on metal racks. Each boat sits in a cubicle and is transported from the rack to the water, generally by specialized forklift trucks. Depending on boat sizes, the racks can extend up to four boats in height.

A distinction must be made between winter storage and the dry-stack storage referred to here, which allows daily in and out movements to the water. This latter type of storage is most suitable for smaller motor craft (less than 24 feet). These boats, because of their shallow draft and more or less flat bottom can easily be transported in and out of racks by

forklift or hoist. Although keeled boats can be transported by forklift, the necessary day to day dismantling of masts makes vertical stacking a less attractive means of storage for sailboats. This method of boat storage will likely become more and more widespread with the increasing sophistication of boat handling equipment and as land costs keep escalating; marina owners benefit from the more efficient use of land area and boat owners benefit, especially in colder climates, because separate winter storage arrangements are not required.

Appearance

One of the most important considerations in the design of any facility to be located within the lakefront is to insure that it be consistent with the present quality and character of the lakefront, as required by the Lakefront Ordinance and the Lakefront Plan. The architectural possibilities of dry stack structures are rather limited. Racks may be open, covered with a roof, or totally enclosed in a warehouse structure. Such facilities will usually require screening, either with land forms or vegetation, and may only be appropriate in certain lakefront areas where the visual impact will not be critical. Two areas that might be appropriate within the present lakefront system are the Navy-Dime Pier area and the old Calumet Yacht Club Harbor.

Density

Dry stack storage is a very space-efficient method for the year-round berthing of smaller boats, especially motor-

boats. Densities as high as 96 boats per quarter acre have been achieved.

Demand

Information obtained from the 1978 boater survey (CRBS) suggests that there is a substantial market for this type of storage. There are more than 40,000 boats in the 16-25 foot length class. The majority of those boats are not presently using Lake Michigan, but the survey indicates a strong interest in additional lakefront development to accommodate their interests, especially if further sheltered-water boating areas were established. Fifty-Six percent of respondents to the survey owning boats of from 16 to 25 feet indicated that dry storage was either preferable or acceptable, and this suggests the need for additional market or demand analysis to see to what degree this is a viable or necessary berthing strategy for future lakefront development.

Fairways

Fairways are an important element in considering berthage design. There must be unobstructed water passages within and adjacent to berthage areas to allow passage to channels and activity areas. The width of these passages should be:

a) 1.5 times the length of the longest slip if slips are parallel to the fairway; and

b) 1.7 times the length of the longest slip if slips are perpendicular to the fairway.

When establishing fairways for mooring areas, a much wider path will be needed, taking into account the full scope of swing of each boat on each mooring. In boating areas

where there are few boats, it is conceivable that the wide space between moorings might preclude the need for a formal fairway. Yet in the Chicago lakefront, there will almost always be slips landward of the moorings, at a rather high density of berthage, necessitating at least one formal internal fairway or channel through the mooring area. Since provisions for such fairways diminishes the number of slips or moorings that can be placed on an acre of water, there may be a temptation to dedicate as little space as possible to this purpose. But the boating survey indicated a general concern about crowding in existing harbors, and fairways are one of the major means of insuring boater safety within confines of protected water areas, and they should be adequately designed.

Berthing Layout

The primary objectives in planning the layout of various berth types to be included in a boating development are to minimize conflicts between boaters and to maximize the use of land and water space. Specific recommendations to achieve these objectives are as follows:

- Launching ramps and stacked storage facilities, if included as part of a larger harbor/marina development, should be located near the harbor entrance and away from slip areas to minimize traffic in fairways. This water area must be protected.
- Slips for small boats should be located within the inner harbor, with larger boats located closer to the harbor entrance. This affords greater protection to small boats, and allows fairways to be tapered in the inner-harbor.
- Moorings should be used in central harbor areas and nearer the harbor entrance.

- Fairways should skirt the bulkhead wherever slips do not use wall space.

In addition, attention should be given to how dinghys will be berthed, not only so that they are conveniently placed, but also so they do not disrupt slips or other boating facilities through clutter. Provision of a dry storage dinghy area placed near the mooring site can conserve both land and water space and avoid clutter.

G. Boat Handling Equipment

Most recreational boating areas require some type of boat handling equipment. The types of boat-handling equipment that are required will depend upon the number and size of boats to be berthed, whether or not dry storage (either summer or winter) will be provided at the site, and the extent of services that the marina will offer.

It is necessary to keep in mind the various factors which give rise to the need for boat handling.

- Launch and retrieval: In addition to boats which are kept on trailers throughout the boating season and thus usually launched at a ramp, boats may be stored in cradles or racks. In these latter cases, special equipment is usually required to launch and retrieve the boat for each boating trip.
- Maintenance, repair, emergency situations: Boats may require periodic removal from the water for maintenance or repair. Emergency situations arise for which boats must be removed from the water.
- Storage: In northern climates where ice is a problem, boats are generally pulled from the water and stored on land for the winter months.

1. Cranes

Cranes are capable of handling loads of 20 tons, or more,

but with the growing popularity of other boat handling techniques, cranes are increasingly used only for smaller boats. They are well-suited to the handling of small sailboats only for smaller boats. They are well-suited to the handling of small sailboats when of sufficient height to allow loading onto trailers or cradles. Boats being lifted by cranes are subject to movement by the wind so care must be taken to minimize the horizontal swaying or revolving that may occur. In areas where cranes will be used, it is also important to insure that there are no overhead lines or wires.

2. Hoists

Of growing popularity due to their versatility are mobile hoists which travel on pneumatic tires, capable of going over any paved or hard surface of reasonable grade. The hoist is designed to straddle a boat-well which consists of two piers or walls onto and off of which the hoist may be driven. Multiple slings are used to lift the boat out of the well. These lifts may be used for masted or unmasted boats of up to 100 tons. Due to their versatility, speed of movement, and economy of land and water space, these "Travelift" type hoists are appropriate for most service or repair facilities.

3. Forklifts

Forklift trucks have become popular for moving smaller, flat-hulled craft around the boat yard and are the most appropriate type of boat handling equipment for a dry stacking storage facility. If equipped with a negative-lift capability, forklifts can place a boat directly into the water, thus

negating the need for additional handling equipment.

Chicago lakefront harbors do not presently have extensive boat handling equipment. This reflects the limited scope of services that are offered at these public boating sites. Winter boat storage, maintenance and repair areas, and dry stack storage are offered almost exclusively by the private sector, and for the most part these establishments are located along the Chicago and Calumet Rivers. Lakefront boat handling equipment (at Montrose, Belmont, and Burnham) is mainly associated with dry storage areas for small sailboats. There is no capability for removing large boats from the water other than by trailering.

Recommendations

The 1972 Lakefront Plan proposes the provision of extensive sheltered water areas through the creation of land extensions and islands. The creation of sheltered water would increase the demand for dry storage areas, and consequently for boat handling equipment. In addition, the boating survey respondents indicated that emergency repair facilities are desired on the lakefront by Lake Michigan boaters.

- For dry storage, a crane should be provided for every 50 boats. A 2 to 2½ ton crane can accommodate boats up to 24 feet in length.
- For dry stack storage, a fork lift capable of lifting 5 tons would be able to handle boats up to 25 feet. It should also have a negative lift capacity of from 3 to 4 feet.
- For service or repair areas, a Travelift-type hoist would provide the most versatile single system.

H. Boat Launching Ramps

The Chicago six-county area has 48,000 boats in the 0-15 foot category, all or most of which are transportable by trailer or car-top. In addition, there are another 40,000 boats in the 16-25 foot category, of which a sizeable portion are trailered.

In addition to seven boat harbors, the Chicago lakefront presently contains 24 ramp areas which receive extensive use. If, as suggested by the intent of the Lakefront Plan, additional sheltered water areas and additional recreational fishing development were to take place, the demand for additional ramp capacity would probably significantly increase.

Width

A single lane ramp can accommodate approximately 50 launchings and retrievals per day of peak use. In areas of high demand such as the Chicago lakefront, each ramp should be at least two lanes wide. Each lane should be approximately 15 feet wide.

Length

To function properly a ramp should extend 2 feet above mean high water and 3 feet below mean low water. Assuming a 10-year fluctuation in the level of Lake Michigan of 5 feet, lakefront ramps should be of from 65 to 80 feet long, depending upon the specific slope.

Slope

A workable slope is from 12% to 15%. Larger boats of deeper draft and/or greater length will require a sharper

dropoff and thus a steeper slope.

Material

In choosing a material for boat ramps, factors to be considered include total cost, durability, and traction. Ramps can be constructed of reinforced concrete, either poured in place or pre-cast; asphalt concrete; or timber. As a rule, both asphalt and timber should be avoided, since they tend to be slippery and less durable. A poured-in-place concrete ramp is perhaps the most ideal, but it is very expensive to construct, and it requires de-watering of the construction site, with increased potentials for environmental disruption, as part of the construction process.

Pre-cast concrete "logs" connected by tie-rods can be used, but are more susceptible to ice damage. When a concrete surface is used, it should be finished with V-grooves for traction. If the grooves are placed at a 45 to 60 degree angle from the ramp axis, a natural cleansing action from waves can be achieved.

Armor

A rock apron at the base of the ramp or similiar engineering techniques will help to insure that a dangerous or annoying hole or drop-off does not form at the ramp base as a result of scour.

Bulkheads/breakwaters

The water surface within the ramp area must be relatively calm, and there must be minimal currents as boats are maneu-

vered on and off of partially submerged trailers. Bulkheads or breakwaters extending beyond the end of the ramp can provide a protected launch area, and also help to protect the submerged end of the ramp from being undercut or eroded by wave or current action. However, some type of fenders/ bumpers may be necessary to protect the boats which collide with the bulkheads.

Parking and Circulation

The flow of traffic is one of the major design problems associated with boat launching ramps. Access roads and parking spaces must be designed for car/trailer units. Roadways must therefore be wider and turnaround areas broader than normal. The layout should facilitate easy approach and back-up to the ramp.

An inadequately designed circulation system could significantly limit the capacity of the ramps, especially at Chicago lakefront sites where ramp facilities can be expected to receive heavy use. An additional design consideration is whether or not ramp parking facilities can be shared with other lakefront activities, or whether these must be reserved strictly for boating use. Whenever possible, recreational boating facilities should be designed for shared use with other lakefront activities. But care must also be taken that essential facilities necessary for the proper functioning of recreational boating are not seriously diminished or pre-empted by non-boaters.

- Each ramp lane should have from 35 to 40 parking spaces. Spaces should be at least 40' x 10'.

- "Pull-through" parking should be incorporated wherever possible. A small number of car-only spaces can be created at irregular, end-of-row areas.
- Planters or islands should be used in parking areas to diminish the visual impact and to direct and separate traffic flow. The grade of the parking area should be a minimum of 1% and a maximum of 5%.
- Drainage from the parking areas should be directed away from the water.
- Ramp traffic should be directed to form a single file line when traffic is allowed to approach from numerous directions, conflicts ensue as impatient boaters attempt to "cut in."
- Ramp traffic should be separated from other lakefront traffic.

Launching Fairways

Unobstructed water fairways should extend from the end of the ramp to the open water. They should be at least as wide as the ramps, and be at least 4 feet deep. Channels connecting ramp areas to Lake Michigan should be at least 4 feet deep also, and have a minimum width of 75 feet. Wave chop should be limited to 6" in fairways and 1'-1.5' in the approach channel.

Boarding Float

Ease and safety of launching can be improved through the provision of boarding floats adjacent to the launch area. It should have a minimum of 50 linear feet of docking space, and should have a minimum live load capacity of 20 pounds per foot. Freeboard of these floats should be of from 8" to 20" under any load condition.

Ancillary Ramp Services

In some instances, ramp areas may not be part of a larger

recreational boating complex, in which instance separate considerations must be given as to which ancillary services should be provided at the ramp site. It is important when designing ramp facilities to consider that ramp users may need or desire many of the same ancillary services provided to boat owners using slips or moorings. It is also important, in initially siting and designing a ramp facility, to seek out opportunities for combining ancillary facilities, so that a restroom might serve ramp users and some other activity group. If, however, such opportunities do not exist, it is important to provide the ramp area with at least a basic set of facilities, such as restrooms, trash receptacles, parking areas, and drinking water.

The Chicago Recreational Boating Survey report and the section of this report dealing with ancillary services should be consulted for additional information on the preferences of ramp owners for ancillary services.

I. Ancillary Services and Facilities

1. Determining Demand

Chicago lakefront harbors and ramps provide fewer ancillary services and facilities then are commonly found in "full-service" marinas. In order to more fully understand present patterns of boat usage, boater preferences, and attitudes towards existing lakefront boating facilities, the Department of Planning, Community and City Development, in cooperation with the Chicago Park District and the Illinois Coastal Zone Management program, conducted a recreational boater survey in

1978 (see Chicago Lakefront Recreational Boating Survey Report).

Respondents to the Survey indicated that they would like to see additional services along the lakefront. While ramp users expressed different priorities than mooring and slip users, there appears to be a common set of desired services and facilities.

	Rank	
Facility	CPD Berthers	CPD Ramps Used
Restrooms	1	1
Restaurants	3	3
Fish Supplies	10	6
Fish Cleaning Station	9	7
Winter Storage	7	9
Routine Maintenance	4	5
Emergency Repair	2	2
Lockers	8	10
Boat supplies	5½	4
Groceries	5½	8

In addition to facility needs, respondents also indicated that harbor crowding was a major concern, along with increasing problems of vandalism. Strong interest was expressed in improving the availability of restrooms and parking space and there is considerable interest in more berthing capacity.

Determining the type and level of services and facilities that will be provided is perhaps more a matter of policy than of design, involving a number of complex issues. Traditionally the Park District harbors have provided a relatively narrow range of services and relied upon the private sector to provide additional levels or types of services both at yacht clubs within the lakefront harbors and along the

Chicago and Calumet Rivers. The 1978 boater survey should not be taken as a final statement on boater needs and preferences, but appears to provide a clear indication that the majority of lakefront boaters are not fully satisfied with both the level and range of services available. In terms of design, this is a critical issue which will significantly influence basic design components such as the proportion of land area to water area; the actual configuration of land and water areas; and whether the desired combination of facilities can be accommodated within existing lakefront areas or whether additional landfill would be required. Since this basic decision about type and level of services/facilities has significant design implications, it follows that the decision process, discussed more fully in the Development Strategy report, should include representatives from the design staff who can provide preliminary indications of the implications of alternative facility mixes being contemplated.

Once a basic decision has been made as to which facilities and services to provide, there are certain concepts which should be considered in establishing detailed designs. One of the most important general design considerations is that of shared facilities. For each type of facility or service discussed in this section, an important design consideration is the degree to which that recreational boating facility or service can be shared by other lakefront activity groups. In some instances, it will be necessary to dedicate the service or facility exclusively or primarily for boaters, but

in most instances some degrees of sharing is both possible and desirable. When this is the case, the design of the facility will require additional criteria based upon the characteristics of the other activities which will be using the facility.

Restrooms and Showers

Respondents to the Survey ranked restrooms as the most important of ancillary recreational boating facilities, which suggests that perhaps restrooms should be included as a 'necessary' functional part of any lakefront boating area. In addition, many respondents indicated an interest in the inclusion of shower facilities, especially where slips and moorings are involved.

- Restrooms should be located as conveniently as possible to berth/launch areas. The distance to any berth or ramp should not exceed 1,000 feet.
- Restrooms should allow access and use by paraplegics.
- There should be one toilet per sex per 35-50 berths, or one toilet fixture per sex for each launching lanein the case of ramp areas.
- If showers are provided, there should be 1 shower stall per sex per 50 berths.
- Restrooms must meet all Chicago, State of Illinois, and Federal public health requirements.

Restaurants

Modern full-service marinas and many yacht clubs include a restaurant, either of the fast food or standard full-menu type. Because of the water setting, such restaurants are often able to attract a significant amount of business including non-boaters. Leasing revenues from such facilities

could be a significant source of income for the operational costs of the boating facility.

Respondents to the CBRS indicated that restaurants or fast food facilities ranked third in importance in a list of ten support facilities. Additional studies would be required to determine if a restaurant would be economically feasible and compatible with the policies of the Lakefront Plan and Lakefront Ordinance.

If a restaurant were to be included as part of a recreational boating complex, it would be important to locate it so that it did not interfere with or compete for space with boating activities. However, it would be important to provide a strong visual linkage with the boating facilities and activities, as an economically valuable amenity to the restaurant site.

Repair Service (emergency and routine)

Emergency repair capability may consist of little more than being able to get a boat to some land or dock point and get it out of the water. Once on land, sufficient repairs can be made to allow the boat to be transported to a full repair facility. The unpredictability of Lake Michigan and the phenomenal boating traffic that the Chicago area experiences make emergency repair service a rather important provision along the lakefront. This is reflected in the CRBS, in which respondents ranked emergency repair as the second most important ancillary facility.

Routine maintenance and repair are also important dimen-

sions of recreational boating, and the CRBS indicates that facilities which would allow this type of work are ranked as fourth in importance. However, such facilities are already provided commercially at other City locations, and the provision of space for such activity has traditionally not been considered as a necessary part of public boating facilities. If included, the repair area should be located on the site perimeter and should be screened through landscaping or vegetation. The area should have direct access both by land and water. The size of the enclosed repair area will be dependent upon the scope of services to be offered. Adequate, hard surfaced dry storage space should be located adjacent to the repair building.

While repair and service facilities should not be developed on a large scale, study should be given to the feasibility of the development of these facilities in certain areas where their visual and aesthetic impact would be minimal. Burnham Harbor appears to be the most appropriate existing facility at which these services could be offered on an expanded basis. An emergency and routine repair area may be compatible with a proposed boating facility development at Navy/Dime Pier. A service area and a dry storage stacking facility might be appropriate on the site of a proposed waterfront acquisition by the Chicago Park District just south of Calumet Park.

Boat Supplies

A boating supply store would provide the boater with

hardware supplies, and equipment that are not generally needed on a day to day basis. Although convenient if located at the harbor/marina, this is not essential. CRBS respondents ranked this service as fifth in importance. The feasibility of supplying such a service on a leasehold basis should be investigated.

Groceries

A small outlet for groceries and convenience foods is another leasehold possibility. It is presumed that such items as beer, liquor, and ice might be the most popular with boaters and do most to make such a concession profitable. At the present time, however, the use of alcoholic beverages is not permitted in Chicago lakefront parks. It is reasonable to assume that this state law will not be amended to exempt Chicago's lakefront. Without the ability to sell beer or liquor, grocery stores may not be economically feasible. In addition, the limited duration of the boating season constrains the feasibility.

Winter Storage

Because of winter conditions in the Chicago area, recreational boats cannot remain in the water year-round unless expensive de-icing equipment is installed. Assuming that within an urban environment most boatowners with large boats cannot store their boats at their home, on-land areas must be reserved for winter storage. In the Chicago area, most winter storage is provided by private boat yards, and the provision of such facilities within the lakefront was

not considered to be of high priority by respondents to the CRBS.

If winter storage areas were to be provided, they should be paved or have a hard surface, and may require fencing as a security measure. Car parking areas are often utilized at marinas for winter storage. However, it is not clear that such use of lakefront parking areas would either be in keeping with the policies of the Lakefront Plan or economically feasible, if security fencing is required.

Fishing Supplies and Services

The provision of fishing supplies might represent a viable leaseholding opportunity. Often this could be combined within a general store or boating supply store, and would not require a separate facility.

Fish cleaning stations may be appropriate facilities, not only for boaters but for fishermen using breakwaters or piers. Special care would be needed to ensure that safe and sanitary conditions existed, and both running water and a waste collection system would be required. Special attention should be given to the location of such facilities to prevent odors from disrupting other lakefront activities.

Charter fishing provides the opportunity for those who don't own a boat to get out on a lake and fish. This item was not included in the CRBS since obviously the greatest use of charter boat fishing would be by non-boatowners. This has proven to be a viable enterprise on Lake Michigan waters and potential for running this service from Chicago

lakefront harbors may exist. However, the feasibility of providing this on a concession basis should be investigated prior to any decision.

Storage Lockers

A very common provision at marinas is gear storage lockers. Small ones may be located adjacent to each slip, or larger ones for clothes, large tools, etc., can be grouped onshore. If a shower-restroom building is provided, then lockers would be appropriate outside or inside it.

The CRBS indicated that boaters do not receive storage lockers as a very necessary harbor/marina item. Lockers ranked last of the ten items listed.

Other Facilities

Other support facilities and services which were not included in the CRBS may be considered for inclusion in a harbor/marina facility. Only a few will be mentioned here.

A clubhouse is often part of a marina development. In addition to having such necessary services as restrooms, it can also house the harbor-master's office, a restaurant, and space for other social activities. A clubhouse could be fitted to accommodate any range of services, and the size, shape and design must be gauged by the anticipated role. One source recommended that a clubhouse within a municipal marina provide between 10 and 30 square feet per berth.

Lodging may be provided at marinas for the convenience of both those who berth in the marina for the season and for transient boaters who visit the marina. Hotel-motel

facilities should not depend exclusively on boaters for revenue generation, but should also attempt to attract patrons from the general public to ensure economic viability.

Allied sports and recreation facilities may be included to help attract a wider range of patrons. A careful analysis of compatible active and passive types of recreation should be conducted. In general, it will be necessary to avoid land-extensive types of recreation.

Chicago lakefront harbors are directly adjacent to a wide variety of intensive lakefront recreational opportunities. Care must be taken in the development of new boating facilities to place next to the harbor only those activities which are most compatible with the harbor development. These might include picnic areas, biking and jogging paths, or fishing piers.

J. Landscaping

An aesthetically pleasing landscape can do much to enhance a recreational boating area. This is especially true for Chicago lakefront harbors, where many casual visitors come just to enjoy the setting, rather than to use a boat. Therefore, landscaping should receive due consideration from the outset of the facility planning process.

Landscaping involves a variety of functions which combine considerations of aesthetics with more technical factors such as drainage and run off, maintenance requirements, circulation, and safety. Specific landscape functions may include: 1) The fillings or contouring of the site, possibly

through the use of dredge spoil; 2) Placement and conceptual design of buildings, roads, walkways, parking lots, other facilities; 3) Addition or removal of plantings and ground cover.

Several policies embodied in the Lake Michigan and Chicago Lakefront Protection Ordinance estbalish guidelines for the overall design and landscaping of future recreational boating facilities. These policies, along with the implications of each on marina landscape design, are as follows:

POLICY #2: MAINTAIN AND ENHANCE THE PREDOMINANTLY LANDSCAPED, SPACIOUS, AND CONTINUOUS CHARACTER OF THE LAKESHORE PARKS.

- The informal and open quality of most of the lakeshore park landscape should be maintained.
- Incorporate into development continuous green areas for walking, jogging, bicycling trails.

POLICY #3: CONTINUE TO IMPROVE THE WATER QUALITY AND ECOLOGICAL BALANCE OF LAKE MICHIGAN.

- All landfill and dredging activities must be in accord with pollution controls.
- Rain water runoff must be diverted to treatment systems.
- Maintenance procedures and operations should not inadvertently contribute to water pollution.

POLICY #6: INCREASE THE DIVERSITY OF RECREATIONAL OPPORTUNITIES WHILE EMPHASIZING LAKE-ORIENTED LEISURE TIME ACTIVITIES.

- It should be recognized that a boat harbor is a conducive backdrop to many non-boating recreational activities. Where space permits, other recreational developments that are compatible with the marina should be included (e.g., fishing)

- Keep as much of the marina facility open to public use as possible.
- Grounds and facilities should be designed with the special needs of handicapped persons in mind.

POLICY #8: INCREASE PERSONAL SAFETY.

- Incorporate innovative environmental design approaches to discourage acts of vandalism or theft against boats, as well as increase the safety of the parks for the general public.
- Keep separate the various means of circulation; pedestrian, bicycle, vehicle.

POLICY #13: ENSURE THAT ALL PORT, WATER SUPPLY, AND PUBLIC FACILITIES ARE DESIGNED TO ENHANCE THE LAKEFRONT CHARACTER.

- An acute shortage of public boating facilities exists along the Chicago lakefront, but additional lakefront facilities should not be developed solely to increase boating opportunities. Facilities must enhance rather than detract from the beauty of the entire lakefront.

Additional Specific Design Recommendations

- Maximize public areas for viewing lake and harbor by:
  1) discouraging placement of buildings parallel to shoreline.
  2) use of balconies on lakeward side of public buildings.
  3) maintain for public use as much of bulkhead and/or main walkways as possible.
- Screen with vegetation large, bulky buildings and other unslightly areas such as repair yards or parking areas.
- Enahance the bulkhead (interface) through use of walkways, railings, plantings, benches, or other furniture.
- Plan for a low maintenance budget over most of grounds - e.g., no exotic plantings or gardens.
- Consider visual linkages, and long range views, from both land and water.

- Use ramps instead of stairs wherever possible, especially along bulkheads.
- Avoid creating monotony in large parking areas through the use of islands and planters.
- Use symbolic barriers to help control the activities which take place in the immediate boating facility confines.

K. Security Planning

A major goal of any recreational boating facility should be to provide a secure and protected place for boatowners to keep their boats. Although most recreational boat facilities do adequately protect boats from the ravages of nature, the problem of theft or vandalism is one of the most serious problems faced by marina managements. Through discussion with appropriate agencies and through the boater survey returns, it has become apparent that security is a substantial problem at Chicago lakefront harbors.

There are several aspects to securing a boating facility. The following recommendations should be considered in the planning of future recreational boating facilities along the Chicago lakefront.

Use of barriers (real and symbolic)

In public harbors, it is desirable to leave open to public use as much of the development as possible. However, it is also desirable to promote proper behavior of those who do visit the facility.

Real barriers, such as fences, should be used to secure only when total physical exclusion is necessary. Access to slip space and dinghy storage space should be limited to

boatowners and their guests. This can be done by:

- Separating the slip area from public area through the use of fencing, water areas, elevation differences, or some combination of these devices. Fencing can be enhanced through the use of hedging.
- Slip areas should then be made accessible through only one or two access points, which can be regulated by locked gate or attendant.

Symbolic barriers affect the perception of the area of those entering an area. Symbolic barriers include shrubbery, low fences, changes in ground level, and lighting standards. These serve to inform people that they are passing from a public park area, where a full range of activities is permissible, to an area more restricted in the types of activity that should take place there.

Enhance Visibility

The facility layout should avoid dark secluded areas. Berthing area walkways should be highly visible to harbormaster headquarters or to a night watchman.

- Lighting should be adequate at activity centers (service piers, repair areas), and along both main and marginal walkways.
- Nightwatchmen may be employed where necessary.
- Hedges and fencing should not limit visibility into harbor or berthing areas.

Coordination with Local Police Agencies

- Working with local police authorities, a facility-wide security plan should be established, including fire precautions;
- Boatowners should be encouraged to employ electronic alarm devices.

Fire Protection

Fire or explosion aboard boats and the ever-present fire

danger inherent in fueling operations make fire protection a very important consideration in marina planning. Inadequate or inefficient systems result if fire protection is not considered from the outset of the facility planning process. The following recommendations have been compiled primarily through reports by the National Fire Protection Association on marine fire safety.

General

- A fire protection plan should be developed during the facility planning stage.
- Fire protection systems within buildings must conform to chapter 39 of the Municipal Code of Chicago.
- Accessibility of area by fire equipment should be maintained: All land entries and passageways should be kept free of obstruction; the harbor should be designed to permit entrance by fire boats.
- Alarm boxes on site should be linked with the Chicago Fire Department so that fire officials are immediately notified of fire.
- All boats using the harbor/marina should conform to the "Fire Protection Standards for Motor Craft", prepared by the National Fire Protection Association.

Berthing Areas

- Fire extinguishers are required on any boat which is either berthed at a slip or which is equipped with a gasoline or diesel engine.
- Water lines at slips should be permanently installed and accessible to all ships.
- Fire extinguishers (ABC-Type) should be furnished on all main walkways; each boat should be not more than 75 feet from a fire extinguisher. These should be centrally-located, well-marked, and easily accessible.
- Mobile devices which can pump water directly from Lake Michigan should be located at the harbor-master's office. Staff should be fully

trained in their use.

- The layout of the boating facility should be such as to permit fire-fighting equipment to be located where hoselines may be extended to the full length of piers or floats.
- Special precautions should be made for dry storage and winter storage areas as outlined in Section 3-3 NFPA No. 303.

Fueling Stations

- Fueling stations should be located as far from berthing areas as possible, preferably near the harbor entrance. If located on a pier, fueling stations should be at the other end of pier?
- Accessible and well-marked equipment for fighting flammable liquid fires should be located at fueling areas.
- Techniques for the containment of spilled fuel should be readily available. Possible methods include:
    1) Log and canvas boom around bunkering areas.
    2) Fire-resistant curtain walls around fueling piers.
- Fuel storage tanks should be placed underground and must conform to Ch. 129.1, Sect. 22 of Municipal Code of Chicago
- A copper grounding bar system should be deployed at all fueling areas to eliminate danger of fire due to static electricity. The bottom end should be driven at least 10"into subsoil. The upper end should be fitted with flexible clamps. When a boat pulls up for fueling, flexible granding clamps are attached to some part of the engine or fuel tank prior to start of fueling operation, thus securely grounding the boat.
- Operations of fueling station must conform to all applicable sections of Chapter 127 and 129.1 of Municipal Code of Chicago.
- Layout should permit access to fuel storage tanks by tank barges (if needed) without requiring entrance into berthing areas.

L. Parking, Roadway Requirements

Parking

The recommended ratio of car parking spaces to boat berths cited in design literature covers a range from less than 1 space per berth to 2½ car spaces per berth in a private or municipal marina. The higher parking requirements assume that boaters will have guests arriving in different cars. In an urban situation such as Chicago, it is the recommendation of this study that for boats under 30 feet in length, one parking space per berth is required; for boats 30 feet and greater 1.5 parking spaces per berth is required. For Chicago lakefront harbors, where recreational boating is surrounded by other recreational opportunities, these parking spaces should be above and beyond the spaces supplied for general park users. If possible, access to specific harbor parking areas should be controlled and limited to boat owners and guests.

Car and trailer parking associated with launch ramps be treated more as a function of the number of launch lanes available. Parking should be supplied for 30 car and trailer rigs per launch lane.

An acre of land should accommodate 145 car spaces, with room to spare for plantings to avoid monotony. Approximately 60 car/trailer spaces can be fit on an acre. Dimensions of spaces should be as follows:

Car only	10' x 20'	angle or perpendicular parking acceptable.
Car/Trailer	10' x 40'	angle (45-60') parking with drive-thru capability.

Roadways

The roadways within a recreational boating facility must be designed to accommodate diverse vehicular traffic. Regular on-site traffic will include passenger cars, cars with boat trailers, trucks and buses, and quite possibly, semi-trailer combinations. All roads need not be designed to accommodate all traffic, but an analysis of traffic use is necessary to assure that each type of vehicle needing access can be accommodated.

Main entrance corridors must be designed to accommodate all expected vehicular traffic. Single lanes each way should be adequate for most situations, where recreational boaters are the only users of the roadway. If substantial non-boating traffic will also be using the corridor, then double lanes may be required. Minimum width for a two-lane roadway should be 22 feet, with a turning radius of not less than 45 feet.

Launch Ramp Corridors must be designed for car-trailer rigs. Roadways should be 20 feet wide with turning radius of not less than 40 feet. Corridors adjacent to rows of angled, pull-through parking should be at least 18 feet wide.

Emergency Vehicles

As part of the facility security plan, roadways should be designed so as to allow emergency vehicles and equipment to reach all parts of the facility.

CHAPTER III

THE DESIGN PROCESS

This report represents one portion of an on-going effort by the City of Chicago, acting through its Department of Planning, City, and Community Development (DPCCD) to support and improve lakefront planning and development. This report, which will be expanded over time, is intended primarily as a source book to assist in the development of future lakefront recreational boating facilities. It is intended to supplement a variety of other informational materials which the Department has or is now developing and should be used in association with those materials.

The design process for lakefront boating facilities involves the integration of the concepts and principles which have been discussed in this report with broader environmental, economic, engineering, regulatory, and policy concerns. This process is not solely a technical one.

In order to provide some indication of how the information in this report is conceptually linked with other information, and how design fits into the broader lakefront planning process, a simplified design process, adapted from the approach of Donald Adie (Marina; 150-155) is discussed below.

Recreational Boating Design Process

A. Determine principal elements of the proposed boating complex, in broad outline.

The Lakefront Plan and Lakefront Ordinance, as well as the Chicago Recreational Boating Survey Report, provide

some initial guidance as to what might be appropriately included. A separate report on recreational boating prepared by the Department provides additional discussion of how a preliminary project concept might be formulated (Strategies for Recreational Boating Development on the Chicago Lake-Front.) At this point in the design process the following types of information should be available.

- The approximate number, size(s) and type(s) of recreational boats that are to be accommodated.
- An approximation of the amount and types of berthing and/or launching facilities to be provided (slips, moorings, stardocks, dry stack storage, ramps).
- The level and type of ancillary services to be included.
- Whether space for berthing and ancillary facilities is to be obtained through infilling at existing harbors or lakefront sites, or whether a landfill project will be required.
- The approximate location of the proposed project.

B. Identify site characteristics, lakefront setting, and environmental factors.

"Design" is concerned with establishing a workable "fit" among the various functional components of a facility, and also establishing a fit between the facility and its surroundings. Thus, it is essential to collect and evaluate a detailed profile of the project area. This same information will be required to obtain permits, such as a U.S. Army Corps of Engineers permit, and so the entire project team should establish an information gathering agenda, including the needs and interests of the design team. The Chicago Lake front Design Workshop report, the Environmental Information Directory, Geological Investigation of the Bed of Lake Michigan,

and the Environmental Analysis Handbook can provide some of the necessary information. The specific information needed will depend both upon the location of the project site, and upon the nature of the project. Generally, the types of information required will include:

1. Physical Environment

- Geology
- atmosphere
- hydrology
- littoral regime
- aquatic and terrestinal ecosystems

2. Social Environment

- demographic characteristics of project area
- patterns of activity (land and water)
- recreational policies, plans, and facilities

3. Cultural Resources

- historic preservation values
- aesthetic form and values

4. Urban Infrastructure

- utility system locations
- transportation system/ circulation patterns
- City lakefront policies

C. Establish user requirements

The Chicago Recreational Boating Survey Report suggests that there may be certain problems with some elements of present lakefront boating facilities. Careful analysis of the Survey findings should be combined with discussion with boaters and Chicago Park District personnel. It is important not to assume what user needs and preferences are, but

instead verify them in detail.

D. Identify design constraints resulting from regulations

The lakeshore and the waters of Lake Michigan are the subject of numerous local, state, and federal rules, regulations, standards and requirements. These imply or explicity require certain types of information to be submitted, certain procedures to be followed, and certain actions or impacts which are prohibited. These include The Lakefront Plan, the Lake Michigan and Chicago Lakefront Protection Ordinance, air quality and water quality regulations, building permits, public health codes, and environmental assessment requirements. The Environmental Impact Handbook provides additional information on some of these possible constraints to design. In addition, the Department will prepare a Regulation Handbook which will identify all pertinent regulations and the standards, procedures and/or information requirements implicitly or explicity associated with each regulation.

E. Develop preliminary design alternatives

Preliminary design approaches to the various functional elements of the proposed recreational boating facility should be prepared. At this stage, there should be a clear indication of how each element will relate to the overall complex, and in addition it should indicate:

- how major site conditions are accounted for.
- how the facilities will relate to existing lakefront recreational facilities and patterns.
- what if any environmental impacts would occur.
- how specific user needs or interests are met.
- how major regulatory constraints are met.
- general cost and time estimates.

F. Obtain preliminary design approval

All members of the project team should approve the design at this time, and some adjustments will probably be required. It will depend upon the size, characteristics, and location of the project as to which additional groups should supply input at this point. It may be desirable to obtain public input, comment and advice from permitting or regulatory agencies, or specific reactions from recreational boaters.

G. Develop preliminary site plan

Based upon the approved design alternative, user requirements and design concepts and principles should be used to prepare a preliminary site plan. This would show in detail:

- how functional areas of the boating complex are linked.
- how access will be provided for deliveries, emergency vehicles, refuse collection, launching and haul-out of largest craft.
- how municipal utilities will be linked to site.
- how existing water use patterns will fit into project.
- how various component facilities will fit into existing lakeshore park.
- drainage
- waterline (edge treatment)
- berthages
- security features
- lighting

H. Obtain review of site plan

Input at this stage of the design process is of particular importance. It is at this point that agencies and individuals can begin to fully understand how the project will work and how it will appear. Efforts should be made to obtain comment and review from:

- o Coast Guard
- o Corps of Engineers
- o State Agencies
- o City Agencies
- o Boaters
- o Park users
- o General Public

I. Develop final schematic design

On the basis of comment obtained during the review process, make any necessary changes in the general site plan and then prepare detailed schematic drawings that will allow permits to be obtained and construction to be undertaken. At this stage the design process the details of various component facilities need to receive particular attention, especially with reference to maintenance, initial construction costs, safety, and visual quality. City building codes and federal regulations administered by the U.S. Corps of Engineers, as well as State of Illinois standards, once again will be of great importance, as they may affect not only the overall project concept and site plan, but the detailed aspects of individual elements.

If successful, the design process should result in recreational boating facilities which:

- comply with all City, State, and Federal regulations
- provide safe and convenient recreational boating opportunities
- enhance and blend with Lake Michigan and Chicago lakefront activities
- minimize costs and maintenance requirements, maximize durability and usability

As the City changes, and as necessary regulatory programs expand and become more exacting, the design process for urban waterfront recreational boating facilities will

become more complex, more challenging. It is the intent and hope of the Department that by continuing to develop a strong informational base as well as planning/design concepts and strategies, that these future complexities can be favorably resolved.

REFERENCES

Adee, Bruce H., Constructing Floating Tire Breakwaters, University of Rhode Island, 1977.

Adie, Donald W., Marinas, Nichols Publishing Company, 1977.

Bureau of Forestry, Parks, and Beautification, Manual of Tree Planting Standards, Chicago, (undated).

Carthage Mills, Filter Handbook, Cincinnati, undated.

Chaney, Charles A., Marinas, National Association of Engine and Boat Manufacturers, 1961.

Chicago District, Corps of Engineers, Lake Michigan Regional Boating Survey and Analysis, 1974.

Chicago District, Corps of Engineers, Shore Stability and Beach and Bluff Protection Methods for the Illinois Shore of Lake Michigan, Illinois Coastal Zone Management Program, 1976.

Chmura and Ross, The Environmental Impacts of Marinas and their Boats., Marine Advisory Service, University of Rhode Island, 1978.

Christiansen, Monty L., Park Planning Handbook, John Wiley and Sons, 1977.

City of Chicago, Lake Michigan and Chicago Lakefront Protection Ordinance, 1973.

City of Chicago, The Lakefront Plan of Chicago, 1972.

City of Chicago, Department of Development and Planning, (see listing of Chicago lakefront publications in Appendix A).

Coastal Engineering Research Center, Shore Protection Planning and Design, 1966.

Crompton, John L., and Ditton, Robert B., A Feasibility, Management and Economic Study of Marinas on the Texas Gulf Coast, Texas A&M Sea Grant, 1975.

Department of Navigation and Ocean Development, Berthing Guidelines, State of California, 1975.

Department of Navigation and Ocean Development, Launching Facility Guidelines, 1975.

Dunham, James W., and Finn, Arnold A. Small Craft Harbors: Design, Construction and Operation, U.S. Army Corps of Engineers Coastal Engineering Research Center, 1974.

Frankenstein, Guenther E., Editor, Proceedings of the Third International Symposium on Ice Problems, International Association of Hydraulic Research, 1975.

Han, Chen, Economic Feasibility of a Proposed Marina at Benton Harbor, St. Joseph, Michigan. PhD dissertation, Michigan State University, 1975.

Jerome, Jerry. Dry Stack Marinas, Dry Stack Marinas, Inc., Miami (undated).

Moffatt and Nichol. Safewater Harbor Feasibility Study (Summary Report), 1978.

Ross, Neil W., Constructing Floating Tire Breakwaters, University of Rhode Island, 1977.

Roy Mann Associates, Recreational Boating on the Tidal Waters of Maryland, Maryland Department of Natural Resources, 1976.

Roy Mann Associates, Shoreline Appearance and Design, New England River Basin Commission, 1975.

Somersan, Ayse. Economic Impact and Needs of Wisconsin's Great Lakes Boaters, Wisconsin Coastal Management Program, 1976.

Sitt, R.L. Wave-Maze Floating Breakwater, 1967.

U.S. Army Corps of Engineers, Hydraulic Characteristics of Mobile Breakwaters Composed of Tires or Spheres.

Vollmer Associates. Parking for Recreation, American Institute of Park Executives, 1965.

Wortley, C., Allen. Ice Engineering Guide for Design and Construction of Small Craft Harbors, University of Wisconsin Sea Grant College Program, 1978.

Young, Mary E., Editor, Recreational Boating Bibliography, NTIS/PS-78/0072.

APPENDICES

Appendix A: Chicago Lakefront Reports

This is a list of reports pertaining directly to the Chicago Lakefront, most of which have been prepared by or for the Department of Planning, City, and Community Development as part of its lakefront planning effort. It is included here as a supplement to the list of references.

Appendix B: Lakefront Plan of Chicago Basic Policy Statements

This appendix lists the fourteen basic policies governing the lakefront of Chicago. The foremost objective of the design process must be to insure that future recreational boating facilities comply with these policy objectives, and the provisions of the Lake Michigan and Chicago Lakefront Protection Ordinance.

Appendix C: Taxonomy of Environmental Concerns

This appendix contains a list of environmental concerns which will or may significantly influence the design of recreational boating facilities. It also represents the type of information that will be required in various state and federal permits.

Appendix D: Review Guidelines for Harbors

In 1978, the Department of Planning, City and Community Development prepared a series of guidelines for the evaluation of proposed lakefront projects to insure their compliance with Chicago's Lakefront Plan and Lakefront Protective Ordinance. The guidelines on harbors provide much information that is pertinent to the boating facilities design process.

Appendix E: Review Guidelines for Boat Launching Facilities

These boat launching facility review guidelines are drawn from the lakefront project review guidelines prepared by the Department of Planning, City and Community Development in 1978. They include much information of importance to the design of launch facilities along the lakeshore.

APPENDIX A

CHICAGO LAKEFRONT REPORTS

General

Borek, P., Davenport, R., and Unzicker, C., Environmental Information Directory, City of Chicago, Department of Development and Planning, 1977.

This document presents a selected listing of information and data collections for the southern basin of Lake Michigan organized into the topical areas of earth characteristics, coastal processes, hydrology, water quality, meteorology, air quality, biology of plants, biology of animals, and environmental health. It includes profile sheets on 223 separate collections.

City of Chicago, Department of Public Works, Geological Investigation of the Bed of Lake Michigan, 1979.

This report presents the findings of a geological study of Lake Michigan adjacent to an one-and-one-half mile reach of Chicago lakefront. Borings were taken at seven stations in Lake Michigan and the core samples were analyzed as to their engineering and geological properties.

Davenport, R., Editor, Lake Michigan Information Symposium Proceedings, City of Chicago, Department of Development and Planning, 1977.

This report is a compilation of the papers and associated formal discussions which focused on attempts to facilitate access to environmental information about the southern basin of Lake Michigan. It includes discussions about perceived needs of various interest groups and possible mechanisms to satisfy these needs.

Economic Utilization of the Lakefront

Booz-Allen & Hamilton, Inc., Port Development Stragegy for Iriquois Landing, City of Chicago, Department of Planning, City, and Community Development, 1979.

This report presents a recommended development scheme and strategy for a containerized cargo handling facility for the mouth of the Calumet River. It includes a discussion of likely cargos by type and volume, a schematic layout of facilities to handle the cargo, and a suggested program of improvements to make the site operational.

City of Chicago, Department of Planning, City, and Community Development, Chicago Lakefront Recreational Boating Survey Report, 1979.

This report presents the findings of a study to determine

the level and distribution of demand for additional lakefront recreational boating facilities (boat harbors and launching ramps) in Chicago. The findings are based on a analysis of a questionnaire administered to a sample of 2,400 boaters from the Chicago SMSA.

City of Chicago, Department of Planning, City, and Community Development, Design Concepts and Standards for Chicago Lakefront Recreational Boating Facilities, 1979.

This technical guide presents standards and concepts for the design of recreational boating facilities along the Lake Michigan waterfront in Chicago. Also included is a discussion of the design process, and how various types of lakefront information are combined to establish an appropriate project.

City of Chicago, Department of Planning, City, and Community Development, Strategies for Recreational Boating Development on the Chicago Lakefront, 1979.

This report presents an overview of the decision process involved in determining whether additional recreational boating facilities should be provided along the Chicago lakefront, and if so, what should they consist of, where should they be located, and how can they be made to fit within the recreational patterns of the lakefront Park and the natural environment of Lake Michigan.

University of Illinois, Department of Leisure Studies, Lake-Front Recreational Demand Study, City of Chicago, Department of Planning, City, and Community Development, 1979.

This report presents a questionnaire, sampling technique, and analytical strategy to be used in determining the public's perception of appropriate lakefront recreational facilities and areas. It also includes the preliminary findings of a rigorous testing of the survey instrument from its administration to a sample of approximately 3,500 residents of one part of the City of Chicago.

Lakefront Expansion

Armstrong, J., Gemmell, R., Meltzer, J., and Reshkin, M., Chicago Lakefront Development: A Proposed Research Agenda, City of Chicago, Department of Development and Planning, 1975 (Out of Print)

This report outlines the research necessary to provide that body of knowledge adequate to determine the consequences of any program of lakefront expansion and to formulate standards and guidelines necessary to design, construct, and manage an expanded lakefront. The report identifies three distinct areas of investigation (existing conditions of the physical and socioeconomics character of the coastal area, the soundness of specific designs, and impacts resulting from project implementation.

City of Chicago, Department of Development and Planning, Chicago Lakefront Demonstration Project: Phase II Report, 1977.

This report discusses the findings of the testing of planning methodologies (Environmental Assessment, Program Management and Coordination, and Benefit/Cost Analysis) against a prototypical lakefront design. It includes listings within each specific area of of concern.

Knoerle, Bender, Stone, and Associates, Inc., Lakefront Land Development Alternatives Report, 1973 (Out of Print).

This report presents an evaluation of the economics of construction spoil disposal as a source of landfill for lakefront expansion. Several planned public works projects were identified and practical aspects of the physical and economic concerns associated with the use of spoil from these projects was discussed.

Goodman, J., PERT Planning, Roy F. Weston, Inc., 1977.

This technical guide was designed to provide assistance in the planning, scheduling, and controlling of lakefront projects and programs. It covers CPM, PERT, and other systematically derived management procedures and techniques to be used in dealing with many of the problems likely to arise in carrying out lakefront projects and programs.

Byner, P., Environmental Analysis, Roy F. Weston, Inc., 1977.

This technical guide was designed to improve the environmental soundness of lakefront design, facilitate the granting of the necessary environmental clearances, and assist in the preparation of environmental impact assessments of lakefront projects. It includes a detailed discussion of the integration of design and assessment strategies.

Settle, R. and Anderson, L., Benefit/Cost Analysis, Roy F. Weston, Inc., 1977.

This technical guide was designed to assist in determining the economic feasibility of specific lakefront projects and to provide a means for systematically and rationally selecting a preferred project from among those proposed. It includes a variety of discussions directed at practical constraints in using benefit/cost analysis along with an illustrative example.

Lakefront Management/Control

City of Chicago, Department of Development and Planning, Review Guidelines for Lake Michigan and Chicago Lakefront Protection Ordinance, 1977.

This document presents proposed guidelines to assist in the review of thirteen types of projects that are likely to be submitted for approval under the Lake Michigan and

Chicago Lakefront Protection Ordinance. It identifies the information needed to evaluate the compatibility of specific projects with the policies of the Lakefront Plan of Chicago and the purposes of the Lakefront Ordinance.

APPENDIX B

LAKEFRONT PLAN OF CHICAGO

BASIC POLICY STATEMENTS

BASIC POLICIES FOR THE LAKEFRONT OF CHICAGO

1. Complete the publicly owned and locally controlled park system along the entire Chicago lakefront.

2. Maintain and enhance the predominantly landscaped, spacious, and continuous character of the lakeshore parks.

3. Continue to improve the water quality and ecological balance of Lake Michigan.

4. Preserve the cultural, historical and recreational heritage of the lakeshore parks.

5. Maintain and improve the formal character and open water vista of Grant Park with no new above ground structures permitted.

6. Increase the diversity of recreational opportunities while emphasizing lake-oriented leisure time activities.

7. Protect and develop natural lakeshore park and water areas for fish and wildlife habitation.

8. Increase personal safety.

9. Design all lake edge and lake construction to prevent detrimental shoreline erosion.

10. Ensure a harmonious relationship between the lakeshore parks and the community edge, but in no instance will further private development be permitted east of Lake Shore Drive.

11. Improve access to the lakeshore parks and reduce through vehicular traffic on secondary park roads.

12. Strengthen the parkway characteristics of Lake Shore Drive and prohibit any roadway of expressway standards.

13. Ensure that all port, water supply, and public facilities are designed to enhance lakefront character.

14. Coordinate all public and private development within the water, park, and community zones.

APPENDIX C

TAXONOMY OF ENVIRONMENTAL CONCERNS

I. NATURAL ENVIRONMENT

A. GEOLOGIC SETTING (EARTH CHARACTERISTICS)

1. Physiography
   a) Geomorphology (shape to-pography)
   b) Structure and Stratigraphy
      . Geologic Cross-Sections
      . Basement Stability
   c) Bathymetry
2. Geophysics
   a) Tectonic/Seismic Activity
   b) Land Subsidance

B. ATMOSPHERIC SETTING

1. Air Quality
   a) Particulates
   b) Aerosols
   c) Auto Emissions
   d) Odors
   e) Atmospheric Fallout
2. Meteorology (Specific information relating to recreation activity and basic statistics for discussion of coastal processes).
   a) Weather
   b) Climate (Wind rows and velocity...most important).
3. Noise and Vibration

C. HYDROLOGIC SETTING

1. Water Setting
   a) Lake levels; Lake Michigan Setting
      . Lake turnover
      . Seiche Action
   b) Nearshore Ice
   c) Water Temperature
2. Movement of Water
   a) Circulation Patterns (Near shore water circulation cells in that portion of the lake within the study area.)
   b) Runoff; location of stormwater outfalls.
   c) Surface Water Hydrology (flooding).
   d) Groundwater concerns
3. Water Quality
   a) Historical context (patterns, cycles)
   b) Current state based on EPA concerns and required parameters

d) Water supply; location of water intakes.

D. LITTORAL SETTING (COASTAL PROCESSES)

1. Distribution of Sediment (Existing sediment environment)
2. Energy Regime
   a) Wave Energy and dynamics
   b) Wave diffraction analysis
3. Sediment Budget
4. Sediment Movement
   a) Erosion
   b) Sedimentation
   c) Sediment Transport
   d) Deflation

E. AQUATIC ECOSYSTEM

1. Components
   a) Physical elements of habitat (Water, sediment, etc.)
   b) Characterization & classification of Aquatic Fauna (Endangered species)
   c) Characterization & classification of Aquatic Flora (Endangered species)
2. Processes
   a) Life zones
   b) Succession & climax
   c) Diversity & stability

F. TERRESTRIAL ECOSYSTEM

1. Components
   a) Physical elements of habitat (Soil, climate, etc.
   b) Characterization & classification of Terrestrial Fauna (including endangered species.
   c) Characterization & classification of Terrestrial Flora (including endangered species)
2. Processes
   a) Life zones
   b) Succession & climax
   c) Diversity & stability

II. SOCIAL ENVIRONMENT

A. DEMOGRAPHIC CHARACTERISTICS

1. Age characteristics
2. Migration characteristics
3. Racial/ethnic characteristics
4. Sex characteristics
5. Religion
6. Occupational class

7. Income
8. Household type
9. Ability to pay (a quantifier of potential displaced people)
   a) Maximum rent existing residents can pay

B. SECURITY

1. Crime control
   a) Rate of crimes
   b) Personal perceptions of security

C. PRIVACY

1. Visual
2. Auditory
3. Personal perceptions of privary

D. PUBLIC HEALTH AND WELFARE (physiological well-being; phenomena that impinge upon the health of humans which are either caused or transmitted by various elements of the natural environment).

1. Hyper-suseptible populations
2. Disease

E. PSYCHOLOGICAL WELL-BEING

1. Crowding (stress situations)
   a) Density (Units/acre)
   b) Crowding (persons/room)
2. Nuisance
3. Overall contentment with neighborhood
4. Physical threat
5. Sociability-friendliness
6. Perceptions of environmental quality

F. COMMUNITY COHESIVENESS/STABILITY

1. Identification of communities and neighborhoods; and their boundaries.
2. Stability assessment
   a) Identify those neighborhoods in transition and determine probable effects of various types of lakefront development on that transition.

G. RECREATIONAL OPPORTUNITIES (Patterns of use for existing parks/facilities)

1. Private recreational areas and facilities
   a) Outdoor
   b) Indoor
2. Public recreational areas and facilities
   a) Outdoor
   b) Indoor

3. Informal recreational areas (Fields, streets, alleys, paths, walkways, beaches)

H. RECREATIONAL NEEDS OF USER POPULATIONS (Unmet Needs)

1. Neighborhoods
2. Multi-neighborhoods (Communities)
3. Regional areas

I. NEEDS OF SPECIAL POPULATIONS

1. Elderly population
2. Handicapped
3. College population

III. ECONOMIC ENVIRONMENT

A. PROPERTY VALUES

1. Land parcels
2. Buildings
3. Rentals

B. EMPLOYMENT (neighborhood and Community Areas)

1. Job Profile (Workers employed in study area)
   a) Industrial
   b) Commercial
   c) Service
   d) Others
2. Underemployed
3. Unemployed

C. WAGES AND INCOME

1. Income to local business
2. Wage levels/income by employment characteristics
3. Wage levels/income by demographic characteristics

D. RESOURCES AND LABOR

1. Monetary resources
2. Construction materials
   a) Landfill
   b) Dike
   c) Soil
   d) Landscaping
3. Labor Force

E. FISCAL STRUCTURE AND STABILITY (Public Sector)

1. Government fiscal flow
2. Public sector stability

F. ECONOMIC STABILITY (Private Sector)

1. Industry
   a) Light
   b) Heavy
2. Commercial and service industries
   a) Entertainment/recreation/tourism
      . Restaurants
      . Hotel and motels
      . General entertainment
   b) Parking

G. PRIORITIES OF PUBLIC EXPENDITURES

1. Real and perceived needs of neighborhood, community and region
   a) Lakefront improvements
   b) Recreational areas and facilities
2. Pressing needs in other areas which will compete for funding

IV. CULTURAL RESOURCES

A. HISTORICAL PRESERVATION VALUES

1. Landmarks
   a) Cultural
   b) Historical
   c) Scientific

B. ARCHEOLOGICAL PRESERVATION VALUES

1. Rarity and importance of sites

C. AESTHETIC FORM AND VALUES

1. Visual values and forms
   a) Views
   b) Color perception
   c) Patterns and forms (Street pattern, sidewalks, tree plantings
2. Human Perception
   a) Images - landmarks (Nodes, districts, boundaries....
3. Architectural and Urban Form
   a) Architectural styles
   b) Street furnishings
   c) Tree plantings
4. Functional Aspects (How people utilize space)
   a) Shopping
   b) Education
   c) Movement
   d) Residency

V. URBAN INFRASTRUCTURE

A. LAND-USE PATTERN

1. Current land-use inventory
   a. Diversity
   b. Density
   c. Trends and patterns

B. ENERGY CONSUMPTION AND CONSERVATION

C. MUNICIPAL AND SOCIAL SERVICES

1. Liquid waste disposal
2. Solid waste disposal
3. Water supply
4. Storm water drainage
5. Police
6. Fire
7. Health/hospital
8. Educational
9. Institution centers
10. Psychological/Emotional (Crisis centers)
11. Day care
12. Cultural-type entertainment (theater, etc.)

D. TRANSPORTATION SYSTEM AND TRAFFIC CONGESTION

1. Physical network
   a) Streets and alleys
   b) Rail
   c) Sidewalks
   d) Bicycle paths
   e) Hiking/running/horseback riding paths
2. Personal Users
   a) Pedestrian travel
   b) Bicycle travel
   c) Private motor vehicles (Auto, motorcycle, truck)
      . Major corridors
      . Through streets
      . Secondary/side streets
   d) Public parking
      . Residential
      . Commercial
   e) Public mass transit
      . Bus
      . Rail
   f) Traffic congestion
      . Peak hours, days of the year
      . Volumes
      . Travel times
   g) Hazard, accident & safety investigan
      . Hazardous areas
      . Emergency vehicles

APPENDIX D

REVIEW GUIDELINES FOR HARBORS

INTRODUCTION

The following sheets set forth guidelines that the Department of Planning, City and Community Development will use in evaluating any harbor construction, modification or rehabilitation proposal and in determining its degree of compatibility and compliance with the fourteen basic policies of the Lakefront Plan of Chicago and the thirteen purposes of the Lake Michigan and Chicago Lakefront Protection Ordinance. These guidelines have been prepared in recognition of the special combination of elements inherent in such an operation. However, applicants are encouraged at the outset to discuss individual projects with the staff of the Department; especially if it appears to the applicant that certain of the information requirements are not appropriate.

It is anticipated that there will be at least three types of harbor projects, each of which will have different information needs. The first of these would be harbor construction in a location where no harbor currently exists. In a case such as this, where sheltered water areas will be created; water circulation, runoff and drainage and their effect upon water quality and aquatic habitats are extremely important. Harbor and channel construction will involve dredging, shoreline protection and possibly landfill. Where applicable, these information packages should be submitted as well. Special attention should be given to the effect the proposed harbor will have upon the adjacent community, land access to the harbor and Lake Michigan navigation.

The second type of harbor project would be some modification (e.g. expansion) of an existing harbor. A proposal involving the addition of a number of slips to a harbor (for example) would mainly concern changes in existing uses, existing navigation patterns and the effect these new slips will have upon water quality.

The third type of harbor project would be rehabilitation of an existing harbor. Depending upon the scale of rehabilitation or reconstruction, the degree of disruptive impacts will vary. Water circulation, drainage and runoff will be major concerns as will the temporary disruption of navigation and recreational uses.

The Department of Planning, City and Community Development has provided the information package to assist the applicant in structuring his responses to the issues raised in the Lakefront Plan of Chicago and the Lake Michigan and Chicago Lakefront Protection Ordinance.

Finally, it should be noted that there are likely to be both positive and negative effects associated with any proposed project of these types. The applicant should recognize this, and focus the discussions accordingly.

HARBOR

REGULATION FACTSHEET

In order to construct a new harbor, or modify and maintain an existing harbor along the lakefront of Chicago several permits and approvals must be obtained. These include:

- A permit from the U.S. Army Corps of Engineers under the authority of Section 10 of the Rivers and Harbors Act of 1899.
- A permit from the U.S. Army Corps of Engineers under the authority of Section 404 of the Water Pollution Control Act of 1972.
- A permit from the U.S. Coast Guard under the authority of 33 USC 401,491, 511, and 525.
- An Environmental Impact Assessment for the Environmental Protection Agency under the authority of the National Environmental Policy Act.
- A permit from the Illinois Environmental Protection Agency under the authority of Section 402 of the Water Pollution Control Act of 1972, and a water quality certificate under the authority of Illinois Revised Statutes, Chapter 111 1/2, Section 1011 et.seq.
- A permit from the Illinois Department of Transportation Division of Water Resources under the authority of Illinois Revised Statutes, Chapter 19, Section 65.
- A permit from the Illinois Department of Public Health under the authority of Illinois Revised Statutes, Chapter 111 1/2, Section 761-785.

All projects will be reviewed by the Chicago Plan Commission in accordance with the provisions of Section 11-12-4 of the Illinois Municipal Code, the Inter-Agency Planning Referral Act.

It will be necessary to obtain permits from the City of Chicago, for certain elements of the proposed project. These include:

- A sewer connection permit from the Bureau of Sewers, Department of Water and Sewers under the provisions of Section 31-2 of the Municipal Code of Chicago.
- A permit from the Water Distribution Division Department of Water and Sewers under the provisions of Sections 83-6, 83-9, 83-15 and 83-20 of the Municipal Code of Chicago.
- A building permit from the Department of Buildings under the provisions of Sections 43-1 to 43-37 of the Municipal Code Chicago.
- A dock construction permit from the Department of Public Works under the provisions of Section 38-36 of the Municipal Code of Chicago.

- A dredging permit from the Department of Environmental Control under the provisions of Section 17-5.9 of the Municipal Code of Chicago and a permit from the Department of Public Works under the provisions of Section 38-38 of the Municipal Code of Chicago.

- An electrical permit from the Bureau of Electrical Inspection, Department of Buildings under the provisions of Section 86-27 of the Municipal Code of Chicago.

- A sidewalk construction permit from the Department of Streets and Sanitation under the provisions of Section 33-47 of the Municipal Code of Chicago.

- A driveway construction permit from the Department of Streets and Sanitation under the provisions of Section 33-15 of the Municipal Code of Chicago.

- A tree planting permit from the Bureau of Forestry under the provisions of Section 32-2 of the Municipal Code of Chicago.

In addition each project must be approved by the Chicago Plan Commission under the provisions of the Lake Michigan and Chicago Lakefront Protection Ordinance (Chapter 194B of the Municipal Code of Chicago). Any approval by the Chicago Plan Commission under the Lake Michigan and Chicago Lakefront Protection Ordinance will be conditional upon the successful issuance of all required permits.

In reviewing and evaluating the proposed harbor construction, modification or maintenance the Chicago Department of Planning; City and Community Development will consider the following concerns:

- Existing Character of the Site
- Change in Existing Use(s)
- Design and Layout of Facility
- Effect Upon Character of the Lakeshore Parks
- Disruption of Existing Park Uses
- Effect Upon Fish and Wildlife
- Operational Safety and Security
- Effect on Adjacent Community
- Phasing of Construction Operations
- Mitigation of Construction Impacts
- Operational Water Quality
- Water Circulation in Sheltered Areas
- Access and Traffic
- Appropriateness of Leaseholds and Concesssions
- Erosion of the Shoreline
- Effect Upon Navigation
- Drainage and Runoff

The following sheets explain the information that will be needed in reviewing and evaluating the proposed project.

RECREATION BOAT HARBOR

AREA OF CONCERN: Existing Character of Site

AUTHORITY: Section 194B-6.2(c) of the Lake Michigan and Chicago Lakefront Protection Ordinance assigns to the Commissioner of the Department of Planning, City and Community Development the responsibility "To make such investigation relative to each application or proposal as he deems necessary."

REQUIREMENT: Existing Conditions Map(s)

EXPLANATION: In order to fully evaluate a harbor construction, modification or rehabilitation proposal submitted under the Lake Michigan and Chicago Lakefront Prorection Ordinance it is necessary to find out what change is going to occur and how that change will affect the present character of the site. Those factors that help define the character include physical and cultural features and patterns of usage. Therefore, in order to define this character, the following exhibits should be provided:

Exhibit 1-- Patterns of Existing Use
This exhibit should provide a schematic representation of the existing patterns of land and water use within the vicinity of the proposed project. Included here should be the location of existing park facilities and activity areas (e.g., beaches, boat mooring areas, parking lots) along with prominent historical, cultural, and recreational features. A discussion of factors associated with patterns of existing use should be included as part of the exhibit if deemed desirable.

Exhibit 2-- Existing Physical Features
This exhibit should provide a frame of reference in terms of baseline conditions at the site. Included here should be existing topography, vegetation, shoreline alignment and treatment, natural habitats, water depths (bathymetry), and such other features as may be deemed appropriate. A discussion of factors associated with these features should be included as part of the exhibit if deemed desirable.

RECREATION BOAT HARBOR

AREA OF CONCERN: Change in Existing Use(s)

AUTHORITY: Section 194B-3(e) of the Lake Michigan and Chicago Lakefront Protection Ordinance states that the Ordinance was adopted for the following purpose: "To insure that the Lakefront Parks and the Lake itself are devoted to public purposes and to insure the integrity of and expand the quality and quantity of the Lakefront Parks."

REQUIREMENT: Statement of Purpose

EXPLANATION: Dicuss the reason harbor modification or construction is proposed for this particular site. Discuss the role of the facility in serving the needs pf various harbor facility users (e.g. yacht clubs, sport fishermen). A user needs survey or similar documentation which address the demand for such facilities in the proposed location would be most helful here. In order to determine if the proposed facility is compatible with the fourteen policies of the Lakefront Plan of Chicago and the Lakefront Protection Ordinance, a detailed discussion of purpose would be helpful.

RECREATION BOAT HARBOR

AREA OF CONCERN: Design and Layout of Facility

AUTHORITY: Policy Two of the Lakefront Plan of Chicago is "Maintain and enhance the predominantly landscaped character of the lakeshore parks." Policy Six of the Plan is "Increase the diversity of recreational opportunities while emphasizing lake-oriented leisure-time activities. Furthermore, Section 194B-6.2(c) of the Lake Michigan and Chicago Lakefront Protection Ordinance assings to the Commissioner of the Department of Planning, City and Community Development the responsibility "to make such investigation relative to each application or proposal as he deems necessary."

REQUIREMENT: Site Plan

EXPLANATION: For the Department of Planning and Development to make its findings and recommendations, as required under the Lakefront Ordinance, it is necessary to clearly understand how the boat harbor will be located relative to adjacent communities, lakeshore park facities and patterns of use, and Lake Michigan patterns of human use and wildlife habitation. A Site Plan should indicate:

- Proximity to Community Edge
- proximity to existing park activities
  a. structures
  b. roads/pathways/formal access points
  c. activity areas
- Proximity to natural habitat areas, nesting/breeding grounds.
- location of slips, breakwaters, piers
- location of parking lots
- location of rest rooms
- location of boat storage areas
- location of all paved areas
- pumpout stations
- fuel storage and pump facilities
- fencing
- aids to navigation
- dock walls
- existing topography and any proposed changes
- existing vegetation and any proposed changes
- areas of dredging

RECREARTION BOAT HARBOR

AREAD OF CONCERN: Effect Upon Character of the Lakeshore Parks

AUTHORITY: Section 194B-3(c) of the Lake Michigan and Chicago Lakefront Protection Ordinance states that the Ordinance was adopted for the following purpose: "To insure that the Lakeshore Parks and the Lake itself are devoted to public purposes and to insure the integrity of an expand the quality and quantity of the Lakeshore Parks." Policy Two of the Lakefront Plan of Chicago states: "Maintain and enhance the predominantly landscaped character of the lakeshore parks."

REQUIREMENT: Compatibility Analysis (and Architectural Rendering if appropriate)

EXPLANATION: The Lakefront Plan of Chicago emphasizes that care must be taken to insure that new developments fit within the landscape of the existing lakefront park; that they enhance public use and enjoyment of the park; and that they are compatible with their suroundings. Therefore, in order for the Department of Planning, City and Community Development to make its findings and recommendations, it is necessary to clearly understand how the proposed facility would fit into its suroundings. For this reason, the application should include a discussion of the steps taken to insure that the proposed facility has been design to fit into the landcape. The discussion should focus on:

- design features that assist in maintaining a sense of openness;
- the nature of the construction materials; and
- an indication of how the proposed facility would affect the lakefront vista.

In those situations where visual aids are needed to illustrate the effect of the porposed facility upon the character of the park, and architectural rendering should be provided.

RECREATION BOAT HARBOR

AREA OF CONCERN: Disruption of Existing Park Uses

AUTHORITY: Policy Two of the Lakefront Plan of Chicago states "Maintain and enhance the predominantly landscaped, spacious, and continuous character of the lakeshore parks." Policy Four of the Plan states: "Preserve the cultural, historical, and recreational heritage of the lakeshore parks." Furthermore, Policy Six of the Plan states: "Increase the diversity of recreational opportunities while emphasizing lake-oriented leisure time activities."

REQUIREMENT: Recreation Impact Analysis

EXPLANATION: The Lakefront Plan of Chicago encourages the provision of lake-oriented leisure time activities. However, there is also a concern expressed to make sure that new projects are harmonious with existing public enjoyment of the park and Lake Michigan waters. For this reason, the application should include a discussion of how the proposed harbor construction or improvement would fit into the existing patterns of use in the area, a discussion of any anticipated changes in the patterns of use resulting from the construction of the project, and a discussion of the mitigation strategies that would be employed to prevent or mitigate unacceptable disruptions or displacements of those existing patterns or facilities.

RECREATION BOAT HARBOR

AREA OF CONCERN: Effect Upon Fish and Wildlife

AUTHORITY: Section 194B-3(d) of the Lake Michigan and Chicago Lakefront Protection Ordinance states that the Ordinance was adopted for the following purpose: "To insure that construction in the Lake or modification of the existing shoreline shall not be permitted if such construction or modification would cause environmental or ecological damage to the Lake or would diminish water quality; and to insure that the life patterns of fish, migratory birds, and others fauna are recognized and supported." Furthermore, Policy Seven of the Lakefront Plan of Chicago is "Protect and develope natural lakeshore park and water areas for fish and wildlife habitation."

REQUIREMENT: Fish and Wildlife Impact Analysis

EXPLANATION: In order for the Department of Planning, City and Community Development to make its findings and recommendations, it is necessary to clearly understand how the proposed boat harbor would accect fish and wildlife habitats in close proximity thereto. For this reason, the application should include an analysis that:

- describes any existing wildlife habitats, breeding or nesting sites, or migratory patterns at or adjacent to the proposed harbor;
- describes the probable impacts upon these elements that would result from the construction and subsequent use of the proposed boat harbor or harbor improvements (e.g., eradication or displacement of aquatic life due to turbidity, hydrocarbon emissions; elimination of habitats);
- identifies the mitigation techniques that would be used to minimize or avoid such impacts;
- indicates any affirmative actions that would be taken to enhance or establish habitats; and
- identifies any new species that would be introduced into Lake Michigan as a result of the proposed project.

RECREATION BOAT HARBOR

AREA OF CONCERN: Operational Safety and Security

AUTHORITY: Section 194B-3(a) of the Lake Michigan and Chicago Lakefront Protection Ordinance states as purpose: "To promote and protect the health, safety, comfort, convenience, and general welfare...." In addition, Policy Eight of the Lakefront Plan of Chicago states: Increase personal safety."

REQUIREMENT: Safety and Security Analysis

EXPLANATION: The Lakefront Plan of Chicago declares that "safety will be a primary concern in landscaping treatments facility and equipment design, and lighting standards...." Therefore, in order for the Department of Planning, City and Community Development to make its findings and recommendations, it is necessary to clearly understand how the proposed harbor and associated improvements would address security and personal safety. For this reason, the application should include a discussion of the following:

- Provisions made for patrolling to increase security for users, spectators, and visitors.
- Provisions made for protecting slips, piers, moorings, and other harbor facilities from the wave action of Lake Michigan.
- Treatment of pedestrian and bicycle pathways in designing the harbor area so that they will not conflict with one another or roadways and parking areas.
- Provisions made for controlling boat traffic and separating boat movements to and from launching facilities from boat mooring/slip areas (if appropriate).
- Provisions for lighting to improve both actual and perceived security.
- Description of fencing, gates, or other features which provide security for boats and facilities.
- Description of any aids to navigation that would be installed or presently exist.
- Identify any water traffic control or swimming restriction zones that would be established (or already exist) to insure necessary separation of activities in the vicinity of the harbor.
- Provisions made for fire prevention and control including location of fire hydrant(s), fire extinguishers, fire alarms, access be fire trucks, and any special features which would deal with boat or fuel fires.
- Provisions made for the harbor to serve as a "harbor of refuge".

RECREATION BOAT HARBORS

AREA OF CONCERN: Effect on the Adjacent Community

AUTHORITY: Policy Ten of the Lakefront Plan of Chicago states: "Ensure a harmonious relationship between the lakeshore parks and the community edge...."

REQUIREMENT: Community Impact Analysis

EXPLANATION: Any recreation boat harbor, by its nature, will be a regional attraction. For this reason, special consideration should be given to the relationship between it and any adjacent neighborhood. Therefore, in order for the Department of Planning, City and Community Development to make a determination as to the compatibility of the proposed harbor with the community edge, the application should include an analysis that identifies:

- anticipated increases in traffic congestion in the neighborhood streets;
- anticipated increases in noise and odors that would result from the construction and use of the harbor (within the neighborhood);
- anticipated nuisance effect (within the neighborhood) of lighting installed to increase the usability and security of the harbor;
- anticipated increase in demand for parking space in neighborhood streets resulting from use of the harbor and any ancillary developments; and
- measures that would be taken to establish positive functional, physical, and visual linkages between the harbor and the adjacent neighborhood if the harbor is located in close proximity to the neighborhood.

In preparing the analysis, care should be taken to consider not only the compatibility of the harbor itself, but also associated activities and functions that would occur adjacent to the harbor. Also, the patterns and types of access to the harbor are important here; both during construction and during subsequent use.

RECREATION BOAT HARBOR

AREA OF CONCERN: Phasing of Construction Operations

AUTHORITY: Section 194B-6.2(c) of the Lake Michigan and Chicago Lakefront Protection Ordinance assigns to the Commissioner of the Department of Planning, City and Community Development the responsibility "to make such investigation as he deems necessary."

REQUIREMENT: Construction Plan

EXPLANATION: In order to adequately evaluate the construction of the recreation boat harbor in light of the policies of the Lakefront Plan of Chicago and the purposes of the Lake Michigan and Chicago Lakefront Protection Ordinance, a detailed outline of all construction-related activities (from start-up to shut-down) should be provided.

NOTE: In addition, if the harbor construction also involves landfill, dredging, and/or shoreline protection, then the respective information packages should be consulted.

RECREATION BOAT HARBOR

AREA OF CONCERN: Mitigation of Construction Impacts

AUTHORITY: Section 194B-3(d) of the Lake Michigan and Chicago Lakefront Protection Ordinance states as one of its purposes: "To insure that construction in the Lake or modification of the existingshoreline shall not be permitted if such construction or modification would cause environmental or ecological damage to the Lake or would diminish water quality...."

REQUIREMENT:
1. Turbidity Control Plan
2. Drainage/Runoff Control Plan

EXPLANATION: In order to adequately evaluate the steps taken to minimize the damage of the proposed construction on Lake Michigan and its environs, it is necessary to be provided with the following:

- Turbidity Control Plan: Turbidity could adversely impact recreational, water supply, or wildlife habitation uses of Lake Michigan. Harbor construction and modification activities could cause turbidity as could dredfging associated with harbor construction. Discuss any strategies that are contemplated including:
  a. scheduling of construction to minimize conflicts or avoid sensitive periods during breeding and migration cycles;
  b. staging of construction; and/or
  c. construction strategies to minimize turbidity (e.g., turbidity curtains.
- Drainage/Runoff Control Plan: Runoff into the Lake that passes through the land side of the site during construction can cause substantial water quality problems due to the character of the materials introduced to the water body. In order to minimize such a problem and protect the Lake, some type of control is needed. Discuss any strategies that would be instituted to:
  a. prevent runoff from passing through the construction site and into Lake Michigan;
  b. provide for stormwater runoff during the period of construction;
  c. prevent trash, construction debris, and other foreign substances from entering the Lake during construction; and
  d. contain any washoff of materials that do runoff into the Lake if an accident should happen.

RECREATION BOAT HARBOR

AREA OF CONCERN: Operational Water Quality

AUTHORITY: Section 194B-3(c) of the Lake Michigan and Chicago Lakefront Protection Ordinance states as purpose: "To maintain and improve the purity and quality of the waters of Lake Michigan." In addition, Policy Three of the Lakefront Plan of Chicago states: "Continue to improve the water quality and ecological balance of Lake Michigan."

REQUIREMENT:

1. Drainage and Runoff Plan
2. Spill Prevention and Containment Plan
3. Flushing Rate Analysis

EXPLANATION: The Lakefront Plan of Chicago recognizes the need to improve the quality of Lake Michigan's waters in order to increase the utility of the Lake as a water supply, a habitat for wildlife, and as a resource for recreation. Therefore, in order for the Department of Planning, City and Community Development to make its findings and recommendations, it is necessary to clearly understand how the operation of the proposed harbor (or harbor modification) would deal with the issue of protecting Lake Michigan. For this reason, the application should include the following:

- Drainage and Runoff Plan: The plan should discuss:
  a. how the drainage and runoff patterns at the site would change as a result of constructing the proposed improvements;
  b. the anticipated increase in runoff volume (during rainstorms) and how this increase would be provided for;
  c. the steps that would be taken to prevent runoff from entering Lake Michigan;
  d. the steps that would be taken to prevent oil and gasoline (and other substances from the paved areas) from entering Lake Michigan;
  e. the location of appropriate sewer hookups and assurances that the sewers are active and capable of accomodating the anticipated volumes of flow; and
  f. the steps that would be taken to prevent trash, debris, and other foreign substances from entering Lake Michigan.
- Spill Prevention and Containment Plan: The plan should discuss:
  a. location of any fuel delivery, storage, and pumping facilities;
  b. the strategies that would be used to prevent or minimize accidental spills which could contaminate the harbor waters; and
  c. the spill contingency plans to contain any spills that should occur within the limits of as small a portion of the harbor as possible.

Flushing Rate Analysis: Under certain conditions, a harbor configuration can result in the stagnation of the water; causing changes in water temperature and quality and habitat conditions. The potential of such problems can be minimized by proper design and construction. To insure that the preferred harbor configuration would not result in unacceptable water stagnation, a determination of the probable flushing rates of the enclosed water body should be provided.

RECREATION BOAT HARBOR

AREA OF CONCERN: Water Circulation in Sheltered Areas

AUTHORITY: Policy Six of the Lakefront Plan of Chicago states: "Increase the diversity of recreational opportunities while emphasizing lake-oriented leisure time activities." Section 194B-3(c) of the Lake Michigan and Chicago Lakefront Protection Ordinance states as purpose: "To maintain and improve the purity and quality of the waters of Lake Michigan."

REQUIREMENT: Water Circulation Analysis

EXPLANATION: The Lakefront Plan of Chicago encourages the creation of expanses of sheltered water. However, the Plan also recognizes the need to protect and enhance the quality of Lake Michigan's waters. Therefore, in order for the Department of Planning, City and Community Development to make its findings and recommendations, it is necessary to clearly understand how the sheltered water within the boat harbor will circulate. For this reason, the application should include a discussion of the following:

- the existing water circulation patterns within the vicinity of the proposed harbor.
- the anticipated change in the circulation pattern that would result from the construction of the proposed improvements;
- the factors incorporated into harbor design to insure adequate water circulation; and
- any operational or maintenance measures that would be used to enhance or otherwise improve water circulation if necessary.

RECREATION BOAT HARBOR

AREA OF CONCERN: Access and Traffic

AUTHORITY: Section 194B-3(f) of the Lake Michigan and Chicago Lakefront Protection Ordinance states as one of its purposes: "To promote and provide for continuous pedestrian movement along the shoreline." Section 194B-3(g) of the Ordinance states as purpose: "To promote and provide for pedestrian access to the Lake and Lakeshore Parks..., and to protect and enhance vistas at these locations...." Policy Eleven of the Lakefront Plan of Chicago states: "Improve access to the lakeshore parks and reduce through vehicular traffic on secondary park roads."

REQUIREMENT: Access Plan

EXPLANATION: Recreation boat harbors, by their nature, are facilities that service regional users, which has special implications in terms of access. For this reason the application should focus, in part, on how access to the site is to be provided while also minimizing the conflicts between access and other park uses as well the congestion in the neighborhood streets. Therefore, the application provide the following:

Exhibit 1 -- Access Schematic
This exhibit should indicate the roads, pathways, and parking areas that would service the facility. If changes in the existing alignment/configuration of the ways and areas is needed, then the changes should be emphasized.

Exhibit 2 -- Circulation Schematic
This exhibit should indicate the circulation patterns within the park and the adjacent neighborhood, both as they now exist and as they are likely to exist in the future should the facility be constructed.

The application should also include a discussion of the following concerns:

- The anticipated increases in traffic resulting from the construction of the harbor improvements and the likely effect of these increases on traffic congestion and existing parking areas.
- How the proposed facility would fit into the vehicular traffic circulation pattern in the adjacent neighborhood.
- How the proposed facility would affect pedestrian access to and along the shoreline and what provisions would be made to preserve and enhance such movements.
- What provisions have been made to accomodate special populations in gaining access to the proposed facility.

- How the proposed facility would fit into the regional traffic circulation pattern.
- How the proposed facility would affect visual access to the Lake and the horizon and any affirmative actions that would be taken to preserve the open and spacious nature of the park.
- How security patrols, emergency vehicles, and service vehicles (e.g., trash collection) would gain access to the site.
- What signs would be installed to facilitate access to the harbor and where would these signs be located.

RECREATION BOAT HARBOR

AREA OF CONCERN: Appropriateness of Leaseholds and Concessions

AUTHORITY: Policy Six of the Lakefront Plan of Chicago states: "Increase the diversity of recreational opportunities while emphasizing lake-oriented leisure time activities."

REQUIREMENT: Leasehold and Concessions Analysis

EXPLANATION: Quality leaseholds and concession arrangements are considered appropriate in the Lakefront Plan of Chicago for providing supportive services which complement or expand the recreation uses and facilities of the parks. These might include boat clubs, restaurants, bait shops, equipment rental, and several other types that are compatible with recreation boat harbors. If the harbor or any facility associated therewith is to be operated as a leasehold or concession, then special consideration needs to be given to the policies of the Plan. For this reason, the application should include:

- a statement of the need which would be satisfied by the concession or leasehold;
- an identification of the stipulations that would be contractually included to protect the public interest by insuring that general use facilities are appropriately designed and open for public use;
- an identification of the stipulations that would be imposed to insure that memberships, when required, would be open on an equal basis to everyone; and
- an identification of how these stipulations would be met.

NOTE: If the leasehold involves the construction of a building, then the erection of structure information package should be consulted.

RECREATION BOAT HARBOR

AREA OF CONCERN: Erosion of the Shoreline

AUTHORITY: Policy Nine of the Lakefront Plan of Chicago states: "Design all lake edge and lake construction to prevent detrimental shoreline erosion." In addition, Section 194B-3(d) of the Lake Michigan and Chicago Lakefront Protection Ordinance states that it was adopted for the following purpose: "To insure that construction in the Lake or modification of the existing shoreline shall not be permitted if such construction or modification would cause environmental or ecological damage or would diminish water quality."

REQUIREMENT: Erosion Control Analysis

EXPLANATION: The Lakefront Plan of Chicago declares that 'all additions to the lakeshore parks through landfill and all features created in the Lake must meet design standards and specifications which will result in a shoreline substantially free erosion and as complementary to the natural forces of the Lake as possible. The concern here is both the ability of the harbor site to withstand erosion and to be so designed as to minimize any erosion downcoast of its entrance. Therefore, in order for the Department of Planning, City and Community Development to make its findings and recommendations, it is necessary to clearly understand how the proposed harbor would address such a concern. For this reason, the application should include a discussion of the following:

- The design features or maintenance strategies that will be used to prevent erosion of the shoreline near the facility that might otherwise occur if the facility is built.
- The construction strategies that will be used to prevent detrimental erosion during the construction of the harbor.

RECREATION BOAT HARBOR

AREA OF CONCERN: Effect Upon Navigation

AUTHORITY: Policy Thirteen of the Lakefront Plan of Chicago states: "Ensure that all port, water supply, and public facilities are designed to enhance lakefront character."

REQUIREMENT: Navigation Impact Analysis

EXPLANATION: The recreational and cultural uses must share the lakefront with two other essential uses; water supply and navigation. A new or expanded boat harbor can affect present patterns of navigation; either by physically disrupting them or by generating additional vessel traffic as part of subsequent use. To insure that the proposed harbor would be harmonious with existing uses, and that it is coordinated with planned patterns of navigation and water transportation, the application should include a discussion of:

- the relationship between the proposes boat harbor site and present channels, harbor entrances, boat launching facilities, and patterns of water use;
- projected patterns and volumes of boating traffic within the harbor and at its entrance;
- the location of any nearby shipping lanes and any measure that would serve to prevent conflicts between and among the recreationan and commercial boat traffic; and
- any coordination efforts with the U.S. Coast Guard, including aids-to-navigation that would be included as part of the project.

RECREATION BOAT HARBOR

AREA OF CONCERN: Drainage and Runoff

AUTHORITY: The Third policy of the Lakefront Plan is: "Continue to improve the water quality and ecological balance of Lake Michigan." The Plan further states that the quality of Lake Michigan's water must be improved as a water supply, a habitat for wildlife, and a resource for recreation.

The Lake Michigan and Chicago Lakefront Protection Ordinance declares one of its purposes is "To maintain and improve the quality of the water of Lake Michigan."

REQUIREMENT: The Submission of a Drainage/Runoff Plan.

EXPLANANTION: The requirement can be satified in part by providing a topographic map showing the existing/ runoff patterns in the area and any changes that will occur if the project is constructed. In addition to the map the applicant should also provide discussions of:

- how drainage will be provided for from paved surfaces, parking lots, and surounding lands;
- how hydrocarbons from fuel areas or parking lots will be prevented from entering the Lake;
- how will sediment, fertilizer, herbicides, and other pollutants be kept from entering Lake Michigan; and
- which sewer will be used to accomodate the runoff, if pertinent, and what steps have been taken to assure that the sewer is active and that it's capacity is adequate to accomodate the increased volume.

APPENDIX E

REVIEW GUIDELINES FOR RECREATIONAL BOAT LAUNCHING FACILITIES

INTRODUCTION

The following sheets set forth guidelines that the Department of Planning, City and Community Development will use in evaluating any proposed recreational boat launching facility and in determining its degree of compatibility and compliance with the fourteen basic policies of the Lakefront Plan of Chicago and the thirteen purposes of the Lake Michigan and Chicago Lakefront Protection Ordinance. These guidelines have been prepared in recognition of the special combination of elements inherent in such a facility. However, applicants are encouraged at the outset to discuss individual projects with the staff of the Department; especially if it appears to the applicant that certain of the information requirements are not appropriate.

Recreational boat launching facilities, by their very nature, serve as regional access points to Lake Michigan and therefore require special locational and environmental attributes. In recognition of this, an attempt is now being made to prepare facility siting strategies and development guidelines. Should this exercise be successful (and the strategies and guidelines are adopted by the Chicago Plan Commission) then future review procedures should be greatly facilitated and the applicant's job made easier.

It is anticipated that there will be at least three types of situations with somewhat differing informational requirements. The first of these, and the one for which the guideline package was prepared, involves a situation where a facility is proposed at a location where no type of boating facility presently exists. In a case such as this, all of the informational requirements must be satisfied at the specified level of detail.

A second situation is exemplified by a proposal to locate a launching facility within an existing recreational boat harbor. In a case such as this, the general informational requirements would still pertain, but the level of detail in the analyses performed to satisfy the requirements would be less.

The third situation is exemplified by a proposal to add one or more lanes to an existing launching facility. In a case such as this, the analyses would only need to focus on the anticipated incremental increases/decreases resulting from the expansion of the facility.

Finally, it should be noted that there are likely to be both positive and negative effects associated with any proposed project of these types. The applicant should recognize this, and focus the discussions accordingly. For example, although a launching facility may displace a natural area on the land, it might be designed so as to allow the enhancement of an aquatic habitat. A discussion of both the positive and negative aspects of the effect on habitats would be in order here.

RECREATIONAL BOAT LAUNCHING FACILITY

REGULATION FACTSHEET

In order to construct a recreational boat launching facility along the lakefront of Chicago several permits and approvals must be obtained. These include:

- A permit from the U.S. Army Corps of Engineers under the authority of Section 10 of the River and Harbor Act of 1899.
- A permit from the U.S. Army Corps of Engineers under the authority of Section 404 of the Water Pollution Control Act of 1972.
- A permit from the Illinois Department of Transportation, Division of Water Resources under the authority of Illinois Revised Statutes, Chapter 19, Section 65. (See note below)
- A water quality certificate from the Illinois Environmental Protection Agency under the authority of Illinois Revised Statutes, Chapter 111½, Section 1011 et seq.

In addition, each project must be approved by the Chicago Plan Commission under the provisions of the Lake Michigan and Chicago Lakefront Protection Ordinance (Chapter 194B of the Municipal Code of Chicago). Finally, it will be necessary to obtain permits from the City of Chicago for certain elements of the proposed facility. These include:

- A building permit from the Department of Buildings; and
- A sewer connection permit from the Department of Water and Sewers.

Any approval by the Chicago Plan Commission under the Lake Michigan and Chicago Lakefront Protection Ordinance will be conditional upon the Successful issuance of all required permits.

In reviewing and evaluating the proposed recreational boat launching facility, the Chicago Department of Planning, City and Community Development will consider the following concerns:

- Change in existing use resulting from proposed project
- Existing character of site
- Design and layout of proposed facility
- Effect upon the character of the lakeshore park
- Disruption of existing park uses
- Effect upon fish and wildlife
- Operational safety and security
- Effects of the facility upon navigation and water supply
- Effect of the facility upon the adjacent community
- Effects of construction activity
- Access and traffic
- Water quality
- Erosion of the shoreline

The following sheets explain the information that will be needed in reviewing and evaluating the proposed project.

NOTE: A permit from the Illinois Department of Transportation will not always be needed, but the agency should be contacted in order to make such a determination.

RECREATIONAL BOAT LAUNCHING FACILITY

AREA OF CONCERN: Existing Character of Site

AUTHORITY: Section 194B-6.2(c) of the Lake Michigan and Chicago Lakefront Protection Ordinance assigns to the Commissioner of the Department of Planning, City and Community Development the responsibility "to make such investigation relative to each application or proposal as he deems necessary."

REQUIREMENT: Existing Conditions Map(s)

EXPLANATION: In order to fully evaluate each project or proposal submitted under the Lake Michigan and Chicago Lakefront Protection Ordinance it is necessary to find out what change is going to occur and how that change will affect the present character of the site. Those factors that help define the character include physical and cultural features and patterns of usage. Therefore, in order to define this character, the following exhibits should be provided:

Exhibit 1 -- Patterns of Existing Use
This exhibit should provide a scematic representation of the existing patterns of land and water use within the vicinity of the proposed project. Included here should be the location of existing park facilities and activity areas (e.g., beaches, boat mooring areas, parking lots) along with prom nent historical, cultural, and recreational features. A discussion of factors associated with patterns of existing use should be included as part of the exhibit if deemed desirable.

Exhibit 2 -- Existing Physical Features
This exhibit should provide a frame of reference in terms of baseline conditions at the site. Included here should be existing topography, vegetation, shoreline alignment and treatment, natural habitats, water depths (bathymetry), and such other features as may be deemed appropriate. A discussion of factors associated with these features should be included as part of the exhibit if deemed desirable.

RECREATIONAL BOAT LAUNCHING FACILITY

AREA OF CONCERN: Design and Layout of Facility

AUTHORITY: Policy Two of the Lakefront Plan of Chicago is "Maintain and enhance the predominantly landscaped character of the lakeshore parks." Policy Six of the Plan is "Increase the diversity of recreational opportunities while emphasizing lake-oriented leisure-time activities. Furthermore, Section 194B-6.2(c) of the Lake Michigan and Chicago Lakefront Protection Ordinance assigns to the Commissioner of the Department of Planning, City and Community Development the responsibility "to make such investigation relative to each application or proposal as he deems necessary."

REQUIREMENT: Site Plan

Explanation; For the Department of Planning, City and Community Development to make its findings and recommendations, as required by the Lake Michigan and Chicago Lakefront Protection Ordinance, it is necessary to clearly understand how the launching facility will be located relative to adjacent communities, lakeshore park facilities, and patterns of use, and Lake Michigan patterns of human use and wildlife habitation. A site plan should be provided which indicates:

- the location of the adjacent community edge(s);
- the location of the adjacent shoreline;
- proximity to existing park activities
  - a. structures
  - b. roads/pathways/formal access points
  - c. activity areas;
- proximity to natural habitat areas;
- location of parking lots;
- location of restrooms;
- location of slips and moorings (if in harbor);
- location of boat staging area (in water);
- location of off-loading/on-loading area (on land);
- fencing;
- bulkheads; and
- landscape treatment

RECREATIONAL BOAT LAUNCHING FACILITY

AREA OF CONCERN: Change in Existing Use(s)

AUTHORITY: Section 194B-3(e) of the Lake Michigan and Chicago Lakefront Protection Ordinance states that the Ordinance was adopted for the following purpose: "To insure that the Lakefront Parks and the Lake itself are devoted to public purposes and to insure the integrity of and expandthe quality and quantity of the Lakefront Parks."

REQUIREMENT: Statement of Purpose

EXPLANATION: Discuss the role of the facility in serving the needs of various user groups (e.g., boaters, fishermen). A user/needs survey or similar documentation of need would be helpful here. In order to determine if the proposed facility is compatible with the fourteen policies of the Lakefront Plan of Chicago and the thirteen purposes of the Lake Michigan and Chicago Lakefront Protection Ordinance, a detailed discussion of purpose would be helpful.

RECREATIONAL BOAT LAUNCHING FACILITY

AREA OF CONCERN: Effect Upon the Character of the Lakeshore Park

AUTHORITY: Section 194B-3(c) of the Lake Michigan and Chicago Lakefront Protection Ordinance states that the Ordinance was adopted for the following purpose: "To insure that the Lakeshore Parks and the Lake itself are devoted to public purposes and to insure the integrity of an expand the quality and quantity of the Lakeshore Parks." Polocy Two of the Lakefront Plan of Chicago states: "Maintain and enhance the predominantly landscaped character of the lakeshore parks."

REQUIREMENT: Compatibility Analysis (and Architectural Rendering if appropriate)

EXPLANATION: The Lakefront Plan of Chicago emphasizes that care must be taken to insure that new developments fit within the landscape of the existing lakefront park; that they enhance public use and enjoyment of the park; and that they are compatible with their surroundings. Therefore, in order for the Department of Planning, City and Community Development to make its findings and recommendations, it is necessary to clearly understand how the proposed facility would fit into its suroundings. For this reason, the application should include a discussion of the steps taken to insure that the proposed facility has been design to fit into the landscape. The discussion should focus on:

- design features that assist in maintaining a sense of openness;
- the nature of the construction materials; and
- an indication of how the proposed facility would affect the lakefront vista.

In those situations where visual aids are needed to illustrate the effect of the proposed facility upon the character of the park, an architectural rendering should be provided.

RECREATIONAL BOAT LAUNCHING FACILITY

AREA OF CONCERN: Disruption of Existing Park Uses

AUTHORITY: Policy Two of the Lakefront Plan of Chicago is "Maintain and enhance the predominantly landscaped, spacious, and continuous character of the lakeshore parks." Policy Four of the Plan is "Preserve the cultural, historical, and recreational heritage of the lakeshore parks." Furthermore, Policy Six of the Lakefront Plan is "Increase the diversity of recreational opportunities while emphasizing lake-oriented leisure-time activities.

REQUIREMENT: Recreation Impact Analysis

EXPLANATION: The Lakefront Plan of Chicago encourages the provision of lake-oriented leisure-time activities. However, there is also an expressed concern that new projects be harmonious with existent public enjoyment of the parks and Lake Michigan waters. For this reason, the application should include a discussion of how the proposed facility will fit in to the existing pattern of uses in the area, an identification of any uses that will be displaced should the proposed facility be constructed, a discussion of the changes in patterns of use that are likely to occur, and a discussion of mitigation strategies that would be employed to prevent or minimize unacceptable disruptions of these existent patterns or facilities. Should one of the purposes of the project be to encourage one pattern of use while discouraging others, a discussion of the rationale behind such a strategy would be helpful.

RECREATIONAL BOAT LAUNCHING FACILITY

AREA OF CONCERN: Effect Upon Fish and Wildlife

AUTHORITY: Section 194B-3(d) of the Lake Michigan and Chicago Lakefront Protection Ordinance states that the Ordinance was adopted for the following purpose: "To insure that construction in the Lake or modification of the existing shoreline shall not be permitted if such construction or modification would cause environmental or ecological damage to the Lake or would diminish water quality; and to insure that the life patterns of fish, migratory birds, and other fauna are recognized and supported." Furthermore, Policy Seven of the Lakefront Plan of Chicago is "Protect and develop natural lakeshore park and water areas for fish and wildlife habitation."

REQUIREMENT: Fish and Wildlife Impact Analysis

EXPLANATION: In order to make a recommendation to the Chicago Plan Commission within this area of concern, it is necessary to fully understand how the facility will affect fish and wildlife habitats within close proximity to the proposed facility. Therefore, an analysis should be performed that includes:

- a description of any existing wildlife habitats, breeding or nesting sites, or migratory patterns at or adjacent to the proposed facility;
- an indication of the probable impacts upon these elements that will result from the construction and subsequent use of the launching facility, and a detailed discussion of mitigation efforts to be used to minimize or avoid such impacts;
- an indication of any affirmative actions to be taken to enhance or establish habitats that may result from or be intended as part of the proposed project; and
- an identification of any new species that would be introduced into Lake Michigan as a result of the project.

RECREATIONAL BOAT LAUNCHING FACILITY

AREA OF CONCERN: Operational Safety and Security

AUTHORITY: Section 194B-3(a) of the Lake Michigan and Chicago Lakefront Protection Ordinance states that the Ordinance was adopted for the following purpose: "To promote and protect the health, safety, comfort, convenience, and general welfare...." In addition, Policy Eight of the Lakefront Plan of Chicago states: "Increase personal safety."

REQUIREMENT: Safety and Security Analysis

EXPLANATION: Utilization of the park facilities is dependent upon the apparent and real safety of the users. Therefore, in order for the Department of Planning, City and Community Development to make its findings and recommendations, it is necessary to clearly understand how the proposed facility would address security and personal safety. Therefore, the application should include a discussion of the following:

- The provisions made for patrolling (and lighting if appropriate) to increase security for users, spectators, and visitors to the facility.
- How have pedestrian and bicycle pathways been treated in designing the facility so that they will not conflict with roadways and parking areas.
- The provisions made for protecting the launching facility and the boat staging area from the wave action of Lake Michigan.
- If the proposed facility is to be part of a recreational boat harbor, the provisions made for separating boat movements.
- The provisions made for separating the trailer staging area from normal traffic circulation patterns, while allowing adequate space for trailer maneuvering.

RECREATIONAL BOAT LAUNCHING FACILITY

AREA OF CONCERN: Effect on the Adjacent Community

AUTHORITY: Policy Ten of the Lakefront Plan of Chicago is "Ensure a harmonious relationship between the lakeshore parks and the community edge...."

REQUIREMENT: Community Impact Analysis

EXPLANATION: If the boat launching facility is in close proximity to the community edge, special consideration must be given to the relationship between it and the community as specified in the Lakefront Plan. In order to assist the Department of Planning, City and Community Development make a determination regarding the relationship between the facility and the community edge, the applicant should prepare analysis that includes a discussion of the following:

- anticipated increases in traffic congestion in the streets of the adjacent neighborhood;
- anticipated increases in noise and odors that would result from the construction and use of the facility;
- anticipated nuisance effect of lighting if to be used at facility to expand usability of the facility; and
- anticipated increase in demand for parking space in neighborhood streets resulting from use of the facility.

RECREATIONAL BOAT LAUNCHING FACILITY

AREA OF CONCERN: Effects of Construction Activity

AUTHORITY: Section 194B-3(a) of the Lake Michigan and Chicago Lakefront Protection Ordinance states that the Ordinance was adopted for the following purpose: "To promote and protect the health, safety, comfort, convenience and general welfare...." Section 194B-3(d) of the Ordinance states that it was adopted for the following purpose: "To insure that construction in the Lake or modification of the existing shoreline shall not be permitted if such construction or modification would cause environmental or ecological damage or would diminish water quality."

REQUIREMENT: Construction Impact Analysis and Mitigation Plan

EXPLANATION: For the Department of Planning, City and Community Development to make its findings and recommendations, it is necessary to clearly understand how the construction activities are likely to disrupt existing use patterns in the vicinity of the site, to impair the water quality of Lake Michigan, and what steps the applicant proposes to take to minimize or mitigate these impacts. Therefore, the application should include the following:

- A construction staging plan which indicates:
  a. the time period during which construction is likely to occur;
  b. how construction materials and equipment are likely to gain access to the site and where they will be stored during construction;
  c. estimations of the types and amounts of traffic moving to and from the site; including likely times of peak movement;
  d. steps to be taken to minimize the disruption of existing park uses and adjacent neighborhoods; and
  e. measures to be taken to mitigate noise, vibration, and air pollution effects on adjacent neighborhoods and nearby natural areas.
- A construction safety plan which identifies the measures that would be taken to protect park users, visitors, community residents, boaters, and swimmers from hazards associated with the construction activities

NOTE: If dredging is required in order to construct the facility, refer to the dredging information package. Also, if landfill is required, refer to the landfill information package.

RECREATIONAL BOAT LAUNCHING FACILITY

AREA OF CONCERN: Water Quality

AUTHORITY: Section 194B-3(c) of the Lake Michigan and Chicago Lakefront Protection Ordinance states that the Ordinance was adopted for the following purpose: "To maintain and improve the purity and quality of the waters of Lake Michigan." In addition, Policy Three of the Lakefront Plan of Chicago states "Continue to improve the water quality and ecological balance of Lake Michigan."

REQUIREMENT: Drainage and Runoff Plan

EXPLANATION: The Lakefront Plan of Chicago recognizes the need to improve the quality of Lake Michigan's water in order to increase the utility of the Lake as a water supply, a habitat for wildlife, and as a resource for recreation. Therefore, in order for the Department of Planning, City and Community Development to make its findings and recommendations, it is necessary to clearly undertand how the proposed facility would deal with the issue of protecting Lake Michigan. For this reason, the application should include a drainage/runoff plan that discusses:

- How the drainage and runoff patterns at the site would change as a result of constructing the facility.
- What would be the increase in the volume of the runoff during rainstorms and how will this increase be provided for.
- What steps will be taken to prevent runoff from entering Lake Michigan.
- What steps will be taken to prevent hydrocarbons (oil and gas) from the parking lots from entering the Lake.
- The location of sewer hookups and assurances that the sewers are active and are capable of accomodating the anticipated flowage increases.
- If the proposed facility is to include a fueling operation, then a spill prevention and containment plan should be provided (see Recreation Boat Harbor for discussion).
- If the proposed facility is to be located in extremely sheltered waters, what is the anticipated rate at which the water body would flush itself.
- What steps will be taken to prevent trash, debris, and other foreign substances from entering the Lake.

RECREATIONAL BOAT LAUNCHING FACILITY

AREA OF CONCERN: Access and Traffic

AUTHORITY: Section 194B-3(f) of the Lake Michigan and Chicago Lakefront Protection Ordinance states that the Ordinance was adopted for the following purpose: "To promote and provide for continuous pedestrian movement along the shoreline." Section 194B-3(g) of the Ordinance states that it was adopted for the following purpose: "To promote and provide for pedestrian access to the Lake and Lakeshore Parks..., and to protect and enhance vistas at these locations and wherever else possible." In addition, Policy Eleven of the Lakefront Plan of Chicago states: "Improve access to the lakeshore parks and reduce through vehicular traffic on secondary park roads."

REQUIREMENT: Access Plan

EXPLANATION: The Lakefront Plan of Chicago encourages the provision of lake-oriented and regional leisure-time activities in the lakeshore parks. However, there is also an expressed concern regarding vehicular congestion and conflicts between access provisions and park uses. For this reason, the application should provide the following:

Exhibit 1 -- Access Schematic
This exhibit should indicate the roads, pathways, and parking areas that would service the facility. If changes in the existing alignment/configuration of the ways and areas is needed to service the facility, then the changes should be emphasized.

Exhibit 2 -- Circulation Schematic
This exhibit should indicate the circulation patterns within the park and the adjacent neighborhood, both as they now exist and as they are likely to exist in the future should the facility be constructed.

The application should also include a discussion of the following concerns:

- The anticipated increases in traffic resulting from the construction of the facility and the likely effect of these increases on traffic congestion and existing parking facilities.
- How the facility will fit into the regional vehicular traffic circulation patterns.
- How the facility will fit into the vehicular traffic circulation pattern in the adjacent neighborhood.
- How the proposed facility will affect pedestrian access to and along the shoreline and what provisions will be made to preserve and enhance such movements.

- How the proposed facility will affect visual access to the Lake and the horizon, and any affirmative actions taken to preserve the open and spacious nature of the park.
- How service vehicles (e.g., trash collection), emergency vehicles, and security patrols will gain access to the site.
- What signs will be installed to facilitate access to the facility and where will the signs be located.

RECREATIONAL BOAT LAUNCHING FACILITY

AREA OF CONCERN: Erosion of the Shoreline

AUTHORITY: Policy Nine of the Lakefront Plan of Chicago states: "Design all lake edge and lake construction to prevent detrimental shoreline erosion." In addition, Section 194B-3(d) of the Lake Michigan and Chicago Lakefront Protection Ordinance states that it was adopted for the following purpose: "To insure that construction in the Lake or modification of the existing shoreline shall not be permitted if such construction or modification would cause environmental or ecological damage or would diminish water quality."

REQUIREMENT: Erosion Control Plan

EXPLANATION: If the facility is to be constructed in an area that is subject to shoreline erosion, or elsewhere along the exposed lakeshore, the potential for shoreline erosion needs to be carefully considered. Therefore, in order for the Department of Planning, City and Community Development to make its findings and recommendations, it is necessary to clearly understand how the proposed facility would address such a concern. For this reason, the application should include a discussion of the following:

- The construction strategies that will be used to prevent detrimentan erosion from occuring during the construction of the facility.
- The design features or maintenance strategies that will be used to prevent erosion of the shoreline near the facility that would accur if the facility is constructed.

RECREATIONAL BOAT LAUNCHING FACILITY

AREA OF CONCERN: Effects of Facility Upon Navigation and Water Supply

AUTHORITY: Policy Thirteen of the Lakefront Plan of Chicago states: "Ensure that all port, water supply, and public facilities are designed to enhance lakefront character."

REQUIREMENT: Navigation and Water Supply Impact Analysis

EXPLANATION: The primary public use of the lakeshore parks should continue to be for culture and recreation. However, the recreation and cultural uses must share the lakefront with two other essential uses; water supply and shipping. Therefore, in order for the Department of Planning, City and Community Development to make its findings and recommendations, it is necessary to clearly understand how the proposed facility would affect water supply and navigation. For this reason, the application should include a discussion of the following:

- the location of any nearby shipping lanes and the measures proposed to prevent conflicts between the boats launched from the facilities and the commercial boat traffic.
- the location of any nearby commercial port operations and the measures proposed to prevent any anticipated conflicts between the operation of both facilities.
- the location of any water intake or treatment facilities nearby the proposed facility and the measures proposed to prevent any anticipated conflicts between the operation of both facilities.