
Guidelines for the Safe Operation and Maintenance of Marinas

by the
National Water Safety Congress



2001 Revision of 1988 Guidelines

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Maintenance of Marinas
by the
National Water Safety Congress**

**2001 Revision of 1988 Guidelines
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Foreword

The National Water Safety Congress (NWSC) was formed in 1951 to promote the safe use of the nation's waters for recreational purposes. Its membership consists of a broad base of individuals and organizations interested in water safety, including many of the top water safety professionals in the United States.

The NWSC encourages participants in water activities-i.e., boaters, swimmers, divers, skiers, anglers, commercial boat operators, etc.-to obtain safety instruction in their field of endeavor. The NWSC promotes water safety through the press, radio, television, and films and through promotion of the work of other organizations such as the American Red Cross, U.S. Coast Guard and U.S. Coast Guard Auxiliary, U.S. Power Squadron, U.S. Army Corps of Engineers, National Park Service, U.S. Forest Service, Tennessee Valley Authority, and others.

The NWSC develops, publishes, and distributes boating safety education courses and materials; collects, compiles, and distributes water accident statistics; encourages state governments to establish water safety programs; promotes uniform legislation and encourages reciprocity of laws among states; and publicly recognizes individuals, organizations, and business firms for their efforts in promoting boating and general water safety. The NWSC annually co-sponsors with the National Safe Boating Council the International Boating and Water Safety Summit, which provides professional boating and water safety training for federal, state, and local boating and water safety education and management personnel.

Introduction

These recommendations provide a guide for minimum safety requirements for the operation and maintenance of marinas to ensure adequate protection of the public from mishaps. Compliance is required with the following federal, state, and local codes: the National Fire Protection Association Codes, particularly but not limited to #7 (National Electric Code); #30 (Flammable and Combustible Liquids Code), 30A (Code for Motor Fuel Dispensing Facilities and Repair Garages), #302 (Fire Protection Standard for Pleasure and Commercial Motor Craft), #303 (Fire Protection Standard of Marinas and Boatyards), #307 (Standard for the Construction and Fire Protection of Marine Terminals, Piers, and Wharves), #312 (Standard for the Fire Protection of Vessels During Construction, Repair, and Lay-up), #325 (Guide to Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids), #326 (Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, and Repair), #329 (Recommended Practices for Handling Releases of Flammable and Combustible Liquids and Gases), and #820 (Standard for Fire Protection in Wastewater Treatment and Collection Facilities); and Code of Federal Regulations, Title 40, Subchapters D (Water Programs), H (Ocean Dumping), I (Solid Wastes), J (Superfund, Emergency Planning, and Community Right-To-Know Programs), N (Effluent Guidelines and Standards), O (Sewer Sludge), and R (Toxic Substances Control Act).

The involvement of professional planners and designers in marina facilities is of vital importance to public safety. It is equally important to public safety that capable and qualified personnel are involved in the management of marina operations and maintenance.

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1. Boat Launching Ramps

- 1.1 Launching ramps should be designed to require a deliberate turn from the access road onto the ramp. Traffic control devices, such as barricades, traffic islands, berms, or other architectural barriers, may be used to ensure access roads are not in direct alignment with the ramp. This will prevent direct access to the ramp and keep unaware persons from driving directly into the water. Where turns or control devices are not feasible, rumble strips, signs, and street lights should be installed.
- 1.2 Ramps should be from 12 to 14 feet wide per anticipated lane and should extend at least 4 feet below the low water level.
- 1.3 Slope should be between 12 and 16 percent above the water line and 15 to 20 percent below the water line.
- 1.4 Each ramp should include a minimum of one, 75-foot-diameter vehicular turnaround.
- 1.5 Ramps should have retaining curbs at the lower end of the ramp and on the outside edges of ramps where drop-offs exist or could form.
- 1.6 Ramp surfaces should be scored or patterned to provide adequate traction.
- 1.7 Where feasible, chock blocks should be provided at each launching ramp and a sign placed to encourage their use.
- 1.8 Ramps should be kept free of algae growth and silt build-up, which could create slipping hazards.
- 1.9 A sign should be located at the launching area and should include appropriate statements, such as:
 - No swimming or wading.
 - Get all passengers out of vehicle.
 - Leave door open on driver's side. Unfasten boat hold-down strap.
 - Is your drain plug in?
 - Do you have the necessary safety equipment in your boat?
 - Alcohol and boating don't mix.
 - Boat safety - make sure someone knows where you are boating and when you will return or file a float plan.
 - The phone number for emergency services is -----.
 - No wake or appropriate boat operating instructions.
- 1.10 Boat launching, rigging, and parking areas and access roads to boat ramps should be free of overhead power lines. Where overhead power lines are present at launching, rigging, and parking areas, warning signs should be posted.
- 1.11 Launching ramps should have a security light for safety.
- 1.12 Courtesy loading docks should be provided at boat ramps. This will allow for safe loading and unloading of persons and gear.

2. Dock Flotation

- 2.1 Flotation should be of materials fabricated for marine use. The flotation material should be expanded, encased, or encapsulated and 100 percent warranted for a minimum of 8 years against sinking, becoming waterlogged, cracking, peeling, fragmenting, or losing beads. All flotation material should resist puncture and penetration and should not be subject to damage by animals under normal conditions for the area. All flotation material should be fire resistant. The use of new or recycled plastic or metal drums or non-compartmentalized air containers for encasement should be prohibited.
- 2.2 Repair or replacement should be required when flotation material no longer performs its designated function or it fails to meet the specifications for which it was originally warranted.
- 2.3 Flotation should be adequate to maintain a stabilized and safe structure capable of supporting use loads. At least 40 percent of the flotation should be above the waterline under all conditions.
- 2.4 Flotation should be securely fastened to the dock using galvanized steel straps, treated wood dowels, galvanized bolts, or other acceptable methods.
- 2.5 Type GR-gasoline resistant flotation - should be required on all new gas docks and within 40 feet of a line carrying fuel or when replacing flotation under existing gas docks.

3. Anchorage

- 3.1 An anchorage system should be provided for mooring all floating structures, taking into consideration water depth, fluctuation, and exposure to wave and wind action. Anchorage systems, such as dead man or ground stakes, should be installed flush with existing grade. Anchor cables or other securing devices should not be attached to trees, stumps, power poles, or guardrail posts. Anchor cables should be fastened with a minimum of three U-bolts or fist grip clamps. All anchor lines should be installed in a manner that will not create a tripping hazard. Anchorage systems should be so situated, marked, and/or guarded so they do not constitute a navigation or other hazard. Floating facilities should be securely anchored to prevent them from floating free during major floods.
- 3.2 Winches located on docks should have cable guards and be mounted so they do not create a hazard.

4. Fuel Dispensing Areas

- 4.1 The fuel dispensing area should be located a sufficient distance from other structures to allow adequate room for safe ingress and egress of craft to be fueled. Dispensing units should be at least 25 feet from any activity not associated with the handling of fuel.
- 4.2 Approved dispensing units, with or without integral pumps, should always be used. Units may be located on open piers, wharves, floating docks, on shore, or on piers of the solid fill type.
- 4.3 Tanks and pumps not integral with the dispensing unit should be on shore or on a pier of the solid fill type and located above the maximum water level elevation.
- 4.4 In a situation where shore location would require excessively long supply lines to dispensers, the authority having jurisdiction may grant permission for installation of tanks on a pier. Applicable portions of the Bulk Fuel Tank Storage section of this manual (Section 6) relative to spacing, diking, and piping should be adhered to, and the quantity so stored should not exceed 1,100 gallons aggregate capacity.
- 4.5 Shore tanks supplying marine service stations may be located above ground where rock ledges, limited space, or a high water table make underground tanks impractical. Applicable portions of Section 6, Bulk Fuel Tank Storage, of this manual relative to spacing, diking, and piping should be adhered to. All federal, state, and local regulations concerning aboveground storage tanks must be followed, including the spill prevention control and countermeasure (SPCC) regulations found in 40 CFR, Part 112.
- 4.6 In a situation where tanks are at an elevation that would produce gravity head on the dispensing unit, the tank outlet should be equipped with a pressure control valve positioned adjacent to and outside the tank block valve, and it should be adjusted so liquid cannot flow by gravity from the tank in case of piping or hose failure.
- 4.7 Piping between shore tanks and dispensing units should be as specified in Section 6, Bulk Fuel Tank Storage, except that, where dispensing is from a floating structure, suitable lengths of oil-resistant flexible hose may be employed between the shore piping and the piping on the floating structure as made necessary by change in water level or shoreline.
- 4.8 A readily accessible and posted valve to shut off the fuel supply from shore should be provided in each pipeline at or near the approach to the pier and at the shore end of each pipeline adjacent to the point where flexible hose is attached.
- 4.9 Piping should be located so it is protected from physical damage. Corrosion protection for piping is also required (details are provided in Section 6 of this manual).
- 4.10 Pipes that handle Class I liquids should be grounded to control stray currents.
- 4.11 **STORAGE AND HANDLING OF FUELS:** The fueling station should be located to minimize the exposure of all other plant facilities. Where tide and weather exposure conditions permit, all fuel handling should be outside the main berthing area.

- 4.12 Inside fueling stations should be located near an exit by water from the berthing area or at some other location from which, in case of fire aboard a boat alongside, the stricken craft may be quickly removed without endangering other boats or structures nearby.
- 4.13 When practical, fueling station docks, including the fuel system piping, should be detachable by means of quick disconnect systems that allow complete removal of the dock by pushing or towing it to a safe location should it catch fire, and piping disconnects that should prevent spillage of any fuel.
- 4.14 Dispensing units for transferring fuels from storage tanks should be in accordance with provisions of the Flammable and Combustible Liquids Code (NFPA No. 30). Every fuel delivery nozzle should be equipped with a self-closing control valve, which will shut off the flow of fuel when the operator's hand is removed from the nozzle. **THE USE OF ANY AUTOMATIC NOZZLE WITH A LATCH-OPEN DEVICE SHOULD BE PROHIBITED.** In the construction of the fuel hose assembly, provisions should be made so the fuel delivery nozzle is properly bonded to the shore electric grounding facilities.
- 4.15 All boat fueling operations should be carefully accomplished in accordance with NFPA 302, "Fire Protection Standard for Pleasure and Commercial Motor Craft."
- 4.16 Fueling from cans should be discouraged.
- 4.17 For the purpose of this section, fuel pipes shall mean all pipelines, tubing, or hoses that are conductors of fuel from the deck filling plate to the engine connection. Related accessories should include any attachments to fuel pipes, such as valves, strainers, pumps, connecting fittings, etc.
- 4.18 Fuel pipes should be accessible. Fuel pipe connections and accessories should be readily accessible.
- 4.19 Fuel pipes should be adequately secured against excessive movement or vibration, protected from potential damage, and should have several piping disconnects with automatic shut-off valves in case the piping gets broken or separated.
- 4.20 Outlets for drawing gasoline below deck for any purpose should be prohibited.
- 4.21 When making up threaded pipe connections, an approved sealing compound, resistant to gasoline, should be used.
- 4.22 When making flared tube connections, it is essential that tubing be cut squarely and be truly flared by tools designed for those purposes.
- 4.23 **SIGNS.** It is recommended that locations such as fueling stations, areas used for the storage and handling of fuel or other flammable liquids, boat storage sheds, paint and woodworking shops, sail lofts, battery charging rooms, boat locker rooms, and storage rooms, display the sign:
"SMOKING AND OPEN FLAMES PROHIBITED."
- 4.24 A means of notifying appropriate authorities must be available should a fire break out or another emergency occurs.
- 4.25 A means of extinguishing small fires quickly must be readily available. See Section 5.

5. Fire Protection

- 5.1 Portable fire extinguishers of approved type 2A:20-B:C and suitable to the hazards and circumstances should be provided throughout the property and located so an extinguisher is within 50 feet of any point. A minimum of two, 4-A:40-B:C should be located outside of and within 30 feet of each fuel pump and in clear view in the gas dock area. These fire extinguishers should be placed at least 15 feet apart, if possible. Fire extinguishers should be inspected monthly.
- 5.2 The gasoline dispensing and other areas where flammable materials are stored or used should be posted as identified in Section 4.23.
- 5.3 A clearly identified and readily accessible emergency shutoff switch that can be used to shut off the supply of power to gasoline pumps should be located on land and near the dispensing pumps should a leak develop.
- 5.4 Hoses and nozzles should be in accordance with Section 4.14.
- 5.5 At least one Coast Guard approved throw-type flotation device (with at least 60 feet of ¾-inch diameter rope attached or a reach pole) should be located in clear view on the gas dock and every 200 feet on other docks.
- 5.6 Immediate notification to the nearest fire department in the event of fire should be the established operating procedure. An approved means for sounding an alarm to notify yard personnel and others of a fire on the premises should be provided.
- 5.7 All fire extinguisher locations should be clearly marked and within easy access. Fire extinguishers should be inspected monthly to ensure they operate properly, when needed.
- 5.8 Emergency phone numbers should be posted conspicuously near the telephone.
- 5.9 Combustible waste material and residues should be kept to a minimum, stored in covered metal receptacles, and disposed of daily.
- 5.10 National Fire Protection Codes should be consulted for specific details. (See Introduction to this manual for list of codes.)
- 5.11 Local fire department personnel should be invited to inspect the facility with special emphasis on access to different areas of the marina in order to fight a fire.
- 5.12 A safety skiff should be available and ready for use. The skiff should be equipped with a wire rope and an attached grabble hook. This skiff should be used to tow a vessel that may be on fire to open water and away from other craft or structures.

6. Bulk Fuel Tank Storage

(See Appendix B for additional information)

- 6.1 **TANK PLACEMENT.** The excavation for an underground tank should provide a firm level base. Ledges or high spots, which might stress the tank, should be avoided. Particular care must be taken when an underground or aboveground tank is to be placed on fill or rocky ground. Fuel storage tanks should be installed in accordance with the Flammable and Combustible Liquids Code and all federal, state, and local ordinances. Dropping the tank or rolling it into the hole should not be permitted. Such handling may break a weld, puncture or damage the tank metal, and may scrape off the protective coating if the tank has been coated.
- 6.2 **LOCATION.** Excavations for underground storage tanks should be made with care to avoid undermining foundations of existing structures. Underground tanks or tanks under buildings should be located with respect to existing building foundations and supports so that loads carried by the latter cannot be transmitted to the tank. Aboveground tanks should be located such that they are protected against unauthorized access and vehicular collisions. Bulk storage of fuel on floating docks is not recommended. Tanks should be located on land above maximum water level elevation.
- 6.3 **DEPTH AND COVER.** Underground tanks should be set on firm foundations and surrounded with at least 6 inches of non-corrosive, inert materials, such as clean sand, earth, or gravel, well tamped in place. Tanks should be covered with a minimum of 2 feet of earth, or be covered with not less than 1 foot of earth, on top of which should be placed a slab of reinforced concrete not less than 4 inches thick. When underground tanks are, or are likely to be, subject to traffic, they should be protected against damage from vehicles passing over them by at least 3 feet of earth cover or 18 inches of well tamped earth, plus 6 inches of reinforced concrete or 8 inches of asphaltic concrete. When asphaltic or reinforced concrete paving is used as part of the protection, it should extend at least 1 foot horizontally beyond the outline of the tank in all directions.
- 6.4 **CORROSION PROTECTION.** One or more of the following methods should provide corrosion protection for the tank and its piping:
- a. Use of protective coatings or wrappings,
 - b. Cathodic protection, or
 - c. Corrosion-resistant materials.

NOTE: Selection of the type of protection to be employed should be based upon the corrosion history of the area.

- 6.5 **LOCATION AND ARRANGEMENT OF VENTS.** Vent pipes from tanks should be located so the discharge point is outside of buildings, higher than the fill pipe opening, and not less than 12 feet above the adjacent ground level. Vent pipes should discharge only upward to disperse vapors. Vent pipes, 2 inches or less in inside diameter, shall not be obstructed by devices that will cause excessive back pressure. Vent pipe outlets should be located so flammable vapors will not enter building openings or be trapped under eaves or other obstructions. If the vent pipe is less than 10 feet long or greater than 2 inches in inside diameter, the outlet should be provided with a vacuum and pressure relief device, or there should be an approved flame arrestor in the vent line at the outlet or within the approved distance from the outlet. In no case should a flame arrestor be located more than 15 feet from the outlet end of the vent line.

- 6.6 **STORAGE TANK ANCHORAGE.** Each tank should be safeguarded against movement when empty and submerged by high ground water or floodwaters by anchoring, weighting with concrete or other approved solid loading material, or securing by other means. Each such tank should be constructed and installed so it will safely resist external pressures due to high ground water or floodwaters.
- 6.7 **DRAINAGE AND DIKED AREAS.** The area surrounding an aboveground tank or a group of aboveground tanks should be diked to provide secondary containment in prevention of discharging liquid from the tank(s), endangering adjoining property, or reaching waterways. The volume of the diked area shall comply with the following requirements:
- a. The volumetric capacity of the diked area or secondary containment basin should not be less than 110 percent of the largest tank within the diked area, assuming a full tank. The capacity of the diked area enclosing more than one tank should have a capacity at least equal in volume to that of the largest tank plus 10 percent of all other tanks enclosed.
 - b. Walls of the diked area or secondary containment basin should be of earth, steel, concrete, solid masonry, or an approved material for tanks that is compatible with fuels, designed to be liquid tight and to withstand a full hydrostatic head. Earthen walls should be compacted and 3 feet or more in height, having a flat section at the top of not less than 2 feet wide. The slope of earthen walls should be consistent with the angle of repose of the material of which the walls are constructed.
 - c. The walls of the diked area should be restricted to an average height of 6 feet above the interior grade.
 - d. Secondary containment can be constructed as a "tank in a tank" or a "tank in a box."
 - e. When provision is made for draining water from diked areas, drainage should be provided at a uniform slope of not less than 1 percent away from tanks toward a sump, drainbox, or other safe means of disposal located at the greatest practical distance from the tank. Such drains should normally be controlled in a manner so as to prevent flammable or combustible liquids from entering natural water-courses, sewers, or drains if their presence would constitute a hazard. Drainage controls should be accessible under fire conditions. No loose combustible material, either empty or full drum or barrel, should be permitted within the diked area.
- 6.8 **FUEL PIPELINES.** Fuel pipelines should be installed in accordance with the provisions of the Flammable and Combustible Liquids Code (NFPA No. 30) and any other applicable federal, state, or local regulation or code.
- a. Piping materials should be steel, of non-corrosive materials if used underground, or as specified by the properties of the flammable or combustible liquid handled. Piping built of materials other than steel should be designed to specifications embodying principles recognized as good engineering design for the material used.
 - b. Piping should be installed free of leaks and in a manner to prevent leaks from developing. Welded, screwed joints, or approved connectors should be used. Flanged joints are not recommended for underground service, but, if used, they should be of steel. Threaded joints and connections should be tight with a suitable lubricant or piping compound. Hard setting compounds, such as litharge or red lead, are prohibited.

- c. Pipes passing through concrete or under paved areas (roads, sidewalks, parking lots, etc.) should be in pipe sleeves, mastic, or be otherwise free to allow for settlement, frost action, vibration, or traffic.
- d. Where dispensing is from a floating structure, suitable lengths of oil-resistant flexible hose may be employed between the shore piping and the piping on the floating structure as necessary by change in water level.
- e. It is recommended that secondary containment of piping be used. Examples include piping sleeves, double-walled piping, impermeable trenches, and piping chase.

6.9 VALVES.

- a. Readily accessible valves to shut off the fuel supply from shore should be provided on each pipeline adjacent to the point where flexible hose is attached.
- b. Where tanks are at an elevation that would produce gravity head on the dispensing unit, the tank outlet should be equipped with a pressure solenoid control valve positioned adjacent to and outside the tank block valve, adjusted so liquid cannot flow by gravity from the tank in case of piping or hose failure.

7. Storage of Flammable Liquids

- 7.1 Rooms where flammable liquids are stored should be ventilated so there is no accumulation of flammable vapors. As a minimum, natural ventilation should be provided by air intake and exhaust vents located on opposite walls approximately 12 inches off the floor.
- 7.2 Smoking should be prohibited, and "**No Smoking**" signs should be posted in the storage rooms and on the outside walls of the room.
- 7.3 Batteries should not be stored in the same room with flammable liquids.
- 7.4 Storage of all flammable liquids in portable containers should be ONLY in approved type safety containers with flame arrestors and labeled for contents.
- 7.5 Fire extinguishers should be located in conspicuous and easily accessible locations.
- 7.6 Metal containers and portable tanks (less than 2.5 cubic meters/660 gallons individual capacity) meeting the requirements of and containing products authorized by Chapter 1, Title 49 of the Code of Federal Regulations (US DOT Hazardous Materials Regulations), Chapter 9 of the United Nations Rules for the Transportation of Dangerous Goods, or NFPA 386, Standard for Portable Shipping Tanks for Flammable and Combustible Liquids, should be used for transportation or storage of flammable or combustible liquids.
- 7.7 Portable tanks (less than 2.5 cubic meters/660 gallons individual capacity) should be provided with one or more devices installed in the top with sufficient emergency venting capacity to limit internal pressure under fire exposure conditions to 69 kPa (10 psig) or 30 percent of the bursting pressure of the portable tank, whichever is greater.

- a. At least one pressure-activated vent having a minimum capacity of 170 cubic meters (6,000 cubic feet) of free air per hour should be used; it should be set to open at not more than 35 kPa (5 psig).
- b. If fusible vents are used, they should be actuated by elements that operate at a temperature not exceeding 115 degrees Centigrade (300 degrees Fahrenheit).
- c. Where plugging of a pressure activated vent can occur, fusible plugs or venting devices that soften to failure at a maximum of 115 degrees Centigrade (300 degrees Fahrenheit) under fire exposure should be permitted to be used for the entire emergency venting requirement.

8. Battery Storage and Charging Areas

- 8.1 Rooms where batteries are charged should be well ventilated near the ceiling to disperse accumulation of gases.
- 8.2 Flammable liquids should not be stored in battery storage and charging rooms.
- 8.3 All metal parts in the battery room should be of corrosion-resistant material or suitably protected from corrosion.
- 8.4 Smoking should be prohibited and "**No Smoking**" signs should be posted in the charging and storage room and on the outside of the room.
- 8.5 A fully charged 2-A:40-B:C fire extinguisher should be located on the outside wall of all battery storage and charging rooms.
- 8.6 Facilities in compliance with 29 CFR, Part 1910.151, "Emergency Services and First Aid," for quick drenching of the eyes and body should be provided for emergency use in the work area. Examples include an eye wash and safety shower.
- 8.7 When charging batteries, battery vent caps should be tightly screwed to avoid electrolyte spray.
- 8.8 Personal protective equipment (PPE) and apparel should be available for employees.

9. Electrical Systems

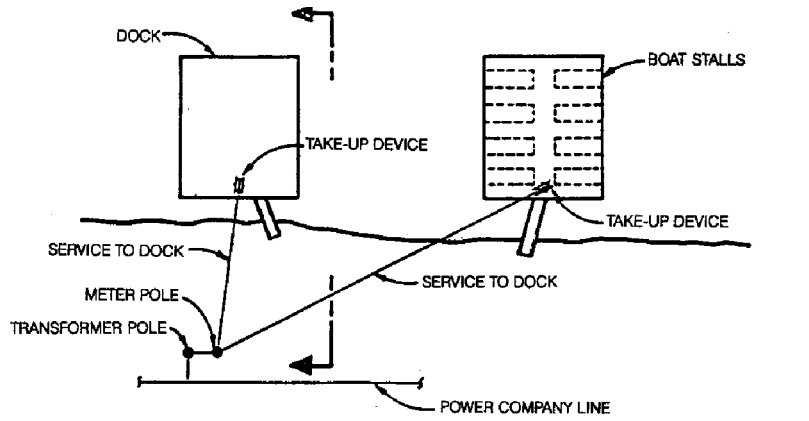
All electrical work should be performed and annually inspected by a licensed electrician. All electrical installations should meet the requirements of all state and local codes and the National Electric Code. Particular attention should be given to articles 339 and 555 of the National Electric Code, which pertain to marinas and boat yards.

- 9.1 When possible, all electric power lines should be placed underground.
- 9.2 If an overhead supply is used, the cable from the meter pole to the dock should be a multi-conductor, neoprene-jacketed cable or messenger-type service cable. Wire should be sized for the intended service but in no case should the conductors be smaller than No. 2 AWG. A take-up device should be furnished either at the dock or the final pole to eliminate excessive sag. A sketch illustrating the power supply to docks is included as Plate 1. If an underground supply is used, the cable must be of a type approved for underground use and should be installed as shown on Plate 3. ("Dock" refers to any separate floating structure requiring electrical service.)
- 9.3 **POWER LINE CLEARANCES.** Power lines over inland bodies of water used by sailboats should be installed to meet the following clearance criteria. PLEASE NOTE: Clearances listed in the chart indicate number of feet power lines are to be located above the highest water level of the body of water in question.

NOTE: Sailboat rigging and launching areas should have clearances 5 feet greater than those listed below. Ideally, power lines should be placed underground. As a general rule where there is no potential for vehicular, boat, or trailer contact, power lines should be at least 12 feet above ground. This will ensure no contact is accidentally made.

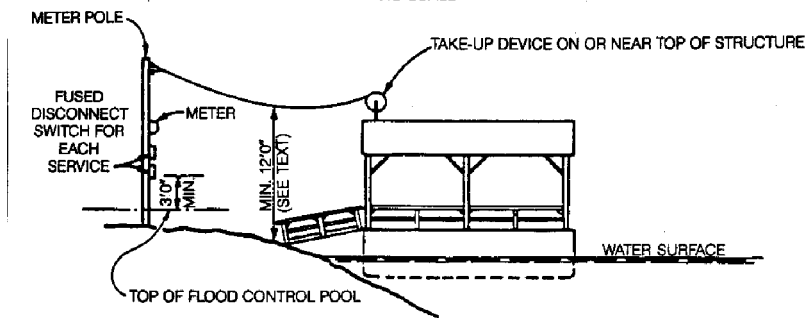
Nominal System AC Voltage - kV	Minimum Vertical Clearance in Feet
0 - 87	55
88 - 115	56
116 - 161	57
162 - 230	58
231 - 345	60
346 - 500	64
501 - 765	69

- 9.4 A fused disconnect switch should be provided for de-energizing the supply cable at the meter pole. The supply cable should be terminated in a main circuit breaker on a panelboard at the dock. The panelboard should be designed to accommodate the number of branch circuits furnished on the dock. (See requirement in 9.5 below for determination of the number of circuits.) The panelboard should be centrally and conspicuously located on the dock and should be in a rainproof enclosure. For those electrical services subject to flooding or large pool fluxuations, a disconnect should be located at or above the 500-year flood or flood risk profile elevation contour that is accessible during flooding.



PLAN

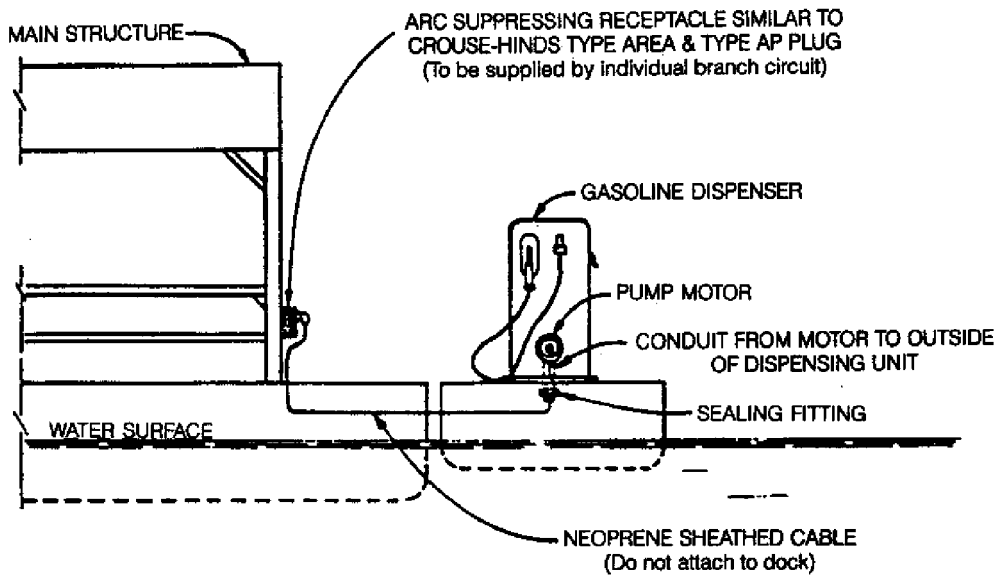
NO SCALE



SECTION

NO SCALE

Plate 1



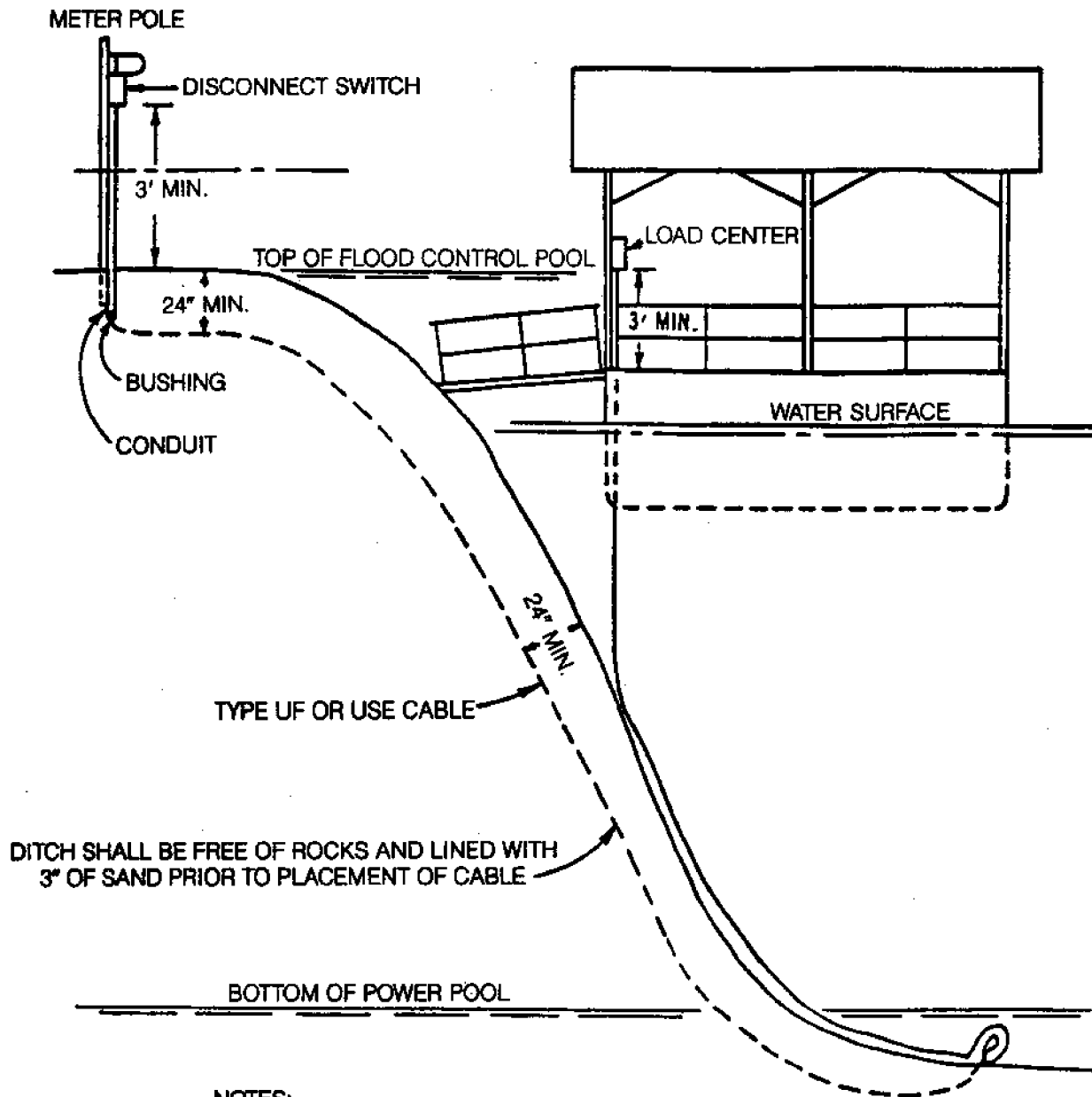
GASOLINE DOCK

NO SCALE

NOTE

Ground connection shall be made to motor housing.

Plate 2



NOTES:

- (1) Cable shall be buried 3' out into lake at all times and 24" below ground with 6" of sand backfill. This operation shall be continued as water recedes.
- (2) Cable shall be long enough to run from meter pole to a point on the shore at the bottom of the power pool and back up the shore to the dock at the top of the flood control pool.

UNDERGROUND ELECTRIC SERVICE
TO BOAT DOCKS

- 9.5 Receptacles should be rated not less than 20 amperes and should be of the grounding type, mounted at least 3 feet above the floor. Ground-fault circuit interrupters should protect 120-volt receptacles other than those supplying shore power to boaters. An individual branch circuit should supply each receptacle, which supplies shore power to boats. Also, receptacles supplying shore power should be rated not less than 20 amperes and should be single and of the locking and grounding type. Convenience outlets provided for battery charging and pumping small craft are not considered shore power. Outside receptacles should be weatherproof and installed in corrosion-resistant boxes having threaded hubs. Other circuits should be designed for the intended use, and individual branch circuits should be provided for all continuous loads except lighting. The dock lighting fixtures should be so constructed and installed that water cannot enter or accumulate in the lampholders or other electrical parts. The fixtures should be "Suitable for Damp (or Wet) Locations" as set out in the National Electrical Code. Each fixture should be mounted on a corrosion-resistant box equipped with a neoprene gasket and threaded hub. Fixtures should be mounted at least 7 feet above walkways.
- 9.6 The following items should be grounded by a conductor and run with other circuit conductors:
- a. Boxes, cabinets, and all other metallic enclosures.
 - b. Metal frames of utilization equipment (drink dispensing machines, ice machines, freezers, minnow vats, gasoline pumps, etc.).
 - c. Grounding terminals of receptacles (all receptacles should be grounding type).
 - d. All metal utilization equipment (drink dispensing machines, minnow vats, gasoline pumps, etc.) that are supplied with electric power should be solidly grounded to prevent electric shock.
- 9.7 All dock wiring should be installed in conduit except non-metallic sheathed cable approved for continuous flexibility and wiring installed in areas that are inaccessible, such as above ceilings and in dry walls. Conduit may be galvanized steel, PVC, or electrical metallic tubing.
- 9.8 The meter pole location should be such that the meter and pole-mounted service equipment are installed at least 3 feet above the top of the high water level and accessible during high water events.
- 9.9 Minimum wire size should be: No. 2 AWG for service conductors, No. 8 AWG for feeder conductors, and No. 12 AWG for branch circuit conductors.
- 9.10 Special care should be employed in the wiring of gasoline dispensing pumps. In cases where a separate (or separable) gas dock is provided, the wiring for it should comply with the sketch shown as Plate 2. If the pumps are integral with the main dock, each circuit leading to the pumps should be provided with a switch to disconnect simultaneously from the source of supply all conductors of the circuit, including the grounded neutral. The switch should be readily accessible and in view of the pumps.
- 9.11 **ELECTRICAL SIGNS.** A special sign, stating the maximum voltage and current (in amperes) available from the shore service connection outlets should be permanently located at the shore end of each pier on which electrical outlets for shore service connections are provided, and on a wall visible to all within the office where arrangements are made for berthing facilities. Each such sign should contain the following additional message in large letters:

"CAUTION"

**"CONNECTION SHALL NOT BE MADE TO ANY SHORE POWER
OUTLET WITHOUT PERMISSION OF THE MANAGEMENT"**

- 9.12 Exposed light bulbs should be covered or guarded.
- 9.13 Lighting sufficient for the anticipated activities should be provided for all marina areas but should be low intensity and pointed in a downward direction to prevent interference with boat navigation.
- 9.14 Marina electrical systems should be inspected annually by a licensed electrician.

10. Grounding

- 10.1 Effective grounding of all non-current carrying metal parts of the electrical system, and provision of suitable equipment grounding facilities at all outlets provided for the connection of portable equipment, including outlets provided for the connection of shore power to vessels afloat, are of utmost importance in marinas, boatyards, boat basins, and similar establishments. This is due to the exposure of electrical systems and equipment to water, damp or wet earth, and to other grounded or partially grounded conductive parts and the consequent danger to life and possibility of high energy sparking adjacent to combustible materials.
- 10.2 A grounding conductor separate from the neutral conductor of the electrical service should be installed with the service conductors and connected to a suitable grounding electrode on the shore. This grounding conductor should be terminated in the distribution panelboard on the dock to provide positive grounding.
- 10.3 The method of providing an effective ground to the non-current-carrying metal parts of the electrical system, and for equipment and portable appliances connected thereto, should comply with the requirements of the National Electrical Code.
- 10.4 In addition to the grounding provided by the conduit system, there should be installed a common grounding conductor of not less than No. 14 AWG arranged in accordance with the requirements of the National Electrical Code, properly attached to the interior of all metallic boxes, housings, and enclosures and properly connected to the grounding facility of the receptacle. Said grounding conductor should terminate at the distribution panel ground.
- 10.5 The partial or complete burial of a metal enclosure in earth is not accepted as a substitute for the grounding requirements listed above.
- 10.6 In any slip or berthing space where metal hulls are stored or berthed, an anode of suitable material and capacity connected to the equipment ground conductor of the electrical system should be suspended in the water.
- 10.7 Portable power tools should be double insulated and only used with ground fault circuit interrupter (GFCI) protected circuits.

11. Walkways

- 11.1 Main walkways should not be less than 4 feet wide. The minimum width between berthing slips should not be less than 3 feet when used as access to boats.
- 11.2 Walkways should be kept free from mud, ice, snow, grease, or any other material or obstruction that could create a slipping or tripping hazard.
- 11.3 Walkways should be structurally sound. Flooring or decking should not be less than 1-inch rough, 2 inch by 6 inch S3S, 3/4 inch exterior plywood, or other material capable of supporting a minimum design load of 50 pounds per square foot.
- 11.4 Walkways should be even, free from protruding bolts and nails, and have a slip-free surface. Carpeting should not be used to provide a non-slip surface.
- 11.5 Walkways from shore-to-dock should have a maximum slope of 3 to 1; be free from excessive spring, deflection, and lateral movement; and be adequately supported with flotation.
- 11.6 Walkways should be above the water level at all times.
- 11.7 Shore-to-dock walkways should have a standard 42-inch high solid handrail with an intermediate rail securely installed on each side.
- 11.8 Where feasible, walkways from shore-to-dock should be constructed to allow access by the handicapped.
- 11.9 Accessways should be adequate for fighting fire as determined by local firefighting personnel.
- 11.10 Marinas at the beginning at the access walkway should be signed to prohibit swimming, diving, and running. Additionally emergency contact numbers should be posted.
- 11.11 Where security is an issue, a gate system to prevent unwelcome visitors, trespassers, and wandering children should be provided.

12. Handrails

- 12.1 Handrails should be provided on all stairways, walkways, and all office and service docks that are open to the general public.
- 12.2 Handrails should be 42 inches in height, with an intermediate rail approximately 22 inches in height. Where children may be present, a guard between the deck and the lower rail is recommended.
- 12.3 Handrails must be capable of withstanding loads of 200 pounds applied in any direction at any point with a minimum of deflection. They must be structurally sound, maintained in a state of good repair, and a

minimum size of 2 inch by 4 inch S4S, or equivalent strength material. Posts for handrails should be spaced on no more than 8-foot centers. Handrails should be smooth-surfaced with no protruding upright posts.

- 12.4 Stairways and walkways from shore-to-dock should have handrails on each side of the stairway or walkway.
- 12.5 Office and service docks should have handrails around the outside perimeter of the dock with appropriate openings for boarding and fueling boats. Handrails are required where public exposure warrants them. For example, places on the dock where people tend to congregate or where the walkway is so narrow that two people carrying gear could not pass each other safely should have handrails. Also, handrails are required where walkways end or make sharp turns that would lead people to walk directly into the water. Handrails are required at the main walkway end of boat storage stalls whenever the dock layout requires shore visitors to pass these openings on their way to other public use facilities.
- 12.6 Gates and signs should be installed to limit access to boat storage and repair areas to authorized personnel only.

13. Throwable Lifesaving Devices and First Aid

- 13.1 At least one throw-type lifesaving device with 60 feet of $\frac{3}{8}$ -inch diameter rope attached and/or a reach pole should be available on each dock. On docks more than 200 feet long, one device should be located every 200 feet along the dock. Rope should be made of polypropylene or some other floating material.
- 13.2 A minimum of one, 16-unit first aid kit should be available at each marina.

14. Housekeeping

- 14.1 Maintenance and operating practices should be in accordance with established procedures to control leakage and prevent accidental escape of flammable or combustible liquids. Spills should be cleaned up promptly.
- 14.2 Adequate aisles should be maintained for unobstructed movement of personnel and fire protection equipment.
- 14.3 Combustible waste material and residues in a building or unit operating area should be kept to a minimum, stored in covered metal receptacles, and disposed of daily.
- 14.4 Ground areas around buildings and unit operating areas should be kept free of weeds, trash, or other unnecessary combustible materials.
- 14.5 All floors should be covered with a slip-free surface and kept free of any tripping or slipping hazard. Loose or rotten boards should be repaired or replaced.

- 14.6 The entire marina area should be kept neat and clean with equipment properly stored so it does not pose any type of safety hazard to the public or marina employees.

15. Sewage Management

- 15.1 Each marina should have a sewage management plan that is in compliance with all federal, state, and local wastewater outfall and septic system requirements.
- 15.2 Marinas should be designated as "no sewage discharge" areas, and sewage discharge should be prohibited within the marina basin.
- 15.3 Marinas should provide a pumpout system (fixed point system, portable/mobile system, or dedicated slipside system) that meets the needs of the marina users at either a free or reasonable cost.
- 15.4 The marina should have a dump station or wand attachment to the pumpout system to empty portable toilets.
- 15.5 Pumpout stations should be clean and easily accessible and/or have marina staff to perform pump outs.
- 15.6 Sewage facilities should be regularly inspected and maintained.
- 15.7 Marinas should prohibit the use of y-valves on marine sanitation devices (MSDs).
- 15.8 Marinas should maintain a sign-in sheet for users of pumpout stations.
- 15.9 Marinas should have clean, functioning restrooms available 24 hours per day.

Appendix A: Minimum Design Criteria for Fixed and Floating Structures

NOTE: Design should meet all Americans with Disabilities Act (ADA) criteria.

1. FIXED STRUCTURES

- A. As a minimum, fixed, covered facilities should be designed to prevent damage to stored boats by forcing them against the roof during a 100-year flood event.
- B. The floor elevation of fixed docks and piers should be a minimum of 2 feet above the normal high pool elevation.

2. FLOATING STRUCTURES

A. DESIGN CRITERIA.

- 1. Wood Material - When wood material is used, it should be designed in accordance with Chapter 25 of The Uniform Building Code, latest edition, as applicable. However, all connections should be secured with galvanized sheet metal, steel plates, metal straps, or treated plywood gussets to resist movement that would otherwise tend to dismantle the structural connections. All wood material in the substructure, including the deck, must be pressure treated with a non-skin-irritating preservative. Wood material in the superstructure should not require preservative treatment, but the exposed exterior should be painted with not less than two coats of exterior oil paint.
- 2. Steel Material - When steel material is used, it should be designed to comply with Chapters 27 and 28 of the latest edition of the Uniform Building Code, as applicable, depending on the type of steel used. Welded or bolted connections are optional. New metal on the exposed exterior of the superstructure is desired. Used steel may be adequate if it is in good condition; however, if the used steel is of a dull color, application of paint may be required.
- 3. Bracing - Wood or steel material or a combination thereof: All columns and studwalls should be adequately braced to resist windloads of at least 20 pounds per square foot. Bracing should be designed and constructed to counteract design loads. The structure should have sufficient flexibility whereby wave actions will not damage the structural or roof system.

B. DESIGN LOADS. (Minimum)

- 1. Deck loads (substructure) 50 lb/ft²
- 2. Approach bridges or walkways 50 lb/ft²
- 3. Windloads (substructures and superstructures) 20 lb/ft²
- 4. Roof loads (superstructures) 10 lb/ft² (to provide for a 2-inch ice load or an equivalent amount of snow [where applicable]).

5. Flotation must be provided under all areas of the substructure having 25 square feet or greater.
- C. **SIDING ON SUPERSTRUCTURE.** Siding on the superstructure may consist of wood, corrugated or flat galvanized steel, or corrugated or flat aluminum.
- D. **ROOFS.** (superstructure)
1. Roofs may be gabled or non-sloped.
 2. Wood roof joists or rafters should not be less than 2 inches by 5 inches and spaced not more than 2 feet center-to-center. Consideration should be given to 4-foot spacing where sufficient vertical supports and bracing are provided. Purlins should be not less than 2 inches by 4 inches and spaced not more than 30 inches center-to-center.
 3. Wood roofs must consist of 1 inch nominal tongue and groove, shiplap or 1/2-inch plywood sheathing covered with 30 pound asphalt roll roofing, or asphalt shingles. (When asphalt shingles are used, the roof slope must be 4 on 12 or steeper.)
 4. Metal roof joists or rafters should not be less than 1-1/4 inch ID standard pipe or structural aluminum tubing, either round, square, or rectangular and spaced not more than 2 feet center-to-center. Consideration should be given to 4-foot spacing where sufficient vertical supports and bracing are provided. Purlins should not be less than 1-inch ID pipe or structural aluminum tubing and spaced not more than 2 feet center-to-center. Other standard steel or structural aluminum shapes may be adequate if designed for the minimum design loads.
 5. Metal roofs should be steel, with a minimum gauge of 28, or aluminum with a minimum thickness of 0.032 inch.
 6. Roofs should be securely fastened to the superstructure to resist wind uplift.
- E. **WOOD CONSTRUCTION.**
1. Floor joists and flotation frames should be not less than 2 inch by 8 inch, and stringers should not exceed 24 inches center-to-center.
 2. Framing for wood columns should be no less than 4 inches by 4 inches and/or double 2 inches by 4 inches, spaced no more than 4 feet center-to-center, or 2 inches by 4 inches, spaced no more than 2 feet center-to-center. Subject to the stability of the roof structure, including adequate bracing, the 4-inch by 4-inch vertical supports may be spaced up to 8 feet on centers. Columns should in every case be spaced symmetrically on each side of the walkway equal to their width. Flooring or decking should not be less than 1-inch rough or 2 inches by 6 inches S45 material and spaced to allow for expansion. Concrete or similar flooring types and decking are allowable. Wood columns will be bolted through a 4-inch dimension to 2 inches by 8 inches stringers or flotation frames.
- F. **METAL CONSTRUCTION.**
1. Floor joists and flotation frames should not be less than 2 inches ID standard pipe. Other standard structural steel sections are acceptable.
-

2. Framing for pipe construction should be no less than 1-1/4 inch H7 standard pipe or structural aluminum, round, square or rectangular tubing. Studs should not exceed 48 inches center-to-center. Other standard steel or structural aluminum sections are acceptable.

G. WALKWAYS.

1. Walkways should be not less than 3 feet wide and structurally sound.
2. Flotation material should be determined on length of walkway in the water and/or connections on the floating craft and the shore.
3. The method of anchoring the walkway to the floating structure and the shore should allow for adequate water level fluctuations and should not create a tripping hazard.

H. STABILIZED OR UNDERWATER BRACE.

1. A stabilized or underwater metal brace is recommended on the front (lake side) of a boat house between dock walkways.
2. The size of the metal brace should be determined on the width between the dock walkways.
3. The depth of the metal brace below the water line should be determined on the draft of the floating craft to be stored in the boat house.

- I. **FLOTATION.** Flotation should be of materials fabricated for marine use. The flotation material should be expanded, encased, or encapsulated and 100 percent warranted for a minimum of 8 years against sinking, becoming waterlogged, cracking, peeling, fragmenting, or losing beads. All flotation material should resist puncture and penetration and should not be subject to damage by animals under normal conditions for the area. All flotation material should be fire resistant. Use of new or recycled plastic or metal drums or non-compartmentalized air containers for encasement should be prohibited.

- J. **MARINE MARKINGS.** Aids to navigation in and around marinas should be consistent with U.S. Aids to Navigation.

Appendix B: Recommended Safeguards for Installation of Underground Tanks

*** Performance standards for new underground storage tanks may be found in the Code of Federal Regulations, Title 40-Protection of Environment, Chapter I-Environmental Protection Agency, Subchapter I-Solid Wastes, Part 280-Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST), Subpart B-UST Systems: Design, Construction, Installation, and Notification.*

1. The design, construction, and use of storage tanks whose capacity exceeds 660 gallons should be as specified in Section 2 of NFPA 30, Flammable and Combustible Liquids Code.
2. Underground tanks provide a widely accepted method for storage of flammable and combustible liquids. Such storage is frequently under buildings or driveways, permitting other uses of the area above the tanks. In all cases tanks should be located above the maximum water level elevation.
3. These liquids in underground tanks seldom become involved in fires even when buildings above them burn to the ground. However, when a tank is buried, it is not like an aboveground tank, accessible for inspection, maintenance, and painting.
4. The labor of replacing an underground tank is often much greater than the cost of installation of the original tank or the value of the replacement tank. Therefore, securing maximum leak-free life from a tank is good economics. The entrance of water into a tank, or leakage of product out of a tank or its connected piping, can also cause serious economic loss and possible hazards to adjacent property.
5. Because visual inspection of underground tanks is impossible, minor leaks may go undetected for some time, particularly if inventory control is inadequate. Small quantities, which might evaporate harmlessly above ground, may be protected from evaporation by ground cover. In well drained areas, such liquids usually dissipate harmlessly. However, where a high water table exists, or where the liquid follows natural or sewer drains, underground piping or conduits escaping liquid may travel some distance underground.
6. A low flash point flammable liquid may create a hazard if it enters a basement, utility manhole, or similar subgrade enclosure where vapors may accumulate and a source of ignition may exist. Fortunately, in occupied premises these vapors usually manifest themselves by odor at concentrations below the flammable range.
7. Fire prevention and economics both require high standards of fabrication and installation to extend the life of the tank and to prevent leakage. Therefore, operating methods that will detect leaks promptly should be employed. Reliable methods for locating the source of spillage or leakage should be employed, and responsibility for each investigation should be established. An effective and safe method should be used for testing each individual tank suspected of leaking.

Appendix C: Sample Marina Inspection Checklists

These checklists are not all inclusive, will not be specifically applicable to all marinas, and are included for information only.

SAMPLE MARINA SELF INSPECTION CHECKLIST

GENERAL APPEARANCE

#	YES	NO	N/A	ITEM
1	_____	_____	_____	Is the facility attractive?
2	_____	_____	_____	Is the facility well organized?
3	_____	_____	_____	Is the facility neat and tidy?
4	_____	_____	_____	Is the facility well maintained?

SANITATION

#	YES	NO	N/A	ITEM
5	_____	_____	_____	Is trash picked up and in proper containers?
6	_____	_____	_____	Is refuse/trash removed daily?
7	_____	_____	_____	Are restroom facilities clean and maintained?
8	_____	_____	_____	Are outlets for non-potable water supply posted clearly?

ACCESS

#	YES	NO	N/A	ITEM
9	_____	_____	_____	Are all ramps, docks, and decks (excluding fingers) at least 36 wide?
10	_____	_____	_____	Do stairs with more than 4 steps have handrails?
11	_____	_____	_____	Are gangways protected by guardrails?
12	_____	_____	_____	Are nails and screws recessed or flush with the surface?
13	_____	_____	_____	Is planking laid close together? (Gaps no more than 3/8 inch)
14	_____	_____	_____	Is planking braced? (No excess springiness)
15	_____	_____	_____	Are tripping hazards marked yellow?
16	_____	_____	_____	Are warning signs placed on public hazards?
17	_____	_____	_____	Where dock sections join, are they securely lashed/fastened?
18	_____	_____	_____	Are accessways free of materials, obstructions?
19	_____	_____	_____	Are dock anchor cables identified if they are hazardous?

ELECTRICAL

#	YES	NO	N/A	ITEM
20	_____	_____	_____	Switches, fuses, circuit breakers marked and labeled?
21	_____	_____	_____	Is grounding provided for non-current carrying metal parts?
22	_____	_____	_____	Are outdoor switches, circuit breakers, and panel boxes in weatherproof enclosures?
23	_____	_____	_____	Do portable and semi-portable electrical tools and equipment have a conductor cord with a ground plug (except for UL/FM approved double insulated tools)?
24	_____	_____	_____	Is a ground fault circuit interrupter (GFCI) provided on all non-permanent 120 volt 15/20 amp receptacles?
25	_____	_____	_____	Is there a designated separate battery charging station?
26	_____	_____	_____	Does an extension cord run items that are supposed to be hard-wired?

ELECTRICAL (Cont'd)

#	YES	NO	N/A	ITEM
27	_____	_____	_____	Are there any frayed cords or wires?
28	_____	_____	_____	Are boats permanently connected when they're not supposed to be?
29	_____	_____	_____	Are permanently connected boats using a power cord?
30	_____	_____	_____	Are permanently connected boats using a proper outlet?
31	_____	_____	_____	Are there any cords that can be walked on, driven over, or chafed by boat or dock movement?
32	_____	_____	_____	Is there any unknown wiring coming from boxes?
33	_____	_____	_____	Are there any damaged or inoperative switches, lighting fixtures, or receptacles?
34	_____	_____	_____	Is electrical certification current?

INSPECTION FOR THE MONTH
OF _____

YEAR _____

FACILITY _____

INSPECTED BY _____

DATE _____

REVIEWED BY _____

DATE _____

APPROVED BY _____

DATE _____

EMERGENCY/FIRST AID

#	YES	NO	N/A	ITEM
35	_____	_____	_____	Is at least one 16-unit first aid kit provided?
36	_____	_____	_____	Are emergency numbers posted?

WATER SAFETY

#	YES	NO	N/A	ITEM
37	_____	_____	_____	Is there a throwable (Type IV) PFD available at intervals of not more than 60 m (200 ft) on walkways?
38	_____	_____	_____	Do ring buoys have at least 21 m (70 ft) of 1 cm (3/8 inch) solid braid polypropylene line attached?
39	_____	_____	_____	Is the maximum capacity posted on each boat?
40	_____	_____	_____	Are the boat capacity levels sufficient for stability when loaded?
41	_____	_____	_____	Is a wearable PFD (Type I, II, III, or V) provided for each passenger?
42	_____	_____	_____	Is a throwable (Type IV) PFD provided for each boat?

FIRE PROTECTION

#	YES	NO	N/A	ITEM
43	_____	_____	_____	Are NO SMOKING signs posted in areas where there are flammables?
44	_____	_____	_____	Is a fire plan posted?
45	_____	_____	_____	Are pay telephones accessible and marked?
46	_____	_____	_____	Are portable fire extinguishers readily available and provided where needed?
47	_____	_____	_____	Are portable fire extinguishers distinctly marked?

FIRE PROTECTION (Cont'd)

#	YES	NO	N/A	ITEM
48	_____	_____	_____	Are portable fire extinguishers fully charged?
49	_____	_____	_____	Are portable fire extinguishers checked monthly for charge, mud dauber nests, and loose powder?
50	_____	_____	_____	Is staff trained in fire extinguisher use?
51	_____	_____	_____	Are portable fire extinguishers examined yearly?
52	_____	_____	_____	Are spare/replacement extinguishers available?
53	_____	_____	_____	Are all rags/waste soiled by oil/grease disposed of daily in tight-closing UL cans?
54	_____	_____	_____	Are exhaust pipes from heating systems insulated where they pass through roofs or walls?
55	_____	_____	_____	Are drums/barrels/containers of flammable liquids stored properly?
56	_____	_____	_____	Are flammable liquids/gas storage tanks grounded and bonded?
57	_____	_____	_____	Do flammable liquid dispensing outlets have quick-closing/self-closing valves?
58	_____	_____	_____	Are portable flammable liquid containers UL approved?
59	_____	_____	_____	Liquid propane systems do not have aluminum or PVC tubing.

GENERAL

#	YES	NO	N/A	ITEM
60	_____	_____	_____	Are parking areas delineated and laid out to prevent traffic congestion?
61	_____	_____	_____	Are parking spaces on sloping terrain provided with barriers to prevent rolling?
62	_____	_____	_____	Are guardrails 42 inches high?
63	_____	_____	_____	Are moving parts of equipment guarded to prevent pinching?
64	_____	_____	_____	Is adequate lighting provided for operations that run into hours of darkness?

SUGGESTED ELECTRICAL INSPECTION CHECKLIST INCOMING SERVICE LINE

YES	NO	N/A	ITEM
_____	_____	_____	Clearance \geq 12 ft. - walks
_____	_____	_____	Clearance \geq 18 ft. - roads
_____	_____	_____	Clear of trees/limbs
_____	_____	_____	Approved conductors

SERVICE POLE

YES	NO	N/A	ITEM
_____	_____	_____	3' above top datum plane
_____	_____	_____	Guy wire tight
_____	_____	_____	Yellow cover on guy wire (marking it as a hazard)
_____	_____	_____	In Weather Head/Conduit
_____	_____	_____	Below 8' above ground
_____	_____	_____	Approved drip loop
_____	_____	_____	Conduit secured < 3'/10'
_____	_____	_____	Panel/Switch secured and clean
_____	_____	_____	Weatherproof/sealed (NEMA 4 or 3R type Encl)
_____	_____	_____	Panel grounded properly with ground lug (#8 CU/#6 AL to Ground Rod)
_____	_____	_____	Ground Rod installed
_____	_____	_____	Bushings installed A/R
_____	_____	_____	Proper Operation
_____	_____	_____	Lugs (AL/CU labeled) for AL wire

DOCK FEEDER

YES	NO	N/A	ITEM
_____	_____	_____	Clearance \geq 12 ft. - walks
_____	_____	_____	Clearance \geq 18 ft. - roads
_____	_____	_____	Clearance \geq 55 ft. - sails
_____	_____	_____	Clearance \geq 18 ft. - boats
_____	_____	_____	With barriers < 12 feet - water
_____	_____	_____	(consider party barges w/antenna & running lights raised)
_____	_____	_____	Take-up reel/weather head
_____	_____	_____	Roof penetration sealed
_____	_____	_____	Busing at roof and panel entrances
_____	_____	_____	Guy wire/supports tight
_____	_____	_____	Conductors Quadplex (3 insulated conductors)
_____	_____	_____	Conductors #8 CU/#6 AL min.
_____	_____	_____	In conduit < 24" burial to 3" below power/navigation pool?
_____	_____	_____	Conduit is "RIGID" type (RGS, schedule 40/80 PVC) stamped on conduit
_____	_____	_____	Conduit secured < 3" of all unions, panels, boxes, fittings and 10' Min.
_____	_____	_____	Underwater feeder secured by Kellums Grips or other approved grip to dock structure
_____	_____	_____	Feeder in conduit where exposed to damage
_____	_____	_____	Bushings installed at conduit J-box entry point, sealed, waterproof
_____	_____	_____	Check for damaged insulation
_____	_____	_____	Flex conduit is sealtight/waterproof type

EXTENSION/FLEXIBLE CORDS

YES	NO	N/A	ITEM
_____	_____	_____	Hard to Extra Hard usage
_____	_____	_____	Not in water
_____	_____	_____	Not across roadways
_____	_____	_____	Not across sharp objects
_____	_____	_____	Not across walkways

DOCK

YES	NO	N/A	ITEM
_____	_____	_____	Panel properly secured and clean inside
_____	_____	_____	Circuit breakers secured to bus bars
_____	_____	_____	Connections tight (AL will creep and work loose)
_____	_____	_____	Circuit breakers labeled clearly (numbered IAW legend)
_____	_____	_____	Panel to elevation < 6' 6" above deck
_____	_____	_____	Panel enclosure NEMA 4 or NEMA 3R rated weatherproof
_____	_____	_____	Unused openings sealed with plugs or silicone sealant
_____	_____	_____	No openings larger than 1/8"
_____	_____	_____	Wiring in conduit (new docks)
_____	_____	_____	Proper bushings
_____	_____	_____	Wiring < 8' above deck (old docks)
_____	_____	_____	Insulated staples @ 4 1/2' intervals
_____	_____	_____	Devices and panels secured to sound structure of dock
_____	_____	_____	Conduit secured < 3" of all unions, panels, boxes, fittings and 10' min
_____	_____	_____	Conduits secured to panels and boxes tightly for electrical bonding/continuity.

DOCK (Cont'd)

YES	NO	N/A	ITEM
_____	_____	_____	Double lock nuts (required for EMT)
_____	_____	_____	Rigid and IMC threaded.
_____	_____	_____	Lights minimum of 8' above deck
_____	_____	_____	Lights with guard and globe
_____	_____	_____	Lights UL listed for damp/weatherproof
_____	_____	_____	Light gasketed
_____	_____	_____	Bulbs not broken
_____	_____	_____	Lights clear of flammable members (12" incandescent, 6" fluorescent)
_____	_____	_____	Outlet boxes containing receptacles, switches, lights must be secured to structure
_____	_____	_____	J boxes must be secured to threaded conduit (IMC or Rigid)
_____	_____	_____	For EMT and Flex, J-Boxes secured to the structure
_____	_____	_____	Receptacles/switches > 30" elevation above water and 12" above deck
_____	_____	_____	Conductors-three to each device: hot, neutral and ground -"EGC"
_____	_____	_____	Bushings installed A/R - Check for conductors in contact with sharp edges of conduit or panels
_____	_____	_____	Conductors not skinned or cracked and in good condition
_____	_____	_____	Conductor insulation approved for damp or wet locations (THW, THHN, THWN)
_____	_____	_____	Conduit supports UL approved nails, straps not allowed in most cases)
_____	_____	_____	Boxes NEMA 4 weatherproof/drip proof NEMA 3R (No boxes with knockouts)
_____	_____	_____	Receptacles properly grounded (check for pigtail ground to box or continuity device on yoke)
_____	_____	_____	Receptacles or Circuit Breakers equipped with GFCI's (Test or reset button on the device)
_____	_____	_____	Receptacles equipped with weatherproof covers (must be closed when unattended unless rated)