college of architecture and planning
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ra needler
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the demand for recreation facilities has been on the increase since the second world war, throughout the united states; factors for this trend center on an increase of personal mobility, income, leisure time, education and population.

delaware county, within the indiana planning and development region six, is described by the state planning commission:

"located in the northwest central portion of the state, region six is dominated by the metropolitan centers of anderson and muncie. there are 37 inventoried tourist attractions in the region, none of which qualify as being of mid-west or national significance. the region is below the average in regional attractions which accounts for 19.3 percent of the 37 attractions. local attractions account of 74.2 percent of the total. the existing attractions show little clustering effect, denoting a potential for recreational development.

the region's two major attractions are mounds state park in madison county and ball state university in delaware county. there is one large body of water in the region, prairie creek reservoir, offering a full range of water-related activities. note-worthy regional and local attractions include the annual glass festival in blackford county and the wilbur wright memorial in henry county. local attractions provide the overwhelming majority of the attractions; however, these are under-utilized due to a lack of larger attractions drawing tourists into the region."

the surrounding regions are drawing local "tourists" with abundant natural lakes, ski slopes, various festivals, and auto racing.
A. Description of Project: A marina with additional recreation facilities for the Muncie Sailing Club at Prairie Creek Reservoir, including dining, short-term rental housing, tennis courts, and classroom facilities for Ball State Sailing Classes and Ball State Sailing Club.

B. Need for Proposed Project: As a long-time resident of the Muncie area, I know that the recreation facilities of Prairie Creek are lacking or in poor condition. A project such as this would improve the quality of the reservoir as well as Muncie in providing these activities.

C. Objectives:
- Members of the Muncie Sailing Club/Ball Sailing Club: middle class workers who want an escape on weekends and holidays and college students interested in learning and enjoying sailing.

D. General Description:
- A small, man-made inlet on the east shore of a man-made reservoir with small hills rising off the water, presently a club house and docking for approx. 75 boats, with additional boats in storage.
- Muncie is located on the reservoir surrounded by small farms and small towns/villages of Selma, Smithfield, and New Burlington with Muncie approx. 7 miles to the northwest. Small boat sailing and swimming/fishing activities at the reservoir.

E. Design Goals:
1. Establish a viable marina for the Muncie Sailing Club which they can use as a base for future expansions and improvements.
2. Develop a recreation facility which can be used by the Sailing Club to increase youth activities at the reservoir, strengthening the club's membership and future.

Date: Sept. 12, 1977
the need of recreation in region six has been established by state planning studies, and the most promising area is prairie creek reservoir. Located six miles southeast of muncie in perry township of delaware county, the reservoir was constructed in 1959 on land owned by the muncie water works company, the remaining land leased to the city of muncie as a park, and has a total area, including land and water, of 2333 acres, with 1252 acres being water. Three and one-half mile length and six-tenths mile average width, the reservoir has an average depth of 18 feet behind a 3000 foot long dam.

bounded by secondary county roads, 560 east on the east, 300 south on the north, 475 east of the west, and 650 south on the south, the reservoir is also ringed by the small towns of smithfield, mount pleasant, and new burlington and fed by prairie creek, felton creek, shavetails creek, collarbone creek, and huffman creek. At the north end, the reservoir feeds into white river, an addition to its flow when necessary for the water needs of muncie,
within the reservoir I propose a recreation facility which can answer some of those needs of the region presently inappropriately supplied, as well as be a viable recreation/leisure attraction within the state.

Of central focus within this facility will be a marina for the Muncie Sailing Club (MSC), now located on the south edge of Shavetail Cove. This facility could incorporate existing sailing and social club activities and expand south to Huffman Creek, approximately 700,000 square feet.

Also within this project is outdoor tennis courts/fields and apartments, overlooking the marina activities. Encouraged winter activities would be ice skating, ice fishing and snowmobiling, with possibilities for ice sailing.
the muncie sailing club:
a racing/cruising club with a membership limited
to 138 due to lack of mooring space. Of
the 138, 20 to 25 members are serious racers
who enter competitions throughout the region
presently a spring to fall club with docks in
place april to november.
races each sunday, but the client stated need
for shorter races which could include
"fleet-type" races, between similar boat
types, and a need for "little league," youth
races.
need for a safety program for junior sailing
and adult sailing.
occasional social programs: banquet at the end
of the season, post-race dinners, held at
muncie establishments.
the present lease with the city will soon expire
and renegotiations for park department money
may be a financial problem.
the ball state sailing club: during spring/
summer, 40 member sailing; planning to pur-
chase 3 new boats and are in need of storage
and repair/work areas.
program

client/user description
growth and change
construction/economics
functions
library/lounge
recreation
lockers/showers
dining
food preparation
miscellaneous
marina activities
the Muncie Water Works company owns/leases the prairie creek reservoir to the City of Muncie park department, a 60 year lease, from December 1961, to maintain the reservoir area as a park. The city has allowed the MSC to establish and maintain its site on the east shore at Shavetail creek cove. The client is the board of directors of the MSC, with the club itself. The board members manage and maintain the existing facilities: 4 room clubhouse, launching area, docks for 30-40 boats with recent mooring bouys added, and trailer/auto parking for its members; from this existing facility I am proposing this project.

Assumed client goals: through proper marina layout, increase the moorings, allowing for an increase in membership; establish a growth/change plan, feasible for a 5 to 10 year period; establish a base which can attract youth to sailing in general and the club in particular; users other than MSC members; club visitors/guests, club employees/volunteers, and park visitors/ users.
the Indiana Department of Commerce's planning division has established in its 1974 "leisure industry" study of the state, establishing regions of potential recreational development. Region 6 contains Delaware County and prairie creek reservoir within the middle of the state. With Muncie's inevitable growth, as well as the other surrounding towns growth, the need for the facilities proposed will become more pressing. The site has an attainable maximum marina size; at this size, the only way for continued growth would be to develop other sites or for an increase in reservoir size.

Change in the MSC could mean a change of focus, from sailing, to other recreation activities, expanding recreational services and limiting sailing services.
"an ideal attitude would consist of 80 percent business acumen and hard work, 10 percent interest in boats and 10 percent instinct for gambling."

essential role: sufficient funds must be available and remain so.
because of its park definition, prairie creek reservoir and the recreational development, could possibly get money from any or all of the following sources: the federal government the state the county the city private investment, by the msc members, or, to increase its investment value, the muncie water works, co.
prefering to use a wooden ship analogy, exposed timber structure with wood decking and canvas as awnings, are used throughout the project, the infill panels are of vertical wood siding, exterior, and of vertical wood siding and canvas panels, interior. the exterior structural timber is pressure-treated fir post construction on concrete piers.
functions
the clubhouse

the functions in this section are arranged into
the private club functions and the public func-
tions, broken down into:

1. general description
2. user description
3. critical issues
4. furniture/equipment
5. lighting, hvac specialties
6. location priority/peak periods
7. views
private club functions:
  offices
  commodore .200 sq. ft.
  vice commodore 150 sq. ft.
  secretary/treasurer/receptionist 300 sq. ft.
  bsu sailing club 150 sq. ft.
  meeting rooms each 400 sq. ft.
  lockers/showers each 1200 sq. ft.
  laundry 400 sq. ft.

public functions:
  library/lounge 1000 sq. ft.
  recreation 1500 sq. ft.
  dining 2500 sq. ft.
  food preparation 1200 sq. ft.
  weather data 400 sq. ft.
  restrooms each 200 sq. ft.
  bar/lounge 1500 sq. ft.
  boat rental office 150 sq. ft.
  boat repair/maintenance 4000 sq. ft.

miscellaneous
  observation decks
  kitchen storage
  custodial rooms
  vending areas
  first aid room
  mechanical
library/lounge 1000 sq. ft.
description: club library of sailing books and periodicals as well as general lounge and trophy display room.
user description: club members waiting out inclement weather, taking sailing lessons, resting or reading.
critical issues: subdued activities space, furniture/equipment: lounge furniture with task lamps,
lighting: task illumination for reading with natural lighting desirable, hvac: general comfort levels, acoustics: subdued sound levels, location priority: adjacent to formal dining and within visual contact of weather data room, peak periods: inclement weather, race day, etc.
views: to docks/water

recreation room 1500 sq. ft.
description: general table games room, user description: club members or guests, children.
critical issues: acoustically insulated, furniture/equipment: lounge chairs, game tables, cards, chess/checkers, billiards, table tennis,
lighting: general illumination levels with natural lighting desired, hvac: general comfort levels, acoustics: insulated from other quieter areas, location priority: adjacent to vending room, peak periods: inclement weather, spring/summer/fall months.
views: to docks/water.
men's locker room - women's locker room 1200 sq. ft.
description: a locker/shower with toilets and
lavatories for club members.
user description: club members beginning/ending
a day of physical activities, i.e. sailing.
critical issues: vandal protection of lockers/equipment.
furniture/equipment: lockers, showers, toilets,
urinals, lavatories, benches, towel bins.
lighting: g.i.l.; hvac: general comfort levels;
acoustics: not critical.
location priority: access to docks.
peak periods: morning/afternoon periods of
sailing.
views: not critical.
formal dining 1500 sq. ft.
description: an evening dinner room for club
members; race awards banquet dinners.
user description: club members and their guests.
critical issues: direct view to docks/water.
furniture/equipment: dining tables and chairs.
lighting: g.i.l.; hvac: g.c.l.; acoustics:
insulated from kitchen noise.
location priority: adjacent to entrance with
terrace access to views of docks/water;
adjacent to kitchen.
peak periods: evening meals; post race banquets;
views: to docks/water.
informal dining 1000 sq. ft.
description: morning/afternoon dining facility;
family oriented.
user description: msc members, guests and park
visitors.
critical issues: views to docks/water; not
disturbed by kitchen noises.
furniture/equipment: tables and chairs, booths,
and/or counter service.
lighting: g.i.l.; hvac: g.c.l.; acoustics: insulated from kitchen noise.
location priority: adjacent to docks, recreation areas; adjacent to kitchen.
peak periods: noon meal times; spring/summer/fall
views: to docks/water, to recreation activities.
kitchen 1200 sq. ft.
description: food preparation facilities for informal and formal dining; storage and dishwashing.
user description: club employees/volunteers.
critical issues: health standards observed.
office space
dishwashing space
food storage
freezer/cooler
restroom/cloakroom
waitress station
furniture/equipment: all necessary kitchen appliances and equipment
lighting: g.i.l. with task lighting; hvac: g.c.l., with ventilation over cooking areas.
location priority: adjacent to dining areas; service access for unloading/storage of deliveries.
peak periods: before, during, after meal times.
views: to dining areas; to docks/water
additional spaces/activities:
weather data room 400 sq. ft.
laundry 400 sq. ft.
vending room 400 sq. ft.
custodial/storage total 200 sq. ft.
mechanical room total 2000 sq. ft.
receiving/storage 200 sq. ft.
restrooms each 200 sq. ft.
bae sail club meeting spaces
commodore office
vice commodore office
secretary/treasurer
marina activities/functions
boat repair/maintenance area 3500 sq. ft.
equipment storage lockers
launching ramps/areas
dry storage for boats
covered moorings
auto w/trailer parking/storage area 12000 sq. ft.
trailer parking 6000 sq. ft.
public activities/functions:
36 apartments 300 sq. ft. each; 28300 sq. ft.
description: short-term rental apartments,
primarily for weekend and holiday sailing/
recreation activities.
user description: msc members as well as
general public renters.
critical issues: carefully controlled rental
stays; avoidance of "resort cabin" appear-
ance.
furniture/equipment: necessary lounging/
sleeping, kitchenette, bathroom furniture/
equipment.
lighting: g.i.l.; hvac: g.c.l.; acoustics:
not critical.
location priority: access to clubhouse activi-
ties, water/docks, recreational facilities.
peak periods: not established.
views: to water/docks, outdoor recreation
activities.
recreation areas; outdoors:
tennis
badminton
volleyball
casual recreation areas: picnic, football,
softball, frisbee.
boat rentals: sailing, rowing.
swimming pool
parking:
clubhouse 20000 sq. ft.
marina 18000 sq. ft.
apartments 16000 sq. ft.
54000 sq. ft.
site/context

area context
site context
site analysis
conceptual analysis
the area in which the project is located is farm land, flooded to create the reservoir. direct-west, across from the site, is the village of new burlington; north of the site is the designated reservoir swimming area, and to the south, the town of mount pleasant.

the prairie creek lake and park, as maintained by the muncie park and recreation department for the muncie water works company, provides basic recreation facilities, many however in poor condition. beach and bath house, basketball court, play equipment, picnic areas are available on the east side of the lake, with campsites, horseback riding areas and motorcycle path on the south and west edges. the north end of the lake is a restricted earthern dam area, which feeds the lake into white river.
centered on an east shore cove formed by shavetail creek feeding into the lake and gates road bridge, the site's features include knolls on each side of the cove, approximately 30 to 35 feet above the water's maintained level, scattered oaks, maples and cottonwoods, park storage barns to the north and the existing muncie sailing club house and docks to the south of the cove.

Utilities to the site include electric and telephone service along gates road and walk for existing park shelters. The existing structures include a remodeled farmhouse which has served as the sailing club's clubhouse, 2 large barns which once served as storage for the prairie creek beagle club, a park picnic shelter and restrooms.
property leased by the city of muncie
prop retained by muncie water works
prop leased for use from mwwco
prop unsuitable for leasing
prop not owned by mwwco
muncie water works
new burlington
unleased farm prop
mwwco
burlington run

scale 1" = 200 feet

prairie creek marina
completed the first quarter of the project, the site analysis was an attempt to compile all environmental information concerning the project site and graphically represent the effects.

circulation: secondary county roads in good condition circle the reservoir and boarder the east boundary of the site. Most significant problem would be heavy snows closing the roads in winter.

land use: the majority of land surrounding the reservoir area, and all land on the water's edge, is owned by the muncie water works company and is leased as farm land. The land on the water is leased by the city of muncie as a park/recreation development.

soils: the soils in the reservoir area are silty clay loams found on moderate sloping sites; erosion possibilities are high, with moderate to low shrink-swell potential.

vegetation: majority of deciduous trees are white oak with mix of maples, cottonwoods and willows; low trees and shrubs cover the washes; open grasses maintained in pier/marina areas.

drainage: site slopes to reservoir and shavetail creek with washes developed; knolls/ridges with ground cover, erosion only along reservoir edges.

utilities: existing utilities include electricity and telephone lines running along gates road to east boundary of the site, and wells providing water service.
site sections: topography
with knolls on both sides of the cove formed by
the bridged shavetail creek, the site falls
away to the creek and to the west to prairie
creek reservoir.

synthesis: the synthesis of site analysis shows
the primary building areas on the knolls beside
shavetail creek, with focus to the creek and
out to the reservoir. the fills allow the pro-
ject to move out into and over the cove, enclo-
sing the marina activities while allowing only
glimpses of the activity from the road to the
east.
pedestrian paths

enclosure by trees and shrubs

prairie creek reservoir

secondary auto-gravel

soft edge - water

open grass from road to water

shavetall creek

primary node - marina

secondary node - picnic shelter

hard edge - road

primary auto-560e

huffman creek

micro: edges/circulation

scale 1:400'

prairie creek marina
majority of large deciduous trees are white oak with sparse maple, willow and cottonwood.
small trees and shrubs areas are cottonwood, willow and wetlands weeds.
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**Macro/Micro:**

**Soils**
poor view of swimming area

good views up and down reservoir

good views across water

prairie creek reservoir

fair view under trees from shelter

good view to end of reservoir

views

scale 1:400

prairie creek marina

view blocked by trees

good views from existing barns

good view to marina

view blocked by trees

fair views from marina clubhouse to water

existing marina

existing chimney

huffman creek

door views of farm horses
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the clubhouse as the bridging element to the east end of the shavetail cove, connecting recreation areas with the apartments to the north and marina to the south; focus is on the marina activities.
marina as the central focus with clubhouse to the north, with best views and the apartments to the south, off of the marina; the recreation areas act as buffers to the road pedestrian circulation required across the country road bridge at shavetail creek.
combining the clubhouse and apartments on to the south side of the cove, placing the marina activities in close proximity to the north; recreation areas would be on the north knoll and south of the clubhouse/apartments.
the concept for both the clubhouse and apartments was a stepping down to the marina activities, forming an amphitheatre-like space in the cove, the marina activities the stage, the apartment residents, and clubhouse users, the audience. the clubhouse is to act as a screen between the public and the marina activities, entering at the upper steps and flowing down to the water, public spaces to private spaces. the apartments as a screen from the public area to the north of the site, entering at upper steps, bring the residents down to the water and view of the marina.
the building type study was investigated with an intention of developing marina/clubhouse relationships.

Some basic relationships found were: the marina drawn into the boating complex, the boating complex pushed out into the marina, and the boating complex fronting the marina.

Conclusions drawn included the advantage of views available to the complex with marina activities on three sides and the possibility of expansion available to the complex fronting the water. These two could be combined in my design, projecting the clubhouse out, while fronting part of it along the water's edge.
Boating complex, Lake Windermere at Bowness, Lake District, North England.

Differing functions in a single complex; use of pitched roofs and traditional materials.

The marina/docks are drawn into the complex, with commercial areas on two sides and services, administration on the other of the ground level. The first and second floors are occupied by a restaurant and further commercial and office space.

Circulation and views are focused on and directed around the marina/docks.

Building types: boating complex - Bowness
Marina, Cherry Creek Reservoir, Denver, Colorado

Used as reference points, a clear indication of its purpose: "Home base" "Concrete 'sails in full wind' painted bright orange"

Set on the edge of the reservoir linear circulation winding around the spaces beside the marina.

Limited public facilities

Building types: Cherry Creek Marina
laurel point, victoria, british columbia, canada

a cluster of four buildings with a central promenade leading to the marina.

central is the hotel with cabaret and meeting rooms with views to the water

set back from the water with a water-edge promenade access.

building types: laurel point
Portmadoc harborside, Gwynedd, Wales

Housing development built to represent the historic coastal village.

Views are out to the water and into the central park and parking, with a launching slipway into the marina.

Building types: Portmadoc, harborside
San Diego Yacht Club, San Diego, California

 Tradition "gingerbread barns of clubhouses"

 Broad covered porches with a central axis to the water; spaces opening off the axis, views to the water, marina.

 Second level: administration and viewing/judging of races.

Building types: San Diego Yacht Club
administration building, shilshole bay marina, seattle
boater oriented first floor and a dining oriented second floor; central axis leads to waterfront wharf
front colonnade acts as pedestrian circulation as well as sun screen
strong connection with parking; bridge leads from parking to second floor dining.

building types: shilshole bay marina
5.4-7 Land-to-water relationship:
The land-to-water area in each case remains equivalent and constant but the shapes and relationships vary as the land wraps around the water. The off-shore marina has the shortest land/water interface but some land is 3 times further from the water than with the land-locked type.

The geography determines the engineering
The engineering determines the profile
The profile determines the lay-out
The lay-out determines the architecture

5.4 Advantage
Minimum bulkhead wall
Minimum land take
Minimum dredging

5.4 Disadvantage
Expensive in deep water
Vulnerable to weather, currents
Navigation hazards
Minimum enclosure
Silting by littoral drift

5.5 Advantage
Good for cut-and-fill economics

5.5 Disadvantage
Navigation hazard

5.6 Advantage
Uninterrupted shore-line
Large land/water interface
Considerable enclosure

5.6 Disadvantage
Large land take
Length of bulkhead wall
Amount of dredging

5.7 Advantage
Maximum enclosure
Minimum interruption of shore-line

5.7 Disadvantage
Maximum bulkhead wall
Distance from open water
Approach by water

5.8 Transport analysis is an essential part of the site selection process. If access does not exist or is inadequate it will have to be provided or improved by way of approach roads and reliable transport services.

5.10 Some of the main activities which generally need to be included within a marina:

moorings &
boatside facilities

5.11 How a draft amenity outline could be developed into a basic lay-out
the schematic design developed from the first concept of the building as bridge, wanting to allow a glimpse of the marina activities to the auto traffic, as well as indicate the continued availability to non-sail boats of shavetail creek, the building steps away at midpoint, as it steps up the knolls, with only a pedestrian bridge as connection.
development of 1st quarter design decisions of clubhouse/marina activities on the south side of shavetail cove and apartment/passive sailing activities on the north side of the cove. apartments and clubhouse set into knolls and stepped back, providing decks.
7 final design - 3rd quarter
8 appendices
By BOB JONASON

Ball State students flock to Prairie Creek Reservoir every spring to sun-bathe and relax, but few take advantage of the many diversions the lake has to offer in the fall and winter seasons. "As far as fishing is concerned, this is the best time of the year," said Ron Bonham, foreman at the Prairie Creek grounds. "It's so doggone hot in the summer that we usually just get the leisure-type people. Now is when we start seeing the serious fishermen."

Bonham said fishing is allowed at all areas of the 1,250 acre reservoir except by the pontoon docks and the dam. A daily permit to fish costs 50 cents and a yearly permit can be purchased for $5. Boats and pontoons are available for rent from now until Oc.t. 15.

Portions of the fishing permits' revenue goes to stocking the reservoir with 5,000 worth of bass and walleyes annually, Bonham said. "Those are the game fish most fishermen like to catch. The lake is also heavily populated with crappies, perch and channel catfish."

"If fishing isn't your bag," Bonham said the picnic equipment will be left out until Oct. 15. "The swimming season closed Labor Day and will open next Memorial Day."

Bohham, who is working for his masters degree in business education at Ball State, said snowmobiling and sledding are popular sports on the west side of the reservoir in the winter months.

"When the ice gets about 4 inches thick, we rope off an ice rink on the east side (where the pontoon boat rentals and swimming can now be found). We usually get a lot of kids from Muncie who come out here, and we also see quite a few Ball State students," he said.

"Ice fishing at the reservoir is also very good," Bonham said.

But the main crowds come to Prairie Creek during the summer, not only to swim and boat, but to drive the motorcycles and four-wheel vehicles on trails located on the reservoir's west side.

In addition, rock dances are held every weekend at a small-craft airplane launching field on the reservoir's south side.

"Prairie Creek maintains a 24-hour police security force between April 15 and Oct. 15, and has at least one policeman on duty during the day in other months," Bonham said, however, they have never had any trouble with Ball State students.

"We never fool with anybody," he said. "We like to see Ball State kids come out here to enjoy themselves and get away from it all, and as long as they're not tearing up things, which we haven't had, we don't bother them."

BSU Daily News 9/9/77
RULES AND REGULATIONS OF PRAIRIE CREEK LAKE AND PARK

The Board of Park Commissioners of the City of Muncie, by authority of the statutes of the State of Indiana and that granted to it by the Common Council of the City of Muncie, does adopt the following RULES AND REGULATIONS concerning the use and activities on Prairie Creek Reservoir:

SECTION 1. That all applicable laws of the State of Indiana and the Ordinances of the City of Muncie are hereby declared to be applicable to the use and activities by the Board of Park Commissioners of the Lake and Park and are referred to and incorporated herein by reference as the Park from the Municipal Works in the year forty-nine dated December 1, 1891.

SECTION 2. No person in the Park shall:

Engage in any activity specifically prohibited by said law.

Throw, discharge, or otherwise place or cause to be placed on the Park grounds or in the use of any stream flowing into such waters, any refuse, matter or thing, liquid or solid, which may result in the pollution of said waters.

Burgl or dump, deposit or leave any broken glass, unbroken bottles or cans, rubbish, waste, garbage, or refuse, or other such refuse or trash shall be placed in waters in or adjacent to the Park, or left here on the grounds thereof, but shall be collected in the proper receptacles where these are placed, and receptacles are not to be provided, all rubbish or waste shall be carried away from the Park or any place in the Park or on or off any private property, in manner and order as to prevent the pollution of the Park or the waters thereof.

Unless authorized by the Park Board, hunt, fish, trap, or other use of any wild animal, bird or fish within the confines of the Park, or shoot or shoot any bird or animal bird or fish, or any wild animal, bird or fish in use within the confines of the Park, or on or off any private property, in manner and order as to prevent the pollution of the Park or the waters thereof.

C. Motor vehicles shall park only in designated parking areas and shall not be driven or carried over any road within the Park at a speed rate of speed than is indicated by speed limit signs posted.

D. Post, display or expose within the Park with the permission of the Park Board any sign, advertisement, circular, notice, emblem or device.

E. Camp overnight without permission of the Park Board.

SECTION 3. No person in the Park shall:

A. Drive any motor vehicle except on drives and service roads provided for the same, unless to use any portion of the Park for purposes of western except drives, roads, roads, or service roads established for said purposes.

B. Use or engage in any activity which in the opinion of the person responsible for the use of the Park, is likely to cause injury or damage to any person or property or is likely to cause any injury or obstruction to the use of the Park.

C. Operate a craft more than 26 feet in length from any point on the shore to the edge of the lake.

D. Operate a craft having more power than 15 horsepower.

E. Operate a craft at a speed in excess of 16 MPH.

F. Be a passenger in any craft without having Coast Guard approved life preserver available and each passenger must have a preserver.
<table>
<thead>
<tr>
<th>Ref.</th>
<th>Type of mooring</th>
<th>Examples</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Stern to quay, jetty or pontoon, bows to ples</td>
<td>Chichester, Le Grande, Motte, Rotterdam, Kristiansund</td>
<td>jetty economy</td>
<td>not as convenient for embarking as alongside jetties or pontoons</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Ditto but bows moored to anchors or buoys</td>
<td>Deauville and the majority of Mediterranean marinas</td>
<td>jetty economy</td>
<td>not suitable with large tide range as excessive space required for head warps; danger of propellers being entangled in head warps</td>
<td>particularly suitable for large yachts in basins with little tide range where gangways can be attached to sterns</td>
</tr>
<tr>
<td>C</td>
<td>Alongside finger piers or catwalks, one yacht on each side of each finger</td>
<td>Cherbourg, Larnaca (Cyprus) and many American marinas</td>
<td>convenient for embarking and disembarking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Ditto but more than one yacht on each side of each finger</td>
<td>Port Hamble, Swanwick, Lymington</td>
<td>Ditto also allows flexibility in accommodating yachts of different lengths</td>
<td>finger piers must be spaced wider apart than in 'C' though this may be compensated for by the larger number of craft between jetties</td>
<td>fingers may be long enough for two or three vessels if more than three then provision should be made for turning at the foot of the berths</td>
</tr>
<tr>
<td>E</td>
<td>Alongside quays, jetties or pontoons single banked</td>
<td>Granville</td>
<td>Ditto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Alongside quays jetties or pontoons up to 3 or 4 abreast</td>
<td>St. Malo, Ouistreham, St. Rochelle</td>
<td>economical in space and pontoons</td>
<td>crew from outer yachts have to climb over inner berthed yachts</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Between piles</td>
<td>Yarmouth, Hamble River, Cowes</td>
<td>cheapest system as no walkways, also high density</td>
<td>no dry access to land; difficulty in leaving mooring if outer yachts are not manned</td>
<td>not recommended except for special situations such as exist in the examples quoted</td>
</tr>
<tr>
<td>H</td>
<td>Star finger berths</td>
<td>San Francisco</td>
<td></td>
<td></td>
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5.D Advantages and disadvantages of some types of berth lay-out: see 5.65 opposite

<table>
<thead>
<tr>
<th>Class</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<tbody>
<tr>
<td></td>
<td>sail &amp; motor</td>
<td>sail &amp; motor</td>
<td>sail &amp; motor</td>
<td>sail &amp; motor</td>
<td>sail</td>
</tr>
<tr>
<td>I</td>
<td>32</td>
<td>30</td>
<td>26</td>
<td>40</td>
<td>9.7</td>
</tr>
<tr>
<td>II</td>
<td>37</td>
<td>35</td>
<td>32</td>
<td>53</td>
<td>10.5</td>
</tr>
<tr>
<td>III</td>
<td>44</td>
<td>42</td>
<td>40</td>
<td>62</td>
<td>11</td>
</tr>
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<td>IV</td>
<td>58</td>
<td>55</td>
<td>52</td>
<td>82</td>
<td>13.5</td>
</tr>
<tr>
<td>V</td>
<td>72</td>
<td>66</td>
<td>64</td>
<td>100</td>
<td>15.5</td>
</tr>
<tr>
<td>VI</td>
<td>100</td>
<td>90</td>
<td>90</td>
<td>140</td>
<td>25</td>
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5.E Recommended metric minimum clearances for the lay-outs proposed in 5.D for well-protected still-water basins
5.65 Mooring layouts

5.66 This double-banked arrangement is one of the most frequently adopted berth lay-outs. It is intended to be rather repetitive if too many rows of identical piers are used, as at Shilshole, Seattle, but it is economic and simple. The Hamble River Marina, Solent, shown here, is unusual in having ‘straight through’ finger piers which master the main walk-way and are actually wider. The end-of-pier piles in roller housings are a neat and conventional solution. The timber dockings add, as usual, a warm and natural appearance.
### Types and Sizes of Typical Sailboats

<table>
<thead>
<tr>
<th>Classification and Name</th>
<th>Length Overall</th>
<th>Beam</th>
<th>Mast Height</th>
<th>Draft</th>
<th>Weight (LBS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEVEN ELEVEN</td>
<td>7'-11&quot;</td>
<td>4'-2&quot;</td>
<td>13'-0&quot;</td>
<td>0'-4&quot;</td>
<td>89</td>
</tr>
<tr>
<td>ROOSTER</td>
<td>9'-7&quot;</td>
<td>3'-10&quot;</td>
<td>8'-0&quot;</td>
<td>0'-5&quot;</td>
<td>100</td>
</tr>
<tr>
<td>SPYRIT</td>
<td>10'-2&quot;</td>
<td>4'-9&quot;</td>
<td>15'-18&quot;</td>
<td>0'-3&quot;</td>
<td>150</td>
</tr>
<tr>
<td>SUNFISH</td>
<td>13'-9&quot;</td>
<td>4'-0&quot;</td>
<td>9'-1 1/2&quot;</td>
<td>0'-4&quot;</td>
<td>172</td>
</tr>
<tr>
<td>WINDMILL</td>
<td>16'-6&quot;</td>
<td>4'-8&quot;</td>
<td>17'-10&quot;</td>
<td>5'-6&quot;</td>
<td>198</td>
</tr>
<tr>
<td>HIGHLANDER</td>
<td>20'-0&quot;</td>
<td>6'-6&quot;</td>
<td>22'-0&quot;</td>
<td>8'-8&quot;</td>
<td>300</td>
</tr>
<tr>
<td>Y-FLYER</td>
<td>18'-2&quot;</td>
<td>5'-9&quot;</td>
<td>22'-0&quot;</td>
<td>8'-6&quot;</td>
<td>500</td>
</tr>
<tr>
<td>LIGHTNING</td>
<td>19'-0&quot;</td>
<td>6'-5&quot;</td>
<td>22'-0&quot;</td>
<td>8'-9&quot;</td>
<td>700</td>
</tr>
<tr>
<td>FIREWIND</td>
<td>19'-5&quot;</td>
<td>6'-7&quot;</td>
<td>22'-0&quot;</td>
<td>3'-4&quot;</td>
<td>1,000</td>
</tr>
<tr>
<td>CAL 24</td>
<td>25'-0&quot;</td>
<td>8'-0&quot;</td>
<td>22'-0&quot;</td>
<td>4'-9&quot;</td>
<td>4,500</td>
</tr>
<tr>
<td>PRIVATEER</td>
<td>31'-3&quot;</td>
<td>8'-0&quot;</td>
<td>31'-6&quot;</td>
<td>3'-6&quot;</td>
<td>6,240</td>
</tr>
<tr>
<td>ISLANDER 25</td>
<td>54'-8&quot;</td>
<td>14'-0&quot;</td>
<td>53'-0&quot;</td>
<td>9'-9&quot;</td>
<td>36,000</td>
</tr>
</tbody>
</table>
### Dimensions for Slips and Catwalks

<table>
<thead>
<tr>
<th>Length Group for Boats</th>
<th>Beam to Be Used for</th>
<th>Min. Clearance for Beam</th>
<th>Total Beam</th>
<th>Allowance for Half Pile Length</th>
<th>Gross Slip Width Using 4 Feet Floats</th>
<th>Gross Slip Width Using 5 Feet Floats</th>
<th>Usable Width of Catwalk</th>
<th>1st Catwalk Span (Feet)</th>
<th>2nd Catwalk Span (Feet)</th>
<th>3rd Catwalk Span (Feet)</th>
<th>Total Length of Catwalk</th>
<th>Distance V.T. to Anchor Pile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 14</td>
<td>6.7</td>
<td>2.9</td>
<td>5.8</td>
<td>10</td>
<td>10.9</td>
<td>10.6</td>
<td>11.8</td>
<td>12</td>
<td>12</td>
<td>9</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>14 to 16</td>
<td>1.4</td>
<td>2.4</td>
<td>9.8</td>
<td>10</td>
<td>11.9</td>
<td>11.4</td>
<td>12.6</td>
<td>12</td>
<td>12</td>
<td>9</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>16 to 18</td>
<td>0.6</td>
<td>2.3</td>
<td>7.5</td>
<td>10</td>
<td>13.4</td>
<td>13.3</td>
<td>14.8</td>
<td>14</td>
<td>14</td>
<td>10</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>18 to 20</td>
<td>0.6</td>
<td>2.2</td>
<td>6.6</td>
<td>10</td>
<td>13.9</td>
<td>13.9</td>
<td>15.4</td>
<td>16</td>
<td>16</td>
<td>13</td>
<td>16</td>
<td>16</td>
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<td>20 to 22</td>
<td>0.5</td>
<td>2.1</td>
<td>6.1</td>
<td>10</td>
<td>13.8</td>
<td>14.0</td>
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<td>15.4</td>
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<tr>
<td>22 to 25</td>
<td>0.5</td>
<td>2.0</td>
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<td>10</td>
<td>12.5</td>
<td>12.5</td>
<td>13.9</td>
<td>13.9</td>
<td>13.9</td>
<td>12</td>
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<tr>
<td>25 to 30</td>
<td>0.4</td>
<td>1.9</td>
<td>4.4</td>
<td>10</td>
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<td>10.4</td>
<td>11.9</td>
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<td>11.9</td>
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<tr>
<td>30 to 35</td>
<td>0.3</td>
<td>1.8</td>
<td>3.5</td>
<td>10</td>
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<td>8.8</td>
<td>9.8</td>
<td>9.8</td>
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<td>8.8</td>
<td>9.8</td>
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<tr>
<td>35 to 40</td>
<td>0.3</td>
<td>1.7</td>
<td>2.7</td>
<td>10</td>
<td>7.2</td>
<td>7.2</td>
<td>8.1</td>
<td>8.1</td>
<td>8.1</td>
<td>7.2</td>
<td>8.1</td>
<td>8.1</td>
</tr>
<tr>
<td>40 to 45</td>
<td>0.2</td>
<td>1.6</td>
<td>1.9</td>
<td>10</td>
<td>5.8</td>
<td>5.8</td>
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<td>45 to 50</td>
<td>0.2</td>
<td>1.5</td>
<td>1.9</td>
<td>10</td>
<td>4.7</td>
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<td>50 to 60</td>
<td>0.2</td>
<td>1.4</td>
<td>1.4</td>
<td>10</td>
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<td>10</td>
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<td>1.8</td>
<td>1.8</td>
<td>1.8</td>
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</tbody>
</table>

**Notes:**
- This tabulation is based upon use of traveler irons.
- Slip widths are to be adjusted when 3 pile anchors are used.
- Catwalks to be planned for full length as needed.
- Refer to Diagram E for typical arrangements.

---

*Fig. 4. Diagram and table for slips and catwalks. The diagram and table are to be used together to determine lengths of slips, lengths of catwalks, and locations for three anchor piles. Fixed dimensions shown in the diagram are considered sufficient for construction purposes. (See also Fig. 3.) The tabulation is based on use of traveler irons. Slip widths are to be adjusted when 3 pile anchors are used. Catwalks are to be planned for full length as needed. Typical arrangements are shown in the diagram.*
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