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of Transportation

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Administration**

Advisory Circular

Subject: Seaplane Bases

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Change:

1. PURPOSE. This advisory circular (AC) provides guidance to assist operators in planning, designing, and constructing seaplane base facilities.

2. APPLICATION. Establishment or modification of a seaplane base requires advance notification to the Federal Aviation Administration (FAA). In support of such establishment or modification, FAA recommends the design embody the guidance in this advisory circular.

LEONARD E. MUDD
Director, Office of Airport Safety and Standards

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CHAPTER 1. INTRODUCTION

1. INTRODUCTION. Aviation plays a significant role in the nation's economy and in its transportation network. Every community, whether large or small, needs access to the airways. A seaplane base serves the flying community like a marina serves boating enthusiasts. Those who engage in seaplane flying and related activities use a seaplane base as a center of business and pleasure. It provides an opportunity for charter and concession operators, the tourist industry, and other enterprises, as well as employment opportunities for commercial pilots, flight instructors, aircraft mechanics, and flight activity support staffs.

a. Service. The seaplane provides a service that is impossible with any other kind of craft. Where water landing areas are available, seaplanes combine the speed of the airplane with the accessibility of boats. It provides a service which has earned an undisputed place in air transportation.

b. Waterways. Many lakes, rivers, and harbors offer natural aircraft landing and takeoff areas. Seaplane bases can replace the need for airports or can supplement major airports by relieving the heavy traffic congestion experienced at some airports. Also, a seaplane base normally has less adverse impact on the environmental than constructing a land runway in areas of recreational and scenic interest. Close-in or downtown seaplane bases can provide seaplane passenger service where transportation by land is tedious or time-consuming.

c. Docking Facilities. Seaplane docking facilities vary in development from a sandy beach, wooden ramp, slip, mooring buoy, pier, or dock, to a more highly developed base that supports a fleet of aircraft with shoreline docks, ramps, and buildings for offices, hangars, repair shops, and recreation.

2. EXPLANATION OF TERMS. The Pilot/Controller Glossary of the Airman's Information Manual (AIM) defines terms used in the Air Traffic Control system such as instrument flight rules (IFR), and visual flight rules (VFR). Copies of the AIM may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Other terms used in this publication follow:

a. Aircraft Landing and Takeoff Area. Any area of land, water, or structure used or intended to be used for the landing and takeoff of aircraft.

b. Airport. Any airport, heliport, helistop, vertiport, gliderport, seaplane base, ultralight flightpark, manned balloon launching facility, or other aircraft landing or takeoff area.

c. Airport Available for Public Use. Any airport that is open to the general public with or without a prior request to use the airport.

d. Hazard to Air Navigation. Any obstruction to air navigation having a substantial adverse effect upon the safe and efficient use of the navigable airspace by aircraft or upon the operation of an air navigation facility. An obstruction to air navigation is presumed to be hazard to air navigation until an FAA study determines otherwise.

e. Obstruction. Any object, including a parked aircraft, which may hinder aircraft operations or which may have an adverse effect upon the operation of an air navigation facility.

f. Obstruction to Air Navigation. Any object, including a parked aircraft, located in navigable airspace.

NOTE: *Code of Federal Regulation (14 CFR), Part 77, Objects Affecting Navigable Airspace, Subpart C, Obstruction Standards, establishes the standards for determining obstructions to air navigation.*

g. Sea Lane. A defined path on a seaplane base prescribed for the landing and takeoff run of aircraft along its length.

h. Seaplane Base. An area of water used or intended to be used for the landing and takeoff of aircraft, together with appurtenant shoreside buildings and facilities.

3. NOTICE OF SEAPLANE LANDING AREA PROPOSAL. In order to establish or modify a seaplane base, notification to FAA is required under 14 CFR Part 157, Notice of Construction, Alteration, Activation, and Deactivation of Airports. For the purposes of that Part, seaplane landing and takeoff areas are considered to be airports.

a. 14 CFR Part 157 requires any person who intends to do any of the following to notify the FAA of their intent:

(1) Construct or otherwise establish a new airport or activate an airport.

(2) Construct, realign, alter, or activate any runway, sea lane, or other aircraft landing or takeoff area.

(3) Deactivate, discontinue using, or abandon an airport or any landing or takeoff area of an airport for a period of one year or more.

(4) Construct, realign, alter, activate, deactivate, abandon, or discontinue using a taxiway or taxi channel associated with a landing or takeoff area on a public use airport.

(5) Change the status of an airport from private use to public use or from public use to private use.

(6) Change any traffic pattern or traffic pattern altitude or direction.

(7) Change anticipated aeronautical operations, e.g., from VFR to IFR.

FAA Form 7480-1, normally used to submit the required notice, can be obtained from the nearest FAA Airports District or Regional Office.

b. AC 70-2, Airspace Utilization Considerations in the Proposed Construction, Alteration, Activation, and Deactivation of Airports, emphasizes the requirement to notify the FAA, outlines some of the airspace utilization factors which seaplane base proponents should consider early in the planning stages, and lists the addresses of FAA offices concerned with implementing this program.

c. When a notice of intent is filed to establish a seaplane base on a body of water, the resulting FAA determination is for seaplane operations landing on and taking off from that body of water. In the case of publically-owned bodies of water, the FAA will issue determinations to subsequent proponents for seaplane bases proposing to utilize the same body of water. In these cases, the subsequent FAA determinations may contain limitations that apply collectively to all previous FAA seaplane base determinations. Subsequent determinations, however, do not normally affect a prior proponent's mooring areas.

(1) It is not uncommon for a point to be reached where seaplane operations to or from different landing and takeoff areas in close proximity to each other must be coordinated to ensure safe and efficient use of the

airspace. The FAA will identify the coordination procedures that must be implemented to prevent traffic pattern overlap of adjacent aircraft landing and takeoff areas and their respective approach and departure paths.

(2) The FAA airspace determination is independent of permission granted by local authorities to use the water area. The proponent may seek and obtain permission to use the water prior to or subsequent to an airspace determination. However, local authorities may require an FAA airspace determination as a prerequisite for granting permission to use the water area.

4. NOTICE OF CONSTRUCTION OR ALTERATION. 14 CFR Part 77 applies to seaplane bases only if the sea lanes are outlined by visual markers.

a. 14 CFR Part 77 requires any person who intends to construct or alter any building or structure on, or in the vicinity, of an existing or proposed airport (including seaplane base) available for public use to notify the FAA of their intent.

b. Form 7460-1 is used to submit the required notice.

5. FAA AERONAUTICAL STUDY OF EXISTING OBJECTS. The FAA conducts aeronautical studies of existing objects whenever there is a need to determine their physical or electromagnetic effect upon aeronautical operations. Situations that normally result in an aeronautical study of existing objects include but are not limited to:

a. A determination as to whether an obstruction to air navigation has a substantial adverse effect upon the safe and efficient use of navigable airspace;

b. A change in an aeronautical procedure at a seaplane base with a marked water operating area;

c. A request for technical assistance in the design and development of a seaplane base with a marked water operating area;

d. A determination as to whether an object should be altered, removed, marked, or lighted;

e. A determination as to whether marking and lighting can be reduced or removed without adversely affecting aviation safety, or whether marking and lighting should be added, intensified, or expanded to make pilots better aware of an object's presence;

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f. A determination of an existing activity's electromagnetic effects upon a navigational aid or communications facility; or

g. A recommendation to the Federal Communications Commission concerning the erection or dismantling of an antenna.

6. SEAPLANE BASE LAYOUT PLAN (SBLP). All seaplane base development financed with Federal funds must be in accordance with an FAA approved SBLP.

a. An FAA approved SBLP is a determination considering all known obstructions to air navigation and all proposed construction whose exact location and dimensions are identified on the SBLP. Approval of a Federal agreement SBLP includes items shown on the plan, such as terminal buildings, NAVAID's, lighting, fences, cargo facilities and maintenance or service areas. Structures in industrial area development, motels, storage hangars, and other non-aviation development inside the seaplane base boundary are also appropriate items for inclusion in the SBLP. The SBLP is similar to the ALP described in appendixes 6 and 7 of AC 150/5300-13, Airport Design.

b. Approval of a SBLP does not constitute approval of structures unless so indicated on the SBLP.

7. U. S. CORPS OF ENGINEERS REGULATORY PROGRAM. The Corps of Engineers is charged with maintaining and regulating the use of navigable waterways. The Corps' regulatory program concerns the integrity of navigation channels and the quality of the waters of the United States, including the territorial seas. Activities and fixed facilities requiring Corps permits include but are not limited to dredging, filling, breakwaters, boat ramps, piers, bulkheads, and riprap. Appendix 1 contains an application form for a Department of the Army Permit.

8. U. S. COAST GUARD APPROVAL. The Coast Guard is charged with marking navigable waterways. Markers of the type used to identify sea lanes are classified as private aids to navigation and require Coast Guard approval. Appendix 2 contains an application form.

9. STATE AND LOCAL REQUIREMENTS.

a. **State Approval.** Many state aviation agencies or similar local authorities require notice or application for the establishment of seaplane operating areas, to allow issuance of a state approval, permit, or license. Requirements vary and may depend on factors such as: ownership, public or private use, commercial activities, type and number of based aircraft, and type and number of aircraft operations. Coordination with the state's department of transportation or aviation agency is recommended.

b. **Local Permits.** Most communities have zoning laws, building codes, fire regulations, and environmental, noise, or similar ordinances. A review should be made to determine whether local laws, rules, and regulations affect the establishment and operation of a seaplane base.

CHAPTER 2. SITE SELECTION

10. DEMAND AND USE FACTORS.

a. Demand. Aeronautical demand is the number of seaplanes and/or seaplane operations a community has and an estimate of how many it will have in the future.

b. Use. Factors in addition to typical aviation activity which may justify a seaplane base are:

- (1) geographical isolation;
- (2) lack of land airports;
- (3) special flight activities; and
- (4) recreational access.

c. Potential. When urban populations abut suitable water operating areas, potential exists for a community seaplane base. The community need and proximity to the suitable water operating area influence the size of a seaplane base. Resident pilot operations plus fixed base operator activities will constitute the primary use. Fixed base operators may use seaplanes to provide charter, student training, aerial photography, and air cargo services. In emergencies, seaplanes can evacuate people and deliver food and medical supplies. The combination of these activities constitutes the need for a seaplane facility.

11. FORECAST. A forecast of the number of seaplanes to be based at a seaplane facility, currently and within five years, is suggested. The five year forecasted need will assist in identifying the appropriate size and support requirements for the seaplane base.

12. WATER OPERATING AREA.

a. Size. The size of the water operating area depends on: the performance characteristics of the seaplanes using the site, existing or potential obstructions in the surrounding area, water currents, and wave action.

b. Location. The location of the water operating area and related shore development is influenced by:

- (1) number aircraft expected to use the site;

- (2) proximity of airports and other seaplane bases;

- (3) accessibility to shore support;

- (4) character of development of the surrounding area;

- (5) atmospheric and meteorological conditions, such as fog, wind, and smoke;

- (6) river geography, shifting channels, swells;

- (7) ship and boating activity; and

- (8) local regulations, and noise considerations.

c. Coordinated Use. Although each community and site is different, a relationship does exist, and operational use of seaplanes must be coordinated with other users and interested parties in the area. Ample maneuvering and turning areas should be provided with considerations made for shipping, pleasure boats, prevailing winds, and currents.

13. APPROACH AND DEPARTURE PATHS.

a. Populated Areas. The approach and departure paths should be clear of established shipping or boating lanes. An overwater approach is preferable to an approach-departure path over populated areas, beaches, and shore developments. Where surrounding development mitigates against straight-in approach and/or straight-out departure paths, an over water climbing turn or letdown procedure may be possible.

b. Operational Limitations. The approach and departure paths should be clear of hazards. If an obstruction to air navigation, determined to be a hazard, cannot be altered or removed, the FAA will impose aircraft operational limitations, e.g., limit the type of aircraft operations, to mitigate the hazard. Lighting, or marking obstructions to air navigation is frequently sufficient to preclude an object being a hazard and avoid the need for operational limitations.

14. WATER AREAS. When selecting a site, it is necessary to choose one that has adequate length, width, and depth dimensions, as well as an unobstructed approach and departure path for the type of seaplanes to be accommodated.

a. Current Flow. Landing and takeoff areas should be located where the currents are less than 3.5 mph (5.5 km/h). Where currents exceed this recommendation, provisions should be made to allow space to accommodate handling difficulties particularly in the slow taxiing mode used to approach a floating dock or in beaching operations. It is preferable to have the current flow away from the dock or float. Prevailing winds may negate some adverse effect of currents. The following locations should be avoided:

- (1) currents that exceed 7 mph (12 km/h);
- (2) a location where water turbulence is caused by a sharp bend in the river, the confluence of two currents, or a locations where rip tides are prevalent; and
- (3) river rapids.

b. Water Level. As a general rule, if the change in water level exceeds 18-24 inches (45-60 cm), floating structures or moderately inclined beaching facilities may be necessary to accommodate aircraft at the shoreline or waterfront area. Where water level variations exceed 6 feet (2 m), special or expanded development may be required to dock the aircraft, e.g., a dredged channel, an extended pier, or special hoisting equipment.

15. WATER SURFACE CONDITIONS.

a. Wave Height. The most desirable conditions exist where the surface of the water is moderately disturbed. Locations where large swells occur, or are frequently created by deep draft vessels and/or tugboats, should be avoided.

b. Floating Debris. Areas subject to excessive debris or debris over extended periods of time should be avoided. Logs are not only a hazard to aircraft, but also to docking facilities constructed in the river. A floating log moving at river speed has considerable momentum and the potential for destruction when it impacts a fixed object.

16. SHELTERED ANCHORAGE AREA. A sheltered mooring or anchorage area, protected from winds and currents, is recommended. A cove, small bay, or other protected area is ideal and can normally be expanded to include docking facilities and on-shore parking areas.

17. SEA LANE ALIGNMENT.

a. Operational Flexibility. An unmarked sea lane or water operating area is normally the choice of seaplane pilots. This allows the pilot to take advantage of the entire water area in order to adjust landing and takeoff operations for current, wind, and waves.

b. Prevailing Winds. If a sea lane is designated, it should be aligned to provide maximum wind coverage. It may be desirable to limit wind analyses to wind data taken during daylight hours since seaplane operations are almost nil after dark.

c. Wind Data. Recorded wind observations taken in the immediate vicinity of the site over an extended period of time are the most desirable. When local observations are not available, data from a nearby locality or airport can be used. Wind data should be validated by comparing observed wind conditions at the proposed water operating area with winds reported at the nearby location. These comparisons should be made under conditions of high and low wind velocity, from all quadrants, on both clear and cloudy days, and at substantially different temperatures.

18. BOTTOM CONDITIONS.

a. Type. Soil type and bottom conditions can influence construction of fixed and floating dock structures, as well as affect taxi operations from the water operating area to the shoreline facility. Mud bottoms ordinarily present little or no difficulty. A hard bottom, e.g., shale or solid rock, can make construction of fixed and offshore structures difficult and costly. Anchors tend to drag over this type of bottom unless specially designed mooring anchors are used.

b. Conditions. Artificial bodies of water such as reservoirs often contain trees or stumps not completely grubbed before flooding. Debris from the former vegetation can be hazardous to aircraft floats and hulls as it rises to the surface or remains partially submerged. Objects that project from the bottom and constitute a water hazard should be removed. If this is impractical, then the objects should be conspicuously marked to alert users to their presence.

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19. BIRD HAZARDS. The location of bird sanctuaries or areas that attract flocks of birds should be considered when orienting water operating areas. Waterways historically used by large flocks of birds should be avoided.

20. ENVIRONMENTAL FACTORS. In seeking approval for establishment of a seaplane base, the permitting authority may require an environmental analysis. This evaluation should include an analysis of the proposals impact on water quality, wildlife, existing and proposed land use, noise, and historical/archeological factors. The design of fueling facilities and storage areas should comply with local regulations and accepted measures for pollution prevention. Order 5050.4, Airport Environmental Handbook, should be followed for an environmental study if Federal financial aid is involved. State Environment Policy Act (SEPA) may also apply to the development of a seaplane base.

CHAPTER 3. WATER OPERATING AREA

21. INTRODUCTION. Most large bodies of water provide adequate length and width for operations. Where the available

22. WATER OPERATING AREA DIMENSIONS.

A water operating area at least 2,500 feet (750 m) by 200 feet (60 m) is recommended. This size will accommodate a sea lane 2,500 feet (750 m) by 100 feet (30 m) with 200 foot (60 m) diameter turning basin at each end. Although a depth of 6 feet (1.8 m) is preferred, a minimum depth of 3 feet (1 m) is adequate for single-engine operations. The length of the water operating area needs to be increased by 7 percent per 1000 feet (300 m) of elevation above sea level to compensate for the change in density altitude.

23. TAXI CHANNEL DIMENSIONS. A taxi channel for small seaplanes should have a minimum width of 125 feet (38 m), although a width of 150 feet (45 m) or more is desirable. The channel should provide direct access to the onshore facility and, when possible, should be oriented so the approach to the ramp or float will be into the prevailing wind or current. A minimum clearance of 50 feet (15 m) should be provided between the side of the channel and the nearest obstruction.

24. TURNING BASINS.

a. Location. Turning basins may be required where use of the water surface is restricted. A minimum radius of 200 feet (60 m) is recommended. A turning basin should be located adjacent to the shoreline facility and at each end of the water operating area.

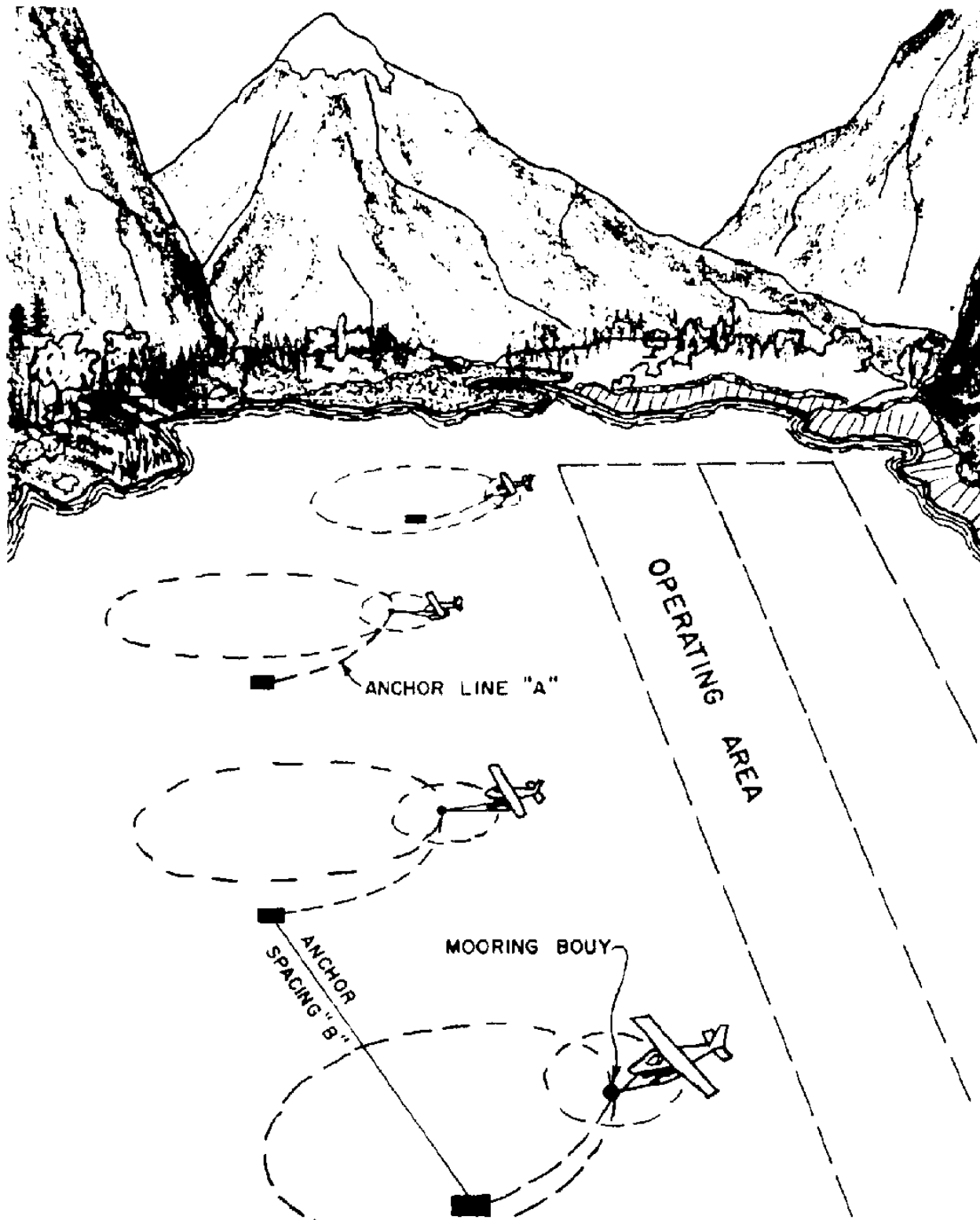
b. Clearance. The stronger the wind, the more room it takes to make a turn. A minimum clearance of 50 feet (15 m), should be provided between the side of the turning basin and the nearest obstruction.

a. Background. Anchorage areas should provide maximum protection from high winds and rough water. They should be located in a manner that will permit unrestricted maneuvering of the aircraft when approaching the buoys. The anchorage area should be within sight and calling distance of a floating dock or ramp. The size is determined by the number and size of aircraft to be accommodated. Anchorage areas must satisfy the need for aircraft to turn into the wind as they swing on their moorings.

b. Space Required. The space required is determined by aircraft length and wing span, the length of line and bridle, and the lowest water level in the anchorage area. The length of anchor line "A" (Figure 3-1) should be six times the maximum depth at mean high water. Where aircraft swing is limited, the length of anchor line may be shortened to not less than three times the water depth, provided the normal anchor weight or holding capacity is doubled.

c. Center-to-Center Spacing. Center-to-center anchor spacing, "B", for small twin-float aircraft mooring, should not be less than twice the length of the longest anchor line plus 125 feet (38 m). For larger aircraft, including flying boats and amphibians, an additional 100 feet (30 m) should be added to this spacing. Figure 3-1 shows a general layout of an anchorage area. Anchor capacity and spacing may be influenced by bottom condition and type.

d. Shear Boom. A shear boom should be considered if seaplanes are to be moored in an area where the current is strong. A shear boom consists of a series of logs tied together at their ends and anchored. Its function is to deflect debris away from the seaplane floats, as well as to create an area of calm water on the downstream side.



CHAPTER 4. SHORELINE FACILITIES

26. INTRODUCTION.

a. Shoreline Facilities. Shoreline installations provide two general functions:

(1) enable servicing, loading and unloading, and mooring without removing the aircraft from the water, and

(2) provide haul-out facilities for removing seaplanes from the water for fresh water wash downs and maintenance.

b. Characteristics. Installations vary according to need. They range from simple wood-plank ramps or slipways, to docks and piers, to elaborate ramps and marine railways.

27. SLIPWAYS. Rectangular slips dredged in the shore line are common and economical and often need no specially constructed sides or ends. See Figure 4-1 for an example of a slipway.

a. Location. A slipway should be where the water level change is not greater than 2 feet (.6 m) and the minimum low water depth is not less than 1.5 feet (.5 m).

b. Dimensions. The inside dimension of the slipway should be 2 to 3 feet (.6 to 1 m) wider than the floats and 3 to 4 feet (1 to 1.2 m) longer than the rudder-down float length.

c. Devices. A gate should be provided to dissipate wave action. A bumper, made of materials such as expanded polystyrene, old automobile tires, or strips of tires, should be attached to the inside of the front wall, sides, and gate to prevent damage to aircraft floats. Cleats to moor or secure the aircraft while it is in the slipway are recommended.

28. RAMPS. Ramps vary widely in size, shape, and construction materials, e.g. from rough logs only slightly wider than the aircraft floats to wide inclines covered with heavy-duty steel and/or concrete structures. The simplest ramp consists of a wood plank platform approximately 15 by 20 feet (5 m by 6 m) laid on a sloping shore, with half of its length in the water thereby permitting a small float plane to taxi up and out of the water.

a. Location. A minimum of 100 feet (30 m) of unobstructed water should be available directly offshore from the ramp, in the direction from which approaches are normally made.

b. Design Concept. Ramps are of fixed or hinged type construction. Fixed ramps are usually weighted down or attached to a fixed in-water footing at the toe, and secured to a stable on-shore structure such as a seawall at the other end. Hinged ramps are allowed to rise and fall with the water by means of a hinge on the shore end, while the toe end is buoyed at a predetermined depth. Fixed ramps are more common, but become relatively costly in shallow areas or where the water level variation exceeds 8 feet (2.5 m). Piling or piers are commonly used to support the stringers of fixed ramps.

c. Slope. The slope of a ramp should not be greater than 6:1, with flatter slopes ranging to 10:1 being desirable. Slopes flatter than 10:1 are usually too long and costly to construct. Ramps intended to serve trigear amphibians should not be steeper than 8:1 since, with steeper slopes, the hull of some amphibians may drag on the ramp as the craft enters the water.

d. Depth. A 4 foot (1.2 m) depth of toe will provide sufficient clearance for most waterborne aircraft. A 3 foot (1 m) depth will accommodate all but the heaviest types of amphibians. An 18 inch (45 cm) depth is adequate for small, light floatplanes. In all cases, depth dimension should be established based on the low water level datum in that locality.

e. Width. A ramp width of 30 to 40 feet (9 to 12 m) will accommodate aircraft in most wind, current, and tidal conditions. 15 feet (4.5 m) is the minimum ramp width required for small twin-float or amphibious aircraft operation when water and wind conditions are relatively calm. Practically all light waterborne aircraft can be handled easily, and pilots of small seaplanes can make an unattended ramp approach under adverse conditions, if 5 feet (1.5 m) is added to this minimum width.

f. Decking. Decking can be laid diagonally or at right angles to the line of travel. Planks should be placed rough side up, and have a .5 inch (1.3 cm) space between each plank. When laid at right angles to the line of travel, the up-ramp edge of each plank may be raised no more than 1 inch (2.5 cm) to permit the hull of the plane to slide easily and still provide good footing for

people walking on the ramp. All bolts, nails, and spikes used to attach the decking should be countersunk to avoid damage to floats or tires.

29. FIXED DOCKS.

a. Location. A minimum of 100 feet (30 m) of unobstructed water or a turning basin should be available in the direction from which approaches are normally made to the floating dock. Docks should be located so that aircraft have access to both sides. Aircraft are usually tied on the inshore side of the dock during inclement weather, in order to use the dock as a breakwater.

b. Clearance. The recommended minimum clearance between the centerline of a taxi route and the near faces of piers, floats, ramps, or marine railway is 60 feet (18 m). Waterborne aircraft can safely taxi past obstructions as close to the centerline of the taxi route as one-half their wingspan plus 15 feet (5 m); however, this factor should be increased at locations having strong currents and windy conditions. An unobstructed dock surface area 21 feet (6.5 m) wide will provide for wing clearance over the dock and permit most floatplanes or small amphibians to come alongside the dock or pier.

c. Separation. When aircraft operate under their own power into, out of, or between mooring positions, the recommended minimum separation between the limits of the mooring positions is 30 feet (10 m). When aircraft are moved by hand, the separation distance between the centers of the berthing or mooring positions should be no less than 60 feet (18 m).

30. FLOATING DOCKS. Floating docks offer great flexibility. These units ride the waves and work satisfactorily in areas of negligible to significant water level variation. Floating docks are commonly referred to as "floats," not to be confused with aircraft floats.

a. Design Concepts. A small float, 10 by 15 feet (3 by 4.5 m), designed to support loads up to 2,500 pounds (1 134 kg), will handle a single plane. Larger floats intended for mooring two or more aircraft should be designed to support gross loads up to 5,000 pounds (2 268 kg). Floats as narrow as 7 feet (2 m) can be used where a long, floating dock parallels the shore. Floats are usually constructed from locally available materials.

b. Dimensions. Float dimensions are determined by the number of aircraft simultaneously using or projected to use the float. The design aircraft

length plus 20 feet (6 m) clearance both fore and aft is recommended where aircraft are to be docked or moored alongside the float. A float should be wide enough for planes to dock on each side with a 10 foot (3 m) minimum clearance between wingtips.

c. Flotation. A variety of materials have been used to provide buoyancy for floating docks, e.g., logs, milled timber, polystyrene billets, fiberglass, and steel containers.

(1) Polystyrene billets have proven to be satisfactory buoyancy devices for floats. The planks should be evenly distributed, rather than piled at concentrated points, under the superstructure. A barrier of 6 mil (.15 mm) black polyethylene sheeting should be placed between all treated timber and flotation material contact surfaces. The load supporting characteristics of polystyrene or styrofoam is approximately 50 pounds per cubic foot (800 kilograms per cubic meter) of material. A common billet size is 10 inches by 20 inches (25 by 50 cm) by 9 feet (3 m). Further data on this material may be obtained from the manufacturers. It is recommended that foam planks be enclosed with woven galvanized wire to prevent damage from aquatic animals and sea gulls. Polystyrene deteriorates when exposed to petroleum products, gas spills, etc.

(2) Fifty-five gallon steel drums are commonly used as flotation devices. Drums should be placed symmetrically around the perimeter of the float to ensure stability. They are fastened to the float by steel straps of sufficient length to extend around the drum and main framing members of the float. Foam, fiberglass, plywood boxes, and steel drum floats are susceptible to damage where deadheads or strong currents prevail. Steel drums have a short life expectancy in salt water. The pilot should be aware of the corrosive affect of galvanic action caused by dissimilar metals. Securing the aircraft to steel or metal drums, by a chain or wire rope, will start a galvanic action that will corrode the aluminum floats. Satisfactory floats can be improvised by using life rafts, small floating docks, pontoons, and similar devices which can be obtained in the open market.

(3) Where relatively large and straight timber is available, logs may be used to construct a raft-type float.

d. Devices. A continuous 4 by 4 inch (10 cm by 10 cm) wood rail, raised approximately 2 inches (5 cm) above the float deck, commonly called bull rail or tie rail, is recommended. Bull rails should be

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secured by long lagbolts to dock cross-members or logs. Cleats should be provided, approximately 5 feet (1.5 m) apart, along the bull rail or sides of the float. Corner posts should extend slightly above the deck to serve as bollards. Bumpers, installed along the sides of the structure, extending below the edge of the float sufficient length to prevent damage to aircraft floats, are recommended.

e. Combined Float/Ramps. Floats equipped with ramps at each end make good operational structures where amphibian aircraft are to be accommodated. A long, narrow float with ramps on both sides is adequate for mooring or tying down light, single-engine floatplanes. A ramp incline no steeper than 8:1 is recommended. The aircraft taxi onto the ramp and are pulled up and tied down to the ramp. This type of float is usually constructed at right angles to the master float. A 144 by 40 foot (44 by 12 m) floating dock, with 10 foot (3 m) wide floats, and 15 foot (4.5 m) ramps on both sides can be used for seaplane storage. Additional docks or floats can be added as needed.

31. GANGWAYS. Floats are usually connected to the shore or pier by a gangway. The length of the gangway depends on the maximum water level variation. Gangways should not be less than 15 feet (4.5 m) long, the normal being 40 to 50 feet (12 to 15 m). The width should be at least 5 feet (1.5 m). Floating gangways 5 feet (1.5 m) or less wide should have longitudinal outriggers spaced every 8 to 10 feet (2.5 to 3 m) to prevent excessive rolling of the gangway. Widths of 6 to 8 feet (2 to 2.5 m) enable baggage carts or other freight equipment to be used. Handrails, preferably on both sides, should be provided. A slope of 2.75:1 or less permits easy walking and reduces the danger of the railings becoming an obstruction to wings. If the facility is to adequately serve the public, requirements contained in the Americans With Disabilities Act (ADA) accessibility guidelines should be satisfied.

32. BARGES. A barge anchored offshore makes an excellent seaplane service facility. An office, lounge, or shop is normally included "aboard;" and floating docks can be added alongside the barge. The barge may be anchored directly to the shore or to a pier by booms and a gangway or anchored offshore in a fixed position.

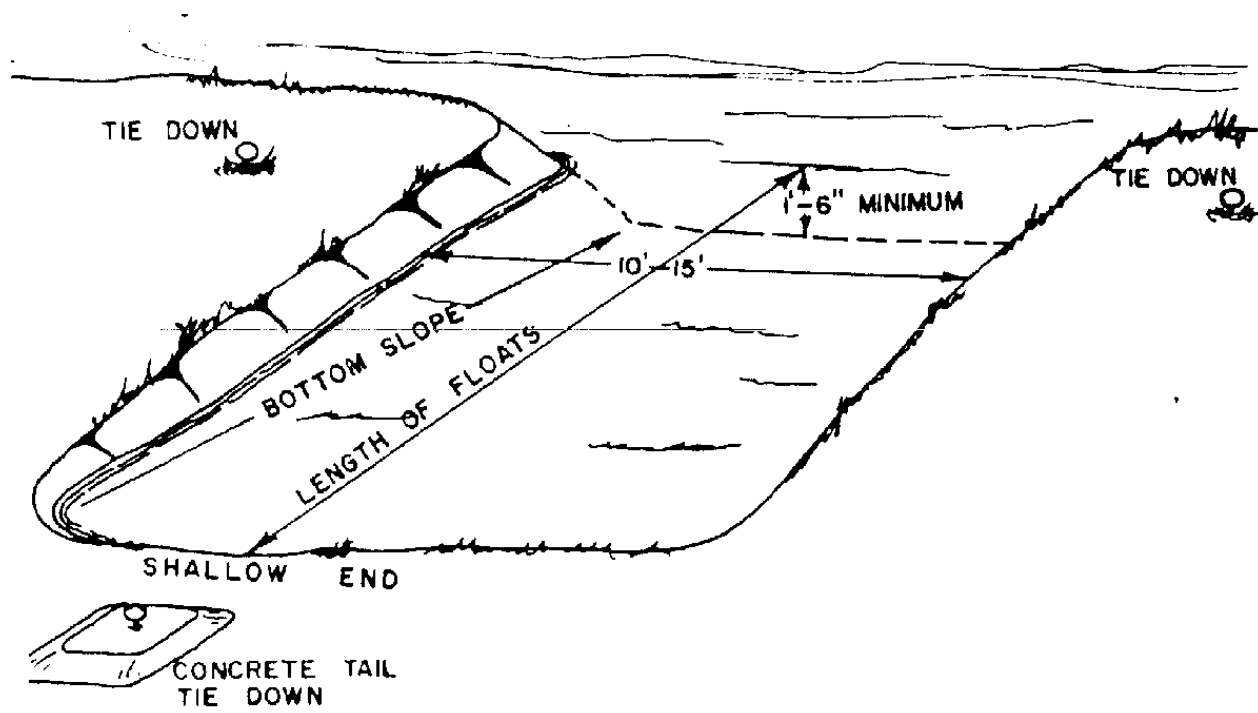
33. PIERS. Piers are recommended where the variation in water level is 16 inches (45 cm) or less.

a. Location. A minimum of 100 feet (30 m) of unobstructed water or a turning basin should be available in the direction from which approaches are normally made to the pier. Piers should be located so that access to them by the public will not require crossing the apron or hangar area.

b. Design Concepts. The pier should extend into the water to a point where the depth at mean low water level is at least 3 feet (1 m). The supporting timbers and decking of fixed structures used for passengers and cargo operations must be designed to support live loads of at least 100 pounds per square foot (488 kilograms per square meter). An access gangway approximately 5 feet (1.5 m) wide with handrails on both sides is recommended. An open deck handling area approximately 30 by 50 feet (9 m by 15 m) at the end of the walkway provides tie-up space for four small or three large seaplanes.

c. Width. Fixed piers or wharfheads should be 8 to 10 feet (2.5 to 3 m) wide and built strong enough to support a loaded pickup truck.

d. Materials. At those locations where timber piles can be used, they are the most economical type of construction. Water jetting and pile driving are common methods of setting piles. Decking spaced with a 1/2 inch (1.3 cm) gap between planks will allow for drainage and expansion. Since piers and wharves are constructed with decks above mean high water, most of the timber supporting members will be subject to alternate cycles of wetting and drying. To prevent decay, creosote or similarly treated timbers must be used. Urethane, epoxy, and shellac are acceptable sealers for all creosote treated wood, and should be used to prevent tracking creosote.



CHAPTER 5. LANDSIDE FACILITIES

34. INTRODUCTION. A service apron, tiedown area, and administrative building are frequently constructed around or near a seaplane ramp or dock. For safety and convenience, these areas should be separated from access roads, automobile parking areas, and other incidental activity areas either by a buffer zone or by fencing. Effective landscaping to separate airside and landside activities, as well as to improve appearance and attract customers, is recommended.

35. APRON. The service apron and tiedown area size should be based on five year forecasted need. They should be sufficient to accommodate the based aircraft that will need landside tiedowns plus a conservative estimate of the peak demand for itinerant parking-loading or tiedown positions. A minimum size tiedown or storage area requires approximately one-quarter acre. A service apron normally requires at least one-quarter acre.

36. HANGARS. Most hangars used for land-based aircraft are adaptable for use by waterborne aircraft. Hangars should have a functional and orderly relationship to haul-out and ramp facilities.

a. Location. Hangars should be separated from an administration building and/or the aircraft tiedown storage area to eliminate as much aircraft movement conflict as possible. The service and storage hangar area should be located relative to the ramp or marine railway so that aircraft may be moved to the hangar without requiring relocation of parked aircraft. Both storage and repair hangars should likewise be located so that delivery of materials and access by service personnel will not conflict with aircraft movements.

b. Size. The space required for service and hangar facilities will depend upon the number and the type of aircraft that are to be accommodated. Sufficient additional space needs to be provided for taxiing, turning, and temporarily parking aircraft.

37. MARINE RAILWAYS.

a. Application. Where the shore is steep, a marine railway can be used to move aircraft from the water. The railway consists of a pair of light weight rails placed on a support structure that slopes into the water. A flanged-wheel platform car rides these rails, and a power unit draws the platform up the rails to higher ground. The car will return by gravity if the rail-slope is

8:1 or steeper. When the incline is less than 8:1, a reversible power winch rigged with an endless cable will return the platform to the water level.

b. Depth of Toe. In cases where a marine railway is used, it should extend far enough below low water so that the platform carriage is low enough for an aircraft to taxi on the carriage with ease. A platform 20 feet (6 m) wide, 20 to 30 feet (6 to 9 m) long, and inclined at a slope of 7:1 or 8:1, will accommodate most aircraft. The toe of the platform should be able to be lowered 4 feet (1.2 m) below the low water mark. In all cases, depth dimension should be established at the low water level datum established for waterways in that locality.

c. Rail Supports. A system of rails, ties, and stringers supported by bents are an economical means of supporting a marine railway. Pile bents are used in water areas and at points on shore where the soil will not support other types of foundations. Concrete piers or sleepers may be used and at considerably less cost than pile bents if the soil at the railhead is stable and not subject to erosion. A wooden platform will stay submerged if iron and steel are used to fabricate the carriage. The weight of the carriage keeps the platform submerged and prevents the wheels from jumping the rails when aircraft taxi on the platform. The system used for decking a ramp can also be used to deck the platform.

d. Catwalk. A catwalk placed to the side of the bent or between the rails enables persons using the railway to reach the platform regardless of its location along the line. A turntable installed on the platform is a convenient means of turning aircraft.

38. HOISTING EQUIPMENT.

a. Introduction. Hoisting devices such as a jib crane, pillar crane, or guyed derrick may be used to remove aircraft from the water. These facilities are frequently needed where installations are developed along a high seawall, bulkhead, or steep bank.

b. General Types. Many types of cranes or derricks can be constructed from suitable local materials, or prefabricated steel units can be obtained from manufacturers. Heavy duty hoisting devices are usually powered by gasoline or electric motors; however, a geared hand winch is adequate to lift most light seaplanes.

c. Capacity. Hoisting equipment should be capable of lifting a gross load of three times the maximum weight of aircraft to be handled. Cable and band type slings will be necessary to lift aircraft that are not equipped with hoisting eyes. Types of hoisting equipment and their use vary with the operating needs of the individual site. Detailed information on the capacity, design, and installation of hoisting equipment may be obtained from manufacturers and engineering reference manuals.

39. ADMINISTRATION BUILDING and COMMON USE AREA.

a. Multi-use Concept. At basic installations, it may be necessary to use a hangar for both aircraft service and office space. At larger facilities a separate administration building may be required to provide adequate space for the manager's office, passenger and pilot's lounge, display space, restaurant, snack bar, and observation deck. An uncomplicated, functional design that can adequately respond to the administrative needs of the facility is highly recommended.

b. Location. The building should be located in a prominent position on the site, readily accessible to aircraft, as well as to the arrival of customers and visitors from the surrounding community. Visibility of the water area from the administration building is desirable.

c. Outdoor Space. It is desirable to reserve an outdoor space immediately adjacent to the administration building for public use and recreational type purposes. This space should consist of a small lawn or paved terrace, preferably overlooking the shoreline and suitable for informal gatherings. The public area should be physically separated from the aeronautical activity area and/or areas used for fueling or storage of flammable materials.

40. ACCESS. Access to the administration building or public area, both for customers and for service personnel, should be by an all-weather road. The SBLP (seaplane base layout plan) should reflect the connection to a main highway or street.

a. Roadway Planning. The access or entrance road should have adequate width, serve the anticipated traffic, and permit safe and easy circulation throughout the landside of the facility.

b. Service Roadways. A public highway should never be part of the interior road system of a seaplane base. Vehicular through traffic will interfere with movement of aircraft and can be hazardous to aircraft operations, service personnel and other pedestrians. To permit authorized access and provide circulation routes for emergency vehicles, deliveries of gasoline, oil, fuel, and refuse removal, limited access service roadways are needed. These limited use roadways should be marked and controlled by devices such as removable posts or chains located at the entrance to the areas of aeronautical activity.

41. PARKING AREAS. Parking space is frequently provided on one or both sides of the access roadway. Either along the access roadway or in a dedicated automobile parking lot, a 9 foot by 18.5 foot (3 m by 5.5 m), parking area should be provided for each car. A 26 foot (8 m) aisle width allows two-way circulation and is general used with 90 degree parking. The parking area should be located for convenient access to the various onshore and shoreline facilities.

CHAPTER 6. STAGE DEVELOPMENT

42. ORGANIZATION OF A PLAN.

a. Design Skill. Economy and rational organization are primary considerations in developing a master plan for a project in which low first costs and low operating costs are essential. Also, the designer's skill and his preference for one type of plan over another will influence the character and appearance of the resulting plan.

b. Layout Growth. The planner may develop a layout which is informal and casual, or formal and symmetrical. In either case, a pleasing result depends more on the designer's skill in handling scale and proportion than on choice of pattern. It is important that the site plan grow logically out of requirements for building type, topography, orientation, and servicing rather than from preconceived patterns used at some other site.

c. Site Development. Once the master plan has been prepared, a community can program site development in successive stages as needs arise. For example, consider the hypothetical four-stage development of onshore and shoreline installations at a small town that supports a resort area. Each stage of the development expands the operational capability of the facility to meet the needs of the community.

43. STAGE 1 - BASIC REQUIREMENTS. The first stage emphasizes those elements that are considered necessary for a basic facility. They include the water operating area, mooring area, slip or dock, gangway, fueling facilities, operations building, access road, and auto parking area. This stage may include a temporary beaching ramp that enables aircraft to be brought ashore.

44. STAGE 2 - RAMP AND SERVICE AREAS.

The second stage develops the ramp, marine railway, service, and tiedown areas. The ramp provides a second location for refueling services, loading, and unloading of aircraft. A necessary requirement for daily maintenance of saltwater seaplanes is an ample supply of fresh water. Fresh water should be available at the ramp to wash down planes before they are moved to onshore parking positions. When required, Stage 2 should include shoreline stabilization or bulkheads in order to provide for present or future needs. Planting of shrubs, trees, and general landscaping should also be accomplished at this time.

45. STAGE 3 - SERVICE HANGAR. This stage provides for the construction of a service hangar which will permit the operator to increase the type and quality of seaplane services. The addition of this element will make it possible to provide all-weather services such as major and minor repairs as well as limited aircraft storage.

46. STAGE 4 - REVENUE PRODUCING FACILITIES. The principal work undertaken in the final stage consists of a storage hangar and an additional tie-down apron. Expansion of the operations building may also be undertaken to provide revenue-producing facilities such as a lunchroom, aviation display room, public observation lounge, and amusement equipment.

CHAPTER 7. CONSTRUCTION CONSIDERATIONS

47. INTRODUCTION.

a. Philosophy. Because of the variety of structures that have been used satisfactorily in various regions of the Country, this section emphasize general design considerations instead of specific plans and details. By following these recommendations, structures can be constructed that are tailored to individual need, finances, and local conditions.

48. PRESERVATION.

a. Marine Borers. If marine structures are to give long service, it is imperative that timbers be protected from attacks by various insects, fungi, and marine borers. The termite, which is the most common, inhabits many parts of the United States and Canada. It frequently enters the wood at or near the ground line. Fungi may develop any time there is a proper amount of air, warmth, food, and moisture. The discharge of various waste materials into bodies of water is conducive to the growth of wood-destroying fungi. The prevalence of marine borers is worldwide, and although they are usually found in salt or brackish waters, slight infestation may be found in rivers above the point of brackishness. No corrosive materials or untreated timbers should be used, in salt water.

b. Preservatives. Some of the more generally used preservatives in marina construction are creosote, chromated copper arsenate (CCA), and ammonical copper zinc arsenate (ACZA). These treatments have advantages and disadvantages, depending on how the wood is used. The most effective type of wood treatment is the pressure process which forces the preservative into the wood. This pressure process may be either the full-cell or empty-cell treatment, which differ in the amount of preservative retained in the wood.

c. Piling Protection. In areas where Teredo and pholad attack are expected or known and where Limnoria tripunctata attack is not prevalent, creosote or creosote solution treatment will provide adequate protection. In areas where Teredo and Limnoria tripunctata attack is expected or known and where pholad is not prevalent, either dual treatment or high retention of ACZA or CCA treatment will provide adequate protection. In areas where Limnoria tripunctata and pholad attack is expected or known, dual treatment provides the maximum protection. Proponents are urged to consult with local experts, engineers, the American Wood Preservers Institute, and the National Timber Piling Council, Inc., prior to using any treated lumber or piling on a project.

d. Hinged Connections. Special provisions must be made so that attachment booms and gangways can adjust to fluctuations in water level. One method is to install a fixed hinge at the shoreline in combination with another hinge on the float or runners for the gangway to slide on as the water level changes.

CHAPTER 8. MOORING, LIGHTING, MARKING, and FUELING

49. ANCHORS.

a. Background. Anchors vary in weight and shape, depending on intended use and bottom conditions. Normal bottoms such as sand, clay, or similar materials require anchors that will "dig in." Mushroom or large base area anchors that will not sink excessively, should be used for soft mud and silt bottoms. For shale, smooth rock or other hard bottoms, a much heavier anchor is required because the weight of the anchor is the principal holding factor. A 5 to 10 pound (2.5 to 4.5 kg) cast-iron or steel boat anchor will be satisfactory, under normal conditions, for a temporary or emergency aircraft mooring. These anchors can also be used to secure temporary night-lighting buoys or floating lighting devices.

b. Weight. Permanent marker or lighting buoy anchors should not weigh less than 250 pounds (100 kg) when submerged. Small aircraft mooring buoy anchors should not weigh less than 600 pounds (275 kg) when submerged and should not roll on the bottom. An excellent mooring anchor for aircraft of gross weights up to 15,000 pounds (6 800 kg) can be made from two large steel drums or wooden barrels filled with concrete and connected with heavy 2 to 3 inch (5 to 7.5 cm) diameter iron pipe. This anchor has a gross weight of approximately 2,200 pounds (1 000 kg) and a submerged weight of about 1,320 pounds (600 kg). A single-barrel anchor constructed as above will be satisfactory for anchoring small aircraft. Three drums may be needed for large aircraft. Filled concrete blocks tied together with reinforcing rods will also make a satisfactory anchor.

50. ANCHOR LINES.

a. Strength. The strength of an anchor line is based on the safe working load being equal to or greater than the gross weight of the anchor. Under most wind and water conditions, .25 inch (6.5 mm) wire rope or chain will be strong enough for mooring aircraft up to 3,000 pounds (1 360 kg) gross weight, and .50 inch (12.5 mm) anchor chains or wire rope will be satisfactory for mooring aircraft up to 15,000 pounds (6 800 kg) gross weight.

b. Effect Of Water. Mooring lines of the size indicated will remain serviceable for several years in fresh water. In salt or brackish waters, due to the rapid deterioration of metals, the minimum size should be

increased by 1/8-inch (3 mm) unless stainless steel rope is used. A practical application is to attach the anchor line to the end of a heavy chain. This arrangement reduces the strain and shock on the aircraft when riding in rough water or heavy swells. Engineering handbooks give weight and strength characteristics of wire rope and chain and are useful for determining anchor line sizes.

c. Metal Fittings. Copper or bronze fittings should not be contact with steel fittings or lines. Without insulation, electrolysis takes place, and the metal corrodes. Galvanized screw or pin shackles are recommended at the buoy, thus allowing the buoy to rotate on the anchor line. All hardware should be hot-dipped galvanized. When wire rope is used, the ends should be doubled back over a thimble and made fast with rope clips or clamps. It is customary to use three clamps per connection.

51. MOORING BUOYS. Mooring aircraft to buoys is a common method of parking seaplanes on the water. A mooring buoy must support the weight of the anchor line or wire rope. In addition, it will have to support flag standards, fittings, and lighting accessories when this extra equipment is used. Buoys must be chosen that will not damage floats or hulls if inadvertently struck during water operations.

52. LIGHTING. Seaplane facility identification and water operating area lighting should be provided for night operations. A simple and inexpensive method is to install a beacon on the shore and a string of portable, battery-operated lights on buoys or other floatation devices.

a. Beacon. A lighted seaplane base can be identified by a beacon alternating white and yellow flashes at the rate of 12 to 30 flashes per minute. In water traffic congested areas, a radio activated strobe beacon may be used to alert mariners and other airman that a seaplane will be arriving or departing within a short time.

b. Floodlights. Floodlights or spotlights may be installed on the shore to illuminate aprons, floats, ramps, and piers. Care must be taken in locating and aiming floodlights to preclude affecting the vision of pilot's landing or taking off or creating distracting reflections.

53. SEAPLANE BASE MARKING.

a. Standard Air Marker. The anchor symbol, similar to the designator found on aeronautical charts, is the standard air marker used to designate a seaplane base. Alternatively, numerals and/or other symbols may be used to identify a seaplane landing facility. The symbols are often painted on roofs or other flat surfaces that are easily visible from the air. Markings should be uncomplicated and easily maintained.

b. Color. The marker shown in Figure 8-1 should be Aviation Yellow, No. 13538, and the border, when used to increase conspicuity by providing contrast with the background, e.g., a light colored concrete surface, should be Aviation Black, Lusterless, No. 37038, as defined in Table X of Federal Standard 595.

c. Dimensions. The recommended minimum overall dimensions for the marker are 13 feet (4 m) long by 8 feet (2.5 m) wide. The width of a black border, if used, is 1/26 the length of the marker and is included within the overall dimensions. The following table reflects dimensions for proportionally larger markers.

Length		Width		Scale
Feet	Meters	Feet	Meters	
13.00	4	8.0	2.5	1.00
16.25	5	10.0	3.0	1.25
19.50	6	12.0	3.5	1.50
22.75	7	14.0	4.0	1.75
26.00	8	16.0	5.0	2.00
32.50	10	20.0	6.0	2.50
39.00	12	24.0	7.5	3.00

d. Layout Procedure.

1. Establish center line AB, 13 units long.
2. Establish points C, D, I, N along AB.
3. Erect perpendiculars to AB: DF, DL, IG, IK.
4. Connect points FG and KL.
5. Establish lines NP, NS, BQ, BR.
6. Connect points PQ and RS.
7. Establish points E, M, H, J, O, T.
8. Connect points HO and JT.
9. Scribe 1.5 unit radius circle about point C.
10. Extend perpendiculars from points E and M to intersect with 1.5 unit circle.
11. Scribe .5 unit radius circle about point C.

54. AVIATION FUEL.

a. Introduction. Where aviation fuel is provided at a seaplane facility, precautions must be taken to minimize the possibility of spills and the resulting adverse environmental effects of fuel spillage. Tank construction and piping should conform to the American Petroleum Institute (API), American Society of Mechanical Engineers (ASME), and American National Standards Institute (ANSI) standards as applicable.

b. Precautions. The following precautions should be taken to minimize the entry of water into underground tanks through improperly closed or leaking openings.

(1) All tank openings subject to frequent opening and closing should terminate above ground, using recommended pipe extensions or spools.

(2) Flush-type tank openings in paved areas should be kept water tight. Inspection and maintenance manholes that are subject to frequent opening should have flanged spool covers.

(3) Below ground tanks located close to a sensitive body of water should be contained within a double wall or inside a ventilated concrete vault.

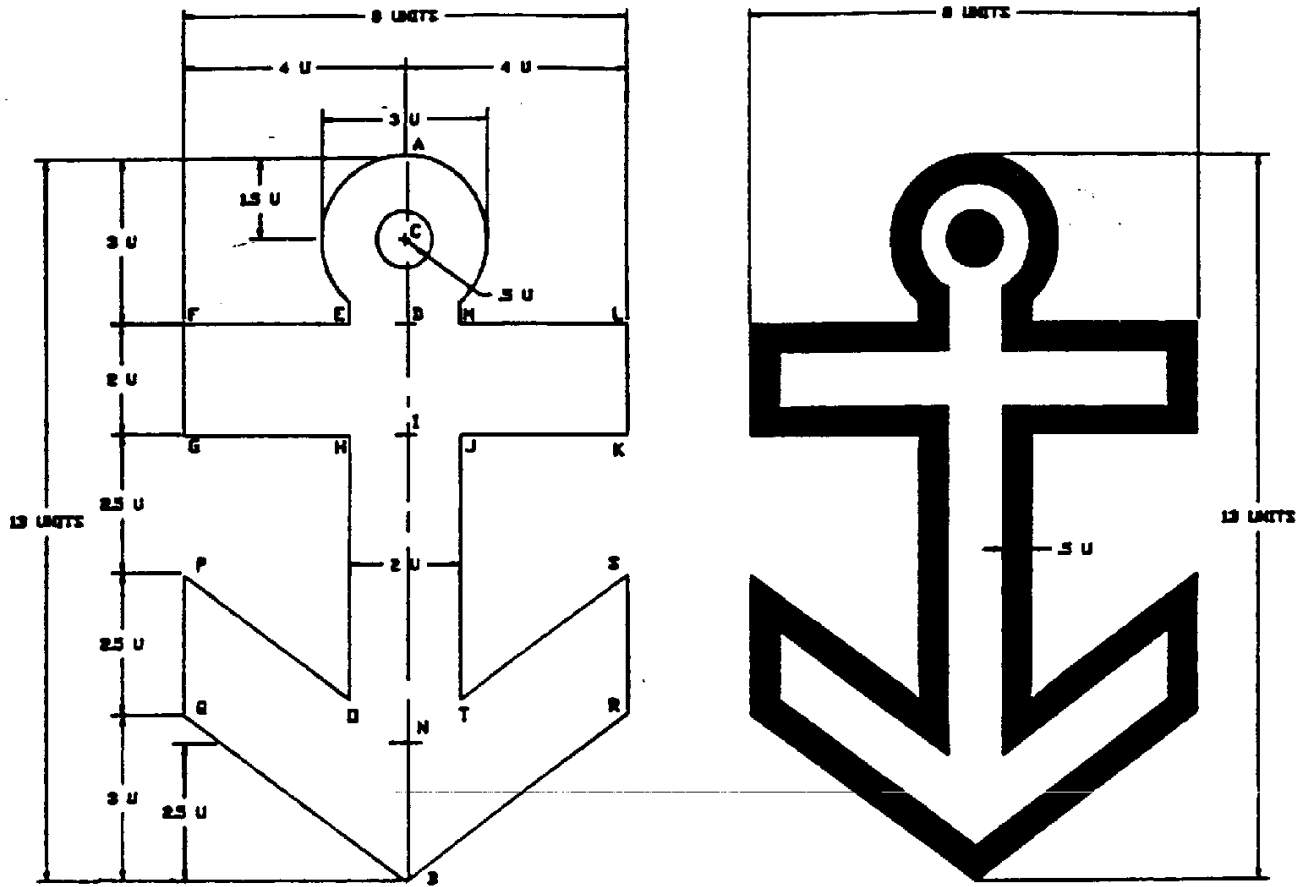
c. Dike. Above ground tanks should be surrounded by a dike designed to retain the full tank capacity of a single tank, or the capacity of the largest, plus 10 percent of the total capacity of the remaining tanks where more than one tank is installed. The dike should be constructed of impervious non-organic soil with a plastic, liquid tight membrane. A drainage system, provided within the dike, should be designed to remove surface water and to discharge it into a drainage system capable of disposing of the fuel and water in a safe manner. Drains should normally be closed.

d. Fuel Dispensing. A fuel dispensing system usually consists of a pump, motor, strainer, meter, hose reel, hose, nozzle, automatic and manual control switches, and three-point, static discharge, electrical grounding equipment, all located above ground. The grounding and bonding system should provide electrical continuity between all metallic or conductive components; should have both ground and bonding wires, and clamps adequate to facilitate prompt, definite electrical ground connection between hose nozzle/pit/cabinet, and aircraft being fueled. A pit or cabinet should be permanently, electrically grounded. The hose reel, from an environmental and safety point of

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view, is an important element of this system. Ideally, an electrically operated rewind wheel should be provided to discourage the practice of "stringing out" the hose along the dock. A 5 gallon (19 l) drip pan located below the rewind reel will collect residual fuel discharge from the nozzle. State and local codes provide additional installation requirements. AC 150/5230-4, Aircraft Fuel Storage, Handling, and Dispensing On Airports, and applicable National Fire Protection Association (NFPA) standards also provide useful information.



Marker "A"--Dark Background , Marker "B"--Light Background
 NOTE: Outside dimensions of markers are identical.
 Black border of marker "B" is .5 unit wide.
 One unit is 1/13 of the overall length.

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Appendix 1

APPENDIX 1. U.S. ARMY CORPS OF ENGINEERS PROGRAMS

The Corps of Engineers is charged with maintaining navigable waterways. This is accomplished by the Corps' permit program whose purpose is to avoid obstructions in navigable waters. The Corps' regulatory program concerns the integrity of navigation channels and the quality of the waters of the United States, including the territorial seas.

a. The proponent of a seaplane base located on navigable water should contact the Office of the District Engineer who has jurisdiction over the area where the seaplane activity will take place or where a structure will be built. This preliminary inquiry will save time in applying for a Department of the Army permit.

b. Pamphlet EP 1145-2-1, May 1985, U.S. Army Corps of Engineers, Regulatory Program, Applicant Information, provides basic and general information of a nontechnical nature designed to assist the proponent in applying for a Corps of Engineers' permit. Code of Federal Regulations, Title 33, Parts 320 through 330, cites the Corps' permit program.

c. Figures A1-1 through A1-6 contain forms and other information required to apply for a Department of the Army permit.

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Appendix 1

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT (31 CFR 123)		OMB APPROVAL NO. 0702-0036 Expires 30 June 1986	
<p>The Department of the Army permit program is authorized by Section 10 of the River and Harbor Act of 1899, Section 404 of the Clean Water Act and Section 103 of the Marine, Protection, Research and Sanctuaries Act. These laws require permits authorizing activities in or affecting navigable waters of the United States, the discharge of dredged or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Information provided on this form will be used in evaluating the application for a permit. Information in this application is made a matter of public record through issuance of a public notice. Disclosure of the information requested is voluntary, however, the data requested are necessary in order to communicate with the applicant and to evaluate the permit application. If necessary information is not provided, the permit application cannot be processed nor can a permit be issued.</p> <p>One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.</p>			
1 APPLICATION NUMBER (To be assigned by Corps)		3 NAME, ADDRESS, AND TITLE OF AUTHORIZED AGENT	
		None	
2 NAME AND ADDRESS OF APPLICANT		Telephone no. during business hours	
Fred R. Harris 852 West Branch Road Blue Harbor, Maryland 21705		A.C. () _____ (Residence) A.C. () _____ (Office)	
Telephone no. during business hours		Statement of Authorization: I hereby designate and authorize _____ _____ to act in my behalf as my agent in the processing of this permit application and to furnish, upon request, supplemental information in support of the application.	
A.C. (301) 585-2779 _____ (Residence) A.C. () _____ (Office)		SIGNATURE OF APPLICANT	DATE
4 DETAILED DESCRIPTION OF PROPOSED ACTIVITY			
4a ACTIVITY			
Build timber bulkhead and pier and fill.			
4b PURPOSE			
To provide boat access and prevent erosion of shoreline at my place of residence.			
4c DISCHARGE OF DREDGED OR FILL MATERIAL			
Approximately 200 cubic yards of upland fill will be placed between new bulkhead and existing shoreline.			

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Appendix 1

6. NAMES AND ADDRESSES OF ADJOINING PROPERTY OWNERS, LESSEES, ETC., WHOSE PROPERTY ALSO ADJOINS THE WATERWAY

Mary L. Clark 850 West Branch Road Blue Harbor, Maryland 21703 (301) 585-8830	Harry N. Hampton 854 West Branch Road Blue Harbor, Maryland 21703 (301) 585-3676
--	---

6. WATERBODY AND LOCATION ON WATERBODY WHERE ACTIVITY EXISTS OR IS PROPOSED
West Branch of the Haven River on Blue Harbor.

7. LOCATION ON LAND WHERE ACTIVITY EXISTS OR IS PROPOSED

ADDRESS
852 West Branch Road

STREET, ROAD, ROUTE OR OTHER DESCRIPTIVE LOCATION

King Edward, Maryland 21703
COUNTY STATE ZIP CODE

Town of Blue Harbor
LOCAL GOVERNING BODY WITH JURISDICTION OVER SITE

8. Is any portion of the activity for which authorization is sought now complete? YES NO
If answer is "Yes" give reasons, month and year the activity was completed. Indicate the existing work on the drawings.

9. List all approvals or certifications and denials received from other federal, interstate, state or local agencies for any structures, construction, discharges or other activities described in this application.

ISSUING AGENCY	TYPE APPROVAL	IDENTIFICATION NO	DATE OF APPLICATION	DATE OF APPROVAL	DATE OF DENIAL
Town of Blue Harbor	Zoning	BH25172	6/20/82	6/30/82	
Md DNR	Certification	DNR258WQ	6/11/82	8/12/82	

10. Application is hereby made for a permit or permits to authorize the activities described herein. I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities or I am acting as the duly authorized agent of the applicant.

And R. Harris Oct. 15, 1982
SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in Block 3 has been filled out and signed

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of The United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than \$10,000 or imprisoned not more than five years, or both.

Do not send a permit processing fee with this application. The appropriate fee will be assessed when a permit is issued.

General Information

Three types of drawings—Vicinity, Plan, and Elevation—are required to accurately depict activities (See sample drawings on pages 16 and 17).

Submit one original, or good quality copy, of all drawings on 8½ × 11 inch white paper (tracing cloth or film may be used). Submit the fewest number of sheets necessary to adequately show the proposed activity. Drawings should be prepared in accordance with the general format of the samples, using block style lettering. Each page should have a title block. See check list below. Drawings do not have to be prepared by an engineer, but professional assistance may become necessary if the project is large or complex.

Leave a 1-inch margin at the top edge of each sheet for purposes of reproduction and binding.

In the title block of each sheet of drawings identify the proposed activity and include the name of the body of water; river mile (if applicable); name of county and state; name of applicant; number of the sheet and total number of sheets in set; and date the drawing was prepared.

Since drawings must be reproduced, use heavy dark lines. Color shading cannot be used; however, dot shading, hatching, or similar graphic symbols may be used to clarify line drawings.

Vicinity Map

The vicinity map you provide will be printed in any public notice that is issued and used by the Corps of Engineers and other reviewing agencies to locate the site of the proposed activity. You may use an existing road map or U.S. Geological Survey topographic map (scale 1:24,000) as the vicinity map. Please include sufficient details

to simplify locating the site from both the waterbody and from land. Identify the source of the map or chart from which the vicinity map was taken and, if not already shown, add the following:

- location of activity site (draw an arrow showing the exact location of the site on the map).
- latitude, longitude, river mile, if known, and/or other information that coincides with Block 6 on the application form.
- name of waterbody and the name of the larger creek, river, bay, etc., that the waterbody is immediately tributary to.
- names, descriptions and location of landmarks.
- name of all applicable political (county, parish, borough, town, city, etc.) jurisdictions.
- name of and distance to nearest town, community, or other identifying locations.
- names or numbers of all roads in the vicinity of the site.
- north arrow.
- scale.

Plan View

The plan view shows the proposed activity as if you were looking straight down on it from above. Your plan view should clearly show the following:

- Name of waterbody (river, creek, lake, wetland, etc.) and river mile (if known) at location of activity.
- Existing shorelines.
- Mean high and mean low water lines and maximum (spring) high tide line in tidal areas.
- Ordinary high water line and ordinary low water line if the proposed activity is located on a non-tidal waterbody.

- Average water depths around the activity.
- Dimensions of the activity and distance it extends from the high water line into the water.
- Distances to nearby Federal projects, if applicable.
- Distance between proposed activity and navigation channel, where applicable.
- Location of structures, if any, in navigable waters immediately adjacent to the proposed activity.
- Location of any wetlands (marshes, swamps, tidal flats, etc.)
- North arrow.
- Scale.
- If dredged material is involved, you must describe the type of material, number of cubic yards, method of handling, and the location of fill and spoil disposal area. The drawing should show proposed retention levees, weirs, and/or other means for retaining hydraulically placed materials.
- Mark the drawing to indicate previously completed portions of the activity.
- Water depth at waterward face of proposed activity or, if dredging is proposed, dredging and estimated disposal grades.
- Dimensions from mean high water line (In tidal waters) for proposed fill or float, or high tide line for pile supported platform. Describe any structures to be built on the platform.
- Cross section of excavation or fill, including approximate side slopes.
- Graphic or numerical scale.
- Principal dimensions of the activity.

Notes on Drawings*

- Names of adjacent property owners who may be affected. Complete names and addresses should be shown in Block 5 on ENG Form 4345.
- Legal property description: Number, name of subdivision, block and lot number. Section, Township and Range (if applicable) from plot, deed or tax assessment.
- Photographs of the site of the proposed activity are not required; however, pictures are helpful and may be submitted as part of any application.

Elevation and/or Cross Section View

The elevation and/or cross section view is a scale drawing that shows the side, front, or rear of the proposed activity. If a section view is shown, it represents the proposed structure as it would appear if cut internally for display. Your elevation should clearly show the following:

- Water elevations as shown in the plan view.

*Drawings should be as clear and simple as possible (i.e., not too "busy").

Address correspondence to:
The District Engineer
U.S. Army Engineer
District
Please include attention
line in address.

ALASKA
P.O. Box 898
Anchorage, AK
99508-0898
Attention: NPACD-RF
907/753-2712

ALBUQUERQUE
P.O. Box 1590
Albuquerque, NM
87103-1590
Attention: SWACO-OR
505/768-2778

BALTIMORE
P.O. Box 1715
Baltimore, MD 21203-1715
Attention: NABOP-R
301/962-3870
Joint application with
New York, Maryland

BUFFALO
1776 Niagara Street
Buffalo, NY 14207-3199
Attention: NCBCO-S
716/876-6454 x2313
Joint application with
New York

CHARLESTON
P.O. Box 919
Charleston, SC
29402-0919
Attention: SACCO-P
803/724-4330

CHICAGO
218 S. Dearborn Street
Chicago, IL 60604-1797
Attention: NCCO-R
312/353-6428
Joint application with
Illinois

DETROIT
P.O. Box 1027
Detroit, MI 48231-1027
Attention: NCECO-L
313/228-2218
Joint application with
Michigan

FT. WORTH
P.O. Box 17300
Ft. Worth, TX 76102-0300
Attention: SWFOD-O
817/334-2881

GALVESTON
P.O. Box 1229
Galveston, TX 77553-1229
Attention: SWGCO-R
409/766-3825

HUNTINGTON
502 8th Street
Huntington, WV 25701-2070
Attention: ORHOP-F
304/529-5487
Joint application with
West Virginia

HONOLULU
Building 230, Fort Sheffer
Honolulu, HI 96859-5440
Attention: PODOO-O
808/438-8258

JACKSONVILLE
P.O. Box 4970
Jacksonville, FL 32222-0019
Attention: SAJRD
904/791-1659
Joint application with
Florida, Virgin Islands

KANSAS CITY
700 Federal Building
601 E. 12th Street
Kansas City, MO 64108-2886
Attention: MRKOO-P
816/374-3845

LITTLE ROCK
P.O. Box 867
Little Rock, AR
72203-0867
Attention: SWLCO-P
501/378-5285

LOS ANGELES
P.O. Box 2711
Los Angeles, CA 90053-2325
Attention: SPLCO-R
213/688-5608

LOUISVILLE
P.O. Box 59
Louisville, KY 40201-0059
Attention: ORLOP-F
502/582-5452
Joint application with
Illinois

MEMPHIS
Clifford Davis Federal
Building
Room B-202
Memphis, TN 38103-1884
Attention: LMMCO-G
901/521-3471
Joint application with
Missouri, Tennessee,
Kentucky

MOBILE
P.O. Box 2288
Mobile, AL 36628-0001
Attention: SAMOP-S
205/690-2658
Joint application with
Mississippi

NASHVILLE
P.O. Box 1070
Nashville, TN 37202-1070
Attention: ORNOR-F
615/251-5181
Joint application with TVA,
Tennessee, Alabama

NEW ORLEANS
P.O. Box 80287
New Orleans, LA
70180-0287
Attention: LMANCO-S
504/839-2255
Joint application with
Illinois

NEW YORK
\$6 Federal Plaza
New York, NY 10278-0080
Attention: NANOP-R
212/264-3966

NORFOLK
803 Front Street
Norfolk, VA 23510-1086
Attention: NACOP-P
804/449-3552
Joint application with
Virginia

OMAHA
P.O. Box 5
Omaha, NE 68101-0005
Attention: MFCOP-N
402/221-4133

PHILADELPHIA
U.S. Custom House
2nd and Chestnut Street
Philadelphia, PA
19105-2991
Attention: NAPOP-R
215/597-2812

PITTSBURGH
Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222-4186
Attention: CRPOP-F
412/644-4204
Joint application with
New York

PORTLAND
P.O. Box 2846
Portland, OR 97208-2846
Attention: NPPNLF-F
503/221-6985
Joint application with
Oregon

ROCK ISLAND
Clock Tower Building
Rock Island, IL 61201-8004
Attention: NRCODS
815/381-6370
Joint application with
Illinois

SACRAMENTO
\$60 Capitol Mall
Sacramento, CA 95814-4794
Attention: SPCO-O
916/440-2842

ST. LOUIS
210 Tucker Blvd., N
St. Louis, MO 63101-1886
Attention: LMSOD-F
314/283-5703
Joint application with
Illinois, Missouri

ST. PAUL
1135 USPO & Custom
House
St. Paul, MN 55101-1479
Attention: NCSOO-RF
612/725-8819

SAN FRANCISCO
211 Main Street
San Francisco, CA 94105-1905
Attention: SPNCO-R
415/974-0416

SAVANNAH
P.O. Box 869
Savannah, GA 31402-0869
Attention: SASOP-F
912/944-6347
Joint application with
Georgia

SEATTLE
P.O. Box C-3765
Seattle, WA 98124-2255
Attention: NP8OP-RF
206/784-3485
Joint application with
Idaho

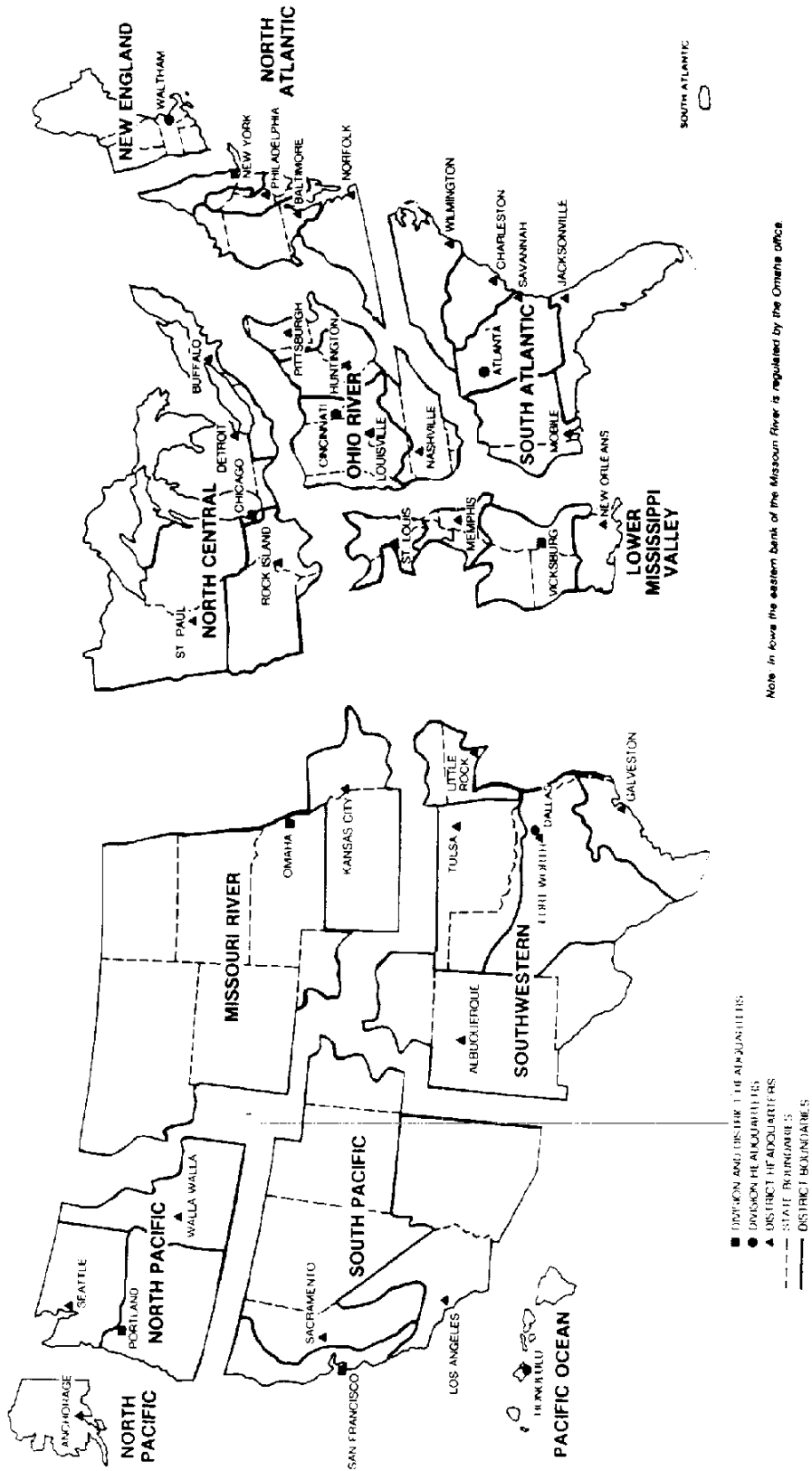
TULSA
P.O. Box 61
Tulsa, OK 74121-0061
Attention: SWTOD-RF
918/561-7281

WICHITA
P.O. Box 60
Wichita, KS 67202-0060
Attention: LMKOD-F
620/334-5276
Joint application with
Mississippi

WALLA WALLA
Building 802
City-County Airport
Walla Walla, WA
509/332-8285
Attention: NPWOP-RF
509/522-6718
Joint application with
Idaho

WILMINGTON
P.O. Box 1890
Wilmington, NC
28402-1890
Attention: SAWCO-E
919/343-4511
Joint application with North
Carolina

The Division Engineer
U.S. Army Engineer
Division
NEW ENGLAND
424 Trapelo Road
Waltham, MA 02254-8149
Attention: NEDCO-R
617/647-8338
Joint application with
Massachusetts, Maine



APPENDIX 2. U.S. COAST GUARD PROGRAMS

The Coast Guard is charged with marking navigable waterways. For the purpose of this advisory circular, "aids to navigation" refers to nautical application rather than to the aeronautical connotation.

a. The proponent of a water operating area located on navigable waters should contact the Commander of the Coast Guard District which has jurisdiction over the area where the water operating area be developed.

b. If the proponent decides that markers are required, then these markers are classified as private aids to navigation. The rules, regulations, and procedures that pertain to private aids to navigation are set forth in the Code of Federal Regulations, Title 33, Chapter 1, Part 66.

c. The Coast Guard requires that the application show evidence of a permit having been issued by the Corps of Engineers prior to completing CG-2554 (item 6 of the form).

d. Figures A2-1 through A2-5 contain instructions for completing the application form as well as addresses of Coast Guard District Commanders.

U.S. COAST GUARD

PRIVATE AIDS TO NAVIGATION APPLICATION

INSTRUCTIONS

1. The rules, regulations, and procedures pertaining to private aids to navigation are set forth in the copy of Code of Federal Regulations; Title 33, Chapter 1, Part 66, on the back of this page.
 2. Three copies of the application for private aids shall be forwarded to the Commander of the Coast Guard District in which the aids will be located 30 days in advance of the proposed action. Sections of charts or sketches showing the work proposed shall accompany each application.
 3. When making application for private aids to mark structures and mooring buoys in navigable waters or to mark the excavating or depositing of material therein, evidence is required of the authorization obtained from Corps of Engineers, Department of the Army, for such work. (Code of Federal Regulations; Title 33, Part 209.120.)
 4. The applicant shall complete all of Blocks 1, 2, 3, 4, 5, 9 and 10 for all new applications. When an aid is being discontinued, Block 3 need not be completed. Block 6 shall be completed whenever authorization is required to be obtained from Corps of Engineers (See Instruction No. 3). Columns of Block 7 will be completed as follows:
 - a. Unlighted buoys - 7a, 7c, 7f, and 7j.
 - b. Lighted buoys - 7a, 7b, 7c, 7d, 7e, 7f, 7g, 7h, and 7j.
 - c. Daymarks - 7a, 7b, 7f (if applicable), 7h, 7i, and 7j.
 - d. Light on a structure - 7a, 7b, 7c, 7d, 7e, 7f (if applicable), 7g, 7h, 7i, and 7j.
- When an aid is being changed, Block 8 shall be used to describe the nature of the change.
5. The required information for each column includes the following:
 - (7a) Proposed number or letter to be assigned to the aid.
 - (7b) Period of light (time in seconds for one complete cycle).
 - (7c) Flash length in seconds. For complex or multiple flashes, explain in column (7j).
 - (7d) Color of light.
 - (7e) Position by two or more horizontal angles, or bearing and distance from a prominent charted landmark. If a prominent charted landmark is not available, show latitude and longitude as precisely as the chart permits.
 - (7f) Depth of water at buoy or structure (if marine site). All depths are measured from mean low water except on Great Lakes where depths are measured from low water datum.
 - (7g) Candlepower, if known; otherwise, include the following information in column (7j): lens size, lamp voltage and amperage if electric, or details of other illuminant to be used.
 - (7h) Height of light or unlighted structure above water. Height is measured from mean high water except in the Great Lakes where heights are measured from low water datum shown on U.S. Lake Survey Charts. The height of a light on a buoy is measured from the water line.
 - (7i) Include details of structure (type, color).
 - (7j) Used for the following specific information, plus any other useful details: a. buoys - size, shape, color, and reflective material used; b. structures - daymark shape and color; c. fog signal on a buoy or structure - type and model, audible range, and characteristic (number of strokes or blasts, period and blast length).
 6. This form may be used to cover more than one aid in the same geographic area. Draw a line between each aid as indicated in example. Attach separate sheet if additional space is required.
 7. Attach a section of chart showing the proposed location of the aid(s) to navigation.
 - a. After receipt of the approved form the applicant will advise the District Commander by telegram or other rapid means of communications when the work authorized is actually accomplished.
 - b. If the aids have not been installed within one year of the approval date, the approved application is automatically cancelled.
 - c. Any discrepancy in the operation of the aid(s) at any time shall be reported to the District Commander by telegram or other rapid means of communication in order that Notices to Mariners may be issued. A discrepancy exists whenever the aid is not as described in the approved application, i.e., lack of signal, incorrect light characteristic, or improper color, shape or position of shore structure or buoy. The correction of the discrepancy will also be reported by the same method.
 9. All classes of private aids to navigation shall be maintained in proper condition. They are subject to inspection by the Coast Guard at any time and without prior notice to the maintainer.

7. APPLICANT WILL FILL IN APPLICABLE REMAINING COLUMNS

FOR DISTRICT COMMANDERS ONLY		EXAMPLE OF USE OF APPLICATION									
LIGHT LIST NUMBER OR PAGE	NAME OF AID	NO. ON LTR. (7a)	LIGHT PER. (7b)	FLASH LGTH. (7c)	COLOR (7d)	POSITION (7e)	DEPTH OF WATER (7f)	CANDLE POWER (7g)	HT. ABOVE WATER (7h)	STRUCTURE TYPE, COLOR, AND HEIGHT (7i)	REMARKS (See Instructions) (7j)
		1	4s	0.4s	WHITE	206 T, 3540 yds from tank, Bayview, Va.	9 Ft.	20	6 Ft.		5' Lighted buoy - black
		2				200 T, 3425 yds from tank, Bayview, Va.	7 FT				Blue buoy - Red White Reflector
		3				210 T, 2810 yds from tank, Bayview, Va.	2 Ft.		7 Ft.	Single pile	2' square daymark - black
		5	2.5s	0.5s	WHITE	218.5 T, 330 yds from tank, Bayview, Va.	6 Ft.	20	13 Ft.	5 - pile	3' square daymark - black

Dept. of Transp., USCG, CG-8834 (Rev. 7-78)

USCG DISTRICT OFFICES

State / City / Time	Field Address	Telephone FTS / Comm
ATLANTIC		
8:00 a.m.-4:30 p.m.	Governor's Island New York, NY 10004-5098	8-664-7196 (212) 668-7196
8:00 a.m.-4:30 p.m.	Maintenance & Logistics Command (Atlantic) Governor's Island New York, NY 10004-5000	8-664-7196 (212) 668-7196
PACIFIC		
11:00 a.m.-7:30 p.m.	Coast Guard Island Alameda, CA 94501-5100	8-536-3196 (415) 437-3196
7:30 a.m.-4:30 p.m.	Maintenance & Logistics Command (Pacific) Coast Guard Island Alameda CA 94501-5100	8-536-3939 (415) 437-3939
DISTRICT 1		
8:00 a.m.-4:30 p.m.	408 Atlantic Ave Boston, MA 02210-2209	8-223-8480 Nights, Sat., Sun., Holidays 8-223-8555 (617) 223-8480
DISTRICT 2		
8:45 a.m.-5:15 p.m.	1222 Spruce Street St. Louis, MO 63101-2832	8-262-7601 (314) 539-7601
DISTRICT 5		
8:00 a.m.-4:30 p.m.	431 Crawford Street Portsmouth, VA 23704-5004	8-393-6287 (804) 398-6287
DISTRICT 7		
7:00 a.m.-4:00 p.m.	Brickell Plaza Federal Bldg. 909 SE 1st Avenue Miami, FL 33130-1608	8-350-5654 (305) 536-5654
DISTRICT 8		
7:45 a.m.-4:15 p.m.	501 Magazine Street New Orleans, LA 70130-3396	8-682-6298 (504) 589-6298
DISTRICT 9		
7:30 a.m.-4:00 p.m.	1240 E. 9th Street Cleveland, OH 44199-2060	8-942-3910 (216) 522-3910
DISTRICT 11		
11:00 a.m.-7:30 p.m.	400 Oceangate Blvd. Long Beach, CA 90882-5399	8-984-5201 (213) 499-5201
DISTRICT 13		
10:45 a.m.-7:15 p.m.	915 2nd Avenue Seattle, WA 98174-1067	8-399-5078 (206) 553-5078
DISTRICT 14		
1:00 p.m.-9:30 p.m.	300 Ala Moana Boulevard Honolulu, HI 96850-4982	(808) 541-2051
DISTRICT 17		
11:00 a.m.-7:30 p.m.	P.O. Box 3-5000 Juneau, AK 99802-1217	8-871-2025 (907) 463-2025

U.S. Coast Guard Districts

Pacific Area
COMPACAREA

Atlantic Area
COMLANTAREA

