The background of the cover is a photograph of a sunset over a lake. The sun is low on the horizon, creating a bright orange and yellow glow that reflects on the water's surface. In the middle ground, there is a large, dark wooden boat dock with a canopy. A small boat is moored at the dock. In the foreground, the dark silhouette of a dog is visible, looking towards the water. The sky is filled with soft, colorful clouds. The title text is overlaid on the upper half of the image.

RESIDENTIAL BOAT DOCK SAFETY GUIDELINES

*A companion to the
Lower Colorado River Authority
Safety Standards for Residential Docks
on the Highland Lakes
September 2004*

INTRODUCTION

LCRA developed these voluntary residential boat dock safety guidelines as a companion to the mandatory safety standards for residential docks on the Highland Lakes. The guidelines were designed to help dock owners, builders and buyers avoid some problems and situations associated with owning a residential dock on the Highland Lakes.

By preventing future problems through compliance with both the mandatory standards and dock safety guidelines, dock owners can help provide a safer and cleaner environment for everyone who wants to enjoy the stark beauty and endless recreational opportunities the Highland Lakes afford.



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REGISTRATION

LCRA does not require a permit or dock registration. However, residential dock owners may voluntarily register the dock with LCRA by contacting Water Surface Management at 1-800-776-5272.

Registration may benefit a dock owner if emergency response or law enforcement are called to the location. LCRA will make the registration data available to those services on request.

In addition, if a dock breaks loose and is found at another location on the lake, registration may help identify its rightful owner and facilitate its return.

All registration information is public information and is subject to the Public Information Act.

FEES

No permit, registration or annual fees are part of the implementation of the Safety Standards for Residential Docks on the Highland Lakes.

A dock owner may be responsible for fees associated with owning or leasing land or fees assessed by other entities with jurisdiction.

LCRA does not repair or recover abandoned or dilapidated docks from the water surface. LCRA may assess a fee for relocating an abandoned dock or swim platform.

A dock owner is responsible for making any improvements necessary to comply with the Safety Standards for Residential Docks on the Highland Lakes.

Because a dock owner may incur significant cost for constructing and locating a dock on the water surface, LCRA recommends reading this document and the Safety Standards for Residential Docks on the Highland Lakes before purchasing or placing a dock on the Highland Lakes.

APPLICABILITY

The Safety Standards for Residential Docks on the Highland Lakes apply only to Lakes Buchanan, Inks, LBJ, Marble Falls and Travis.

New Docks

A new dock is one that is placed on the surface of the Highland Lakes after Feb. 18, 2004. These docks are subject to the *Safety Standards for Residential Docks on the Highland Lakes*.

Existing Docks

An existing dock is one that was in place before Feb. 18, 2004. Requirements for an existing dock are the least restrictive but require some action on the part of the dock owner. See the Safety Standards for Residential Docks on the Highland Lakes.

Owners of floating residential docks that exceed 1,500 square feet on lakes Buchanan and Travis must comply with the Highland Lakes Marina Ordinance (HLMO). The HLMO contains the most stringent regulations regarding engineering requirements, property ownership, setbacks, location and configuration and other measures to ensure water quality and public safety.

Residential docks on Lake Austin are regulated by the City of Austin. Contact the Austin Parks and Recreation Department at (512) 974-6737 for information and regulations.

Other Regulations

Compliance with the Safety Standards for Residential Docks on the Highland Lakes does not ensure compliance with requirements or regulations from other entities. Entities with jurisdiction may include cities, counties, property owners associations and homeowners associations. Compliance may be required with LCRA's Nonpoint-Source Pollution Control Program, Land and Water Use Regulations and On-Site Sewage Facilities Program. In cases where LCRA and another entity have different regulations or requirements, the most stringent regulations apply.

It is the dock owner's responsibility to comply with all applicable regulations or requirements from any other entity with jurisdiction.

DOCKS IN PLACE

An existing residential dock that was permanently affixed to realty (fixed dock) as of Feb 18, 2004, may remain in place. Any modification, including but not limited to an extension or expansion of an existing fixed dock, must comply with the current standards.

A dock owner may be required to submit an affidavit to swear that a dock was at its current location and configuration on Feb. 18, 2004.

A dock owner may repair or replace a structure on a 1:1 basis and continue to be considered an existing dock. A 1:1 replacement means replacement of the structure with the same location, configuration and size.

Temporarily moving a dock to accommodate the varying lake level will not be considered a relocation.

Docks using flotation may continue to use non-encased flotation until Feb. 18, 2014 (10 years from the effective date of the standards), at which time all flotation will be required to be encased flotation only. If the flotation is being replaced in conjunction with the replacement of the structures of the residential dock in its entirety, encased flotation must be used.

VARIANCES

A dock owner may apply for a variance if it can be demonstrated that compliance with the standards creates an unreasonable hardship or injustice the criteria for which are described in the Dock Safety Standards. The standards were developed considering extensive public input and most circumstances that dock owners on the Highland Lakes may encounter.



SITING CONSIDERATIONS

Proper siting is essential for a dock. Disregard for any of the siting considerations prior to construction may cost dock owners valuable assets and time.

Prospective dock owners should check water depth where the dock will be located to ensure it is adequate for the dock and associated activities. A slip designed for a runabout watercraft may not have adequate depth for swimming or to berth a sailboat. Small shallow coves located on variable level lakes present challenges for mooring a large boat. The dock may have to move frequently to be located in adequate depth to berth the boat, or it may become unusable during periods of low lake levels.

Residential docks are at the mercy of the elements, and at some places on the lakes there are exceptional stress loads. This is the case on Lake Travis and Lake Buchanan, where deep water, long fetches, and high winds may create exceptionally large waves. If a dock is located near a dam, floodgate operations can create swift water which may be released at any time without advance notice.

Recessing a dock is one of the most effective ways to negate the effects of fast moving water and is encouraged wherever possible, particularly on pass-through lakes, such as Lake LBJ, Inks Lake and Lake Marble Falls. Placing a dock on the Llano River on Lake LBJ may prove challenging due to the fast moving water and debris from flood events. The Central Texas area has been dubbed *Flash Flood Alley* because of the river conditions, and recessing a dock is strongly recommended.

Visiting a waterfront location on a cold, cloudy winter day may not provide a dock owner with an accurate picture of the type of usage the location experiences on a summer day. Some coves may be used during the summer for “rafting” watercraft, some are busy commercial locations and others may be dry as water recedes during the summer months. Locations with open water may provide passage for larger watercraft, and some of the watercraft can create significant wakes.

The standards contain rules limiting the maximum size and distance from shore allowed for residential docks. (See Maximum Size/Height require-

CAN A DOCK GO HERE?



This is an example of a recessed dock.

ments.) The standards do not require a setback from adjacent property lines, but the proximity of a dock to such things as neighboring docks, boat ramps, designated swim areas and parks should be considered.

Floating docks on Lake Buchanan and Lake Travis normally go aground or follow the water as it recedes during the summer months. Plan ahead to know where your dock will be sited when the water recedes, and make sure you have permission to place the dock where it will be located during times of low water. If your dock will go aground, ensure it is designed to do so without damaging the dock.

Fixed docks are inherently more stable than floating docks, and are normally the dock of choice on the pass-through lakes (Inks, LBJ and Marble Falls). Floating docks are normally more appropriate on the variable level lakes (Travis and Buchanan). A floating dock generally requires more maintenance than a fixed dock. While a fixed dock remains in place, a floating dock has anchor cables and anchors and usually moves often to follow the water as it fluctuates. Placement of anchors and anchor cables should be considered when evaluating a site for a floating dock.

PROPERTY OWNERSHIP

The water surface is public domain. LCRA has responsibility for protection of water quality, safety and regulation of the water surface of the Highland Lakes. The right to place a dock on the water surface depends on the ownership of the submerged land under the dock.

The Highland Lakes are unique because the majority of land above and below the surface of the water is privately owned. All submerged property on the Highland Lakes is owned by someone. It may be LCRA, a county, a city, a developer, a property owners' association or other ownership. The property owner has the right to give permission for someone to place a dock over the property. A property owner with property contiguous with submerged property owned by LCRA should contact LCRA Real Estate Services at 1-800-776-5272 about permission to place a dock over LCRA's submerged property.

There are two basic types of land ownership on the Highland Lakes.

Privately Owned Land

The majority of land under the Highland Lakes is owned by individuals or private entities, such as estates, homeowner associations (HOA), property owner associations (POA), subdivisions and developers. Anyone wanting to place a dock over privately owned land should have permission from the landowner. LCRA recommends owning, leasing or otherwise controlling the property under which a dock is located.

Publicly Owned Land

Some of the land under the Highland Lakes is owned by a city, a county, the state or a public entity such as LCRA. Each of these entities may have their own requirements for dock placement over property they own. A prospective dock owner should determine which public entity owns the submerged land and what type of permission is needed before placing a dock. A dock owner is responsible for complying with any applicable requirements imposed by an entity that has jurisdiction over the property. LCRA may allow placement of a residential dock over its property if the

CAN A DOCK GO HERE?

property is adjacent to that of the dock owner. Owners of fixed docks located over LCRA land may be subject to a lease fee. For information about leasing LCRA property, call Real Estate Services.

Dock owners are responsible for determining property ownership. Information can be obtained from a variety of sources, such as county tax records, title companies, POAs and HOAs. It is best to determine ownership of the property under a dock before purchasing and placing the dock. Failure to do so may result in wasting valuable time and assets.

Property lines aren't imaginary lines extended into the water. Property lines under the water surface look very much like those on dry land and may extend in many directions. A tax map or property plat should indicate all property boundaries. A land owner may own property only to a certain elevation or contour line but not own any property that is normally submerged. Owning waterfront property does not entitle the owner to place a dock on property owned by others.

Anchors should be placed only over property that is owned, leased or otherwise controlled by the dock owner. The owner of a floating dock on lakes Travis and Buchanan should have a low water plan. The plan should allow the dock to be located over property that is owned, leased or otherwise controlled by the dock owner. If the dock moves to follow receding water, it may become located over someone else's property.

A dispute over the placement of a dock over property that is not controlled by the dock owner must be settled in a court of competent jurisdiction. LCRA has no jurisdiction over these matters.

TYPES OF DOCKS

Residential docks on the Highland Lakes primarily consist of two types: fixed or floating. Each type has its own advantages and disadvantages, but a dock's intended location may determine the best type. LCRA recommends consulting with a professional engineer or a qualified dock builder to determine which type may work best in any given location.



This is an example of a fixed dock supported by pilings.

Fixed docks

- Normally are located in the pass-through lakes (Inks, LBJ and Marble Falls) where the water level does not vary significantly on a regular basis.
- Consist of a system of pilings fixed into the lakebed with decking and other structural members attached to the pilings.
- May require less maintenance because the dock does not move.
- Are structurally more stable than floating docks and usually are capable of supporting larger loads.
- Tend to last longer.
- When installed on a variable-level lake, may become submerged at high lake levels or be “high and dry” at low lake levels.

CAN A DOCK GO HERE?

Floating docks

- Normally are located on variable level lakes, such as Travis and Buchanan.
- Require frequent maintenance to stay on location, thereby creating other maintenance issues for the electrical system and any structural components affected by frequent movement.
- Can follow receding water and increase the time the dock is useable.

LCRA recommends specific site engineering for loads, wind and wave action, relocation due to lake level variation, environmental stress and structural stability concerns.



This floating dock can follow receding water levels.

LAKE CHARACTERISTICS

Lake characteristics may be important factors in determining the type of dock structure that will successfully withstand the stress placed on docks on the Highland Lakes.

Here are some unique characteristics of the Highland Lakes that should be considered before placing a dock:

- The levels of lakes Travis and Buchanan fluctuate.
- Lake levels tend to recede slowly but rise rapidly during flood events.

CAN A DOCK GO HERE?

- High winds often create large waves on these deep lakes with wide basins.
- The prevailing wind at certain times of the year can cause some areas of these lakes to be windy and rough. For example, the west and north sides of Lake Buchanan can be very windy in the summer while the south and east sides can be windy creating large waves during the winter.
- The basin on Lake Travis can be windy and have large waves at any time during the year.

Lakes LBJ, Marble Falls and Inks are pass-through lakes and are maintained at or near their normal pool elevation most of the time. Flood events can cause the elevation of these lakes to rise rapidly above normal pool elevation. During a flood event, water rises quickly and often carries debris, such as trees, brush, and docks which have broken loose.

Maximum Historic Lake Levels

	Full	Maximum	Date	Feet above maximum
Buchanan	1020.3	1021.39	12/20/91	+1.04
Inks	888.2	902.8	7/25/38	+14.58
Marble Falls	825	836.16	9/11/52	+11.16
Travis	681	710.44	12/25/91	+29.41

All elevations are feet above normal mean sea level, a point of reference to measure lake elevation. It is the elevation of the ocean halfway between high tide and low tide.

Floodgate operations can cause swift water to move quickly downstream, causing swift currents and higher lake levels. All natural bodies of water may contain many hazards, such as sandbars and rock outcroppings, many of which are near the shore. A dock owner should know what exists under the water over which a dock is placed.

There are high boating traffic areas during certain months of the year. Boating traffic can affect use and enjoyment of a residential dock. Before

placing a dock on the water, it may be a good idea to observe boating activity around the potential site at different times of the year.

Flood debris can accumulate on the upstream side of a dock, causing an increased stress load. Docks located on the Llano, Colorado, and Pedernales rivers should be engineered to be able to withstand the additional stresses created by flood debris and remain on location. Any location may be subject to flood debris.

LAKE ACCESS

The water contained in the Highland Lakes is owned by the people of the State of Texas. LCRA is responsible for managing the Highland Lakes and part of that responsibility is to enhance safety, protect water quality, and ensure public access.

Public lake access must be maintained to the canals and coves on the Highland Lakes and navigable passage also must be maintained to get to them.

The Highland Lakes Marina Ordinance requires marinas to provide adequate navigable passage (access for the public into a cove) around a marina. A residential dock may not interfere with this passage if the marina controls the land over which the navigable passage is maintained.

Recessing a dock can be beneficial for both the dock owner and the public. A recessed dock does not remove any water surface area from public use and provides extra protection from damage during flood events.

As the water in Lakes Buchanan and Travis recedes, floating docks in coves often must move close together to remain afloat due to diminished water surface area. This may block access. When this occurs, access must be provided for any dock owner who requests access in the cove. Dock owners generally cooperate with each other during times of low water, and this “rafting” may not cause conflict. Such cooperation has proven to be beneficial and is not a violation of the standards.

A residential dock that exceeds 1,500 square feet in size may not extend a distance that exceeds 33 percent of the width of a cove. If a cove is less than 40 feet wide, a new dock may not be placed that would further restrict

CAN A DOCK GO HERE?

access. Floating docks on Lake Travis and Lake Buchanan that exceed 1,500 square feet may be subject to the more restrictive requirements of the Highland Lakes Marina Ordinance.

LCRA Land and Water Use Regulations prohibit any floating or fixed structure on LCRA water that restricts public access, interferes with safe navigation or normal movement of debris and water currents on the Highland Lakes. For a copy of this document, call 1-800-776-5272.

SIZE AND HEIGHT

There are no size or height limits for residential docks contained in the standards, but a floating dock on Lake Travis or Lake Buchanan that exceeds 1,500 square feet is required to obtain a marina permit in compliance with the Highland Lakes Marina Ordinance, which does have a height restriction.

Although there are no limits to the size of a dock, the following factors should be considered:

- Be aware and considerate of existing aesthetic conditions in the area where the dock will be located. While it is not a violation of the standards to locate a dock so that it blocks a neighbor's view or to build a dock that is completely inconsistent with the existing aesthetic conditions, a dock owner may create an adverse relationship with neighbors or community.
- The amount of stress exerted on a dock is proportional to its size and height. Taller and larger docks must be engineered to avoid toppling and accommodate the increased stress loads created by wind and waves. Increased stress loads are created when a large floating dock must absorb both the crest (tallest) side of the wave and the trough (lowest side of the wave) at the same time. This situation is particularly common in areas where the lake is wide and the water is deep. A qualified engineer or dock builder should be consulted to determine the size and height of a dock that is best for the location.
- The standards are minimum safety requirements for the Highland Lakes. Cities, counties, subdivisions, property owners associations and deed restrictions may exist and exceed requirements contained in the standards. Dock owners are responsible for complying with any rules or regulations imposed by other entities.



Dilapidated docks create a hazard to navigation, a pollution concern and become a haven for snakes, rodents and other animals.

DILAPIDATED DOCKS

What is a dilapidated dock?

A dock is dilapidated if it has loose structural members or if the decking, roofing, flotation or walkways are not securely attached. A dock that is submerged or partially submerged, not floating upright, has decks or floors below the waterline, is in a state of disrepair or is not otherwise in compliance with the standards is dilapidated.

Dock owners are liable

It is the dock owner's responsibility to maintain his or her dock. Any and all liability issues resulting from damage caused by a dilapidated or abandoned dock is that of the dock owner. For example, an improperly maintained dock may become detached from its moorings and collide with another dock or with other structures on the water. In addition, improperly maintained structural members, roofing and decking that become detached from a dock can enter the water and become a hazard for watercraft, swimmers, skiers and wake board riders.

Importance of regular maintenance

Regular maintenance is essential for maintaining the life expectancy and usefulness of a residential dock. For example, if a dock is not properly anchored and maintained to accommodate the normal stresses created by wind, waves, boat wakes and fluctuating lake levels, it may break loose and become a hazard. Flotation that has vegetation growing in it will break apart and must be replaced prematurely.



Repairs

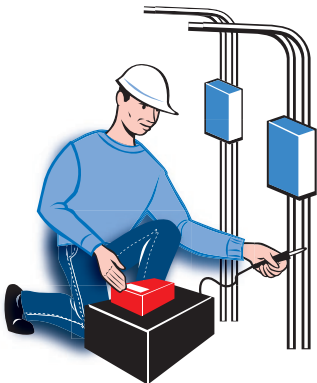
Repairs to docks can be major or minor. Some examples may be as simple as reattaching loose roofing or decking. More extensive repairs involving structural damage and flotation replacement will involve the need to evaluate the cost of repair versus replacement. Dock owners need to consider that major replacement of structural members or flotation may require compliance with the standards for new docks. Buying used or unencased flotation may seem cost effective, but prove to be a more costly option in the long run. The normal life expectancy of unencased flotation is eight to 10 years. Encased flotation may have double the life expectancy of unencased flotation.

**REMEMBER:
ALL DOCKS USING FLOTATION MUST USE
ONLY ENCASED FLOTATION BY
FEB. 18, 2014**

If you get a notice of violation

Dock owners will have **30 WORKING DAYS** to correct any violation of the standards. If a dock owner has problems complying with this time-frame, an extension of time can be requested in writing. Once a required repair is complete, the dock owner must contact LCRA to inspect the dock for compliance.

DOCK EXAMINATION



Before purchasing a dock or a home with a dock, a careful examination of the dock should be performed by qualified individuals. Keep in mind that a prepurchase home inspection may not include inspection of the dock. Often the dock is not on the survey or title policy because it may be located over property that is not owned by the homeowner. Buyers should have a dock examined by a professional engineer or dock builder and consider the expense that may be necessary to bring a dock into compliance with the standards.

MAINTAINING A DOCK

At a minimum, examination of a dock should include examination of anchor cables, decking, structural members, electrical fixtures and systems, flotation, and roofing.

DISTANCE FROM SHORE

The maximum distance a dock can extend from shore is different for each of the Highland Lakes. *The shore is the point at which the water touches the land at any given time and at any given lake level.* The maximum distance from shore for each lake was determined based on physical characteristics and historical usage of each lake.

The maximum distance from shore for each lake is:

Lake Buchanan	150 feet
Inks Lake	35 feet
Lake LBJ	50 feet
Lake Marble Falls	35 feet
Lake Travis	100 feet

Lakes Inks and Marble Falls are not as long and wide as the other Highland Lakes, and the 35-foot maximum distance from shore reflects the fact that most docks on these lakes tend to be located close to the shore. Most docks on Lake LBJ can easily be located within the 50-foot maximum distance from shore, although in shallow areas, some docks may extend farther than 50 feet.

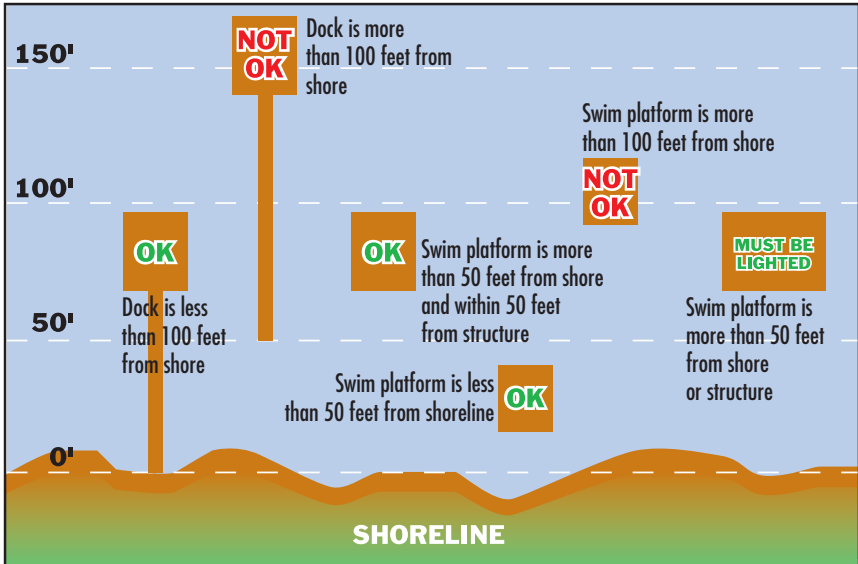
In shallow areas on each of the lakes, a dock may extend farther than the maximum distance from shore:

- As long as it does not pose a hazard to navigation.
- As long as it does not extend more than 200 feet from the shore.
- If it does not extend past the maximum distance solely to avoid having to move a floating dock to accommodate varying lake levels.
- If it does not extend further from the shoreline than necessary to allow for boat access to docks in shallow water.
- If it does not violate any other provision of the standards.

MAINTAINING A DOCK

A dock that extends more than the maximum distance from shore must be lighted so that the presence of the entire structure and walkway is defined from sunset to sunrise and during times of limited visibility.

DOCKS EXCEEDING MAXIMUM DISTANCE REQUIREMENTS



The maximum extension from shoreline on Lake Travis is 100 feet.

Water levels on the Highland Lakes are not constant, and lakes Travis and Buchanan tend to fluctuate more than Inks Lake and Lakes LBJ and Marble Falls. Docks located on lakes Travis and Buchanan are normally moved to accommodate the water level which tends to recede slowly over the summer. When a flood occurs, these lakes fill rapidly and docks that have been moved to accommodate lower lake levels may become abandoned docks because their location exceeds the maximum distance from shore. An abandoned dock in this situation is required immediately to be lighted from sunset to sunrise and during periods of restricted visibility and must remain lighted as long as it exceeds the maximum distance from shore.

MAINTAINING A DOCK

If a dock owner knows that his or her dock will exceed the maximum distance from shore when lake elevation rises, the dock should have lighting in place so that it does not pose a navigation hazard when the lake level rises.

There is no grace period for an abandoned dock. It must be moved immediately to a location within the maximum distance from shore.

Dock owners may not locate their docks far out into the lake as a matter of convenience to alleviate the need to move the dock frequently as the water recedes. A dock located more than the maximum distance from shore in anticipation of receding lake levels is in violation of the standards. Docks must always be located within the maximum distance from shore. The dock owner is responsible for properly maintaining a dock on location at all times. An absentee dock owner or an owner who expects to be away should have someone maintain the dock during his/her absence if needed. LCRA maintains a voluntary registration database to help dock owners find their docks. For more information, call 1-800-776-5272.



An unlit swim platform extending far into the lake poses a navigation hazard.

When a dock or swim platform is adrift, it is abandoned. LCRA will attempt to locate the owner of a dock that is found adrift. Any dock or swim platform that is creating a safety hazard will be moved immediately to minimize the hazard. LCRA may assess a fee for relocating a dock or swim platform. ***See illustration on page 21.***

A dock owner who is searching for a dock that may be adrift should call Water Surface Management at 1-800-776-5272.

MAINTAINING A DOCK

A dock that appears on property where it does not belong can usually be recovered by its owner. However, a dilapidated dock that washes up on property where it does not belong may be removed from the water surface by the property owner.

The LCRA Web site, www.lcra.org, is a source for weather information and lake levels. During flood events, weather warnings, anticipated lake levels and other pertinent information may be available at this site.

LIGHTING

The only dock required by the standards to be lighted is one that is not located within the maximum distance from shore or a dock that creates a hazard to navigation. Lighting must adequately define the presence of the entire structure all the way to the shoreline so boaters may determine on which side they may safely pass. If a dock is required to be lighted, it must be lighted from sunset to sunrise and during times of restricted visibility.

Most periods of low lake levels are followed by a flood, and docks commonly are not located within the maximum distance from shore. In this situation, the dock is required to be lighted immediately, as it may create a navigation hazard. Plan ahead if a dock will follow the fluctuating lake level.

Several alternatives to standard wiring methods are available for lighting a boat dock. Solar-powered lighting can provide an excellent alternative to extending electrical service to a dock that is temporarily not located within the maximum distance from shore. In addition to solar power, the use of 12-volt lighting may add an extra measure of safety.

LCRA recommends that lighting be directed downward and/or shielded so it clearly identifies the structure to which it is attached. All lights should be designed to illuminate only the structure and/or shielded to prevent “blinding” boat operators as they pass the dock. Ideally, properly shielded lights identify only the structure, and no bulbs are visible to boaters or a neighbor’s property. Lights should be fixed (not blinking) so boaters will not confuse them with buoy lights.

White street lights, in addition to blinding boat operators, attract a variety of insects and varmints. When practical, yellow or amber light bulbs

should be installed. Yellow or amber lights are less likely to attract a food source for spiders.

Red and green lights should not be used on docks, as boaters may confuse them with the lighting that marks the deepest part of the river channel.

Using low wattage bulbs (40 watts or less) may reduce the glare from lights and identify the dock. Low wattage fluorescent lights that can be used in incandescent bases are available, and usually have a longer lifespan.

Reflectors used in combination with other lighting can be effective, but reflectors alone are not adequate lighting for docks. For maximum visibility, reflectors should be about 21 square inches and either white or amber. They should be placed on each corner or on all sides of the dock, except the side that faces the shoreline.

ANCHORING

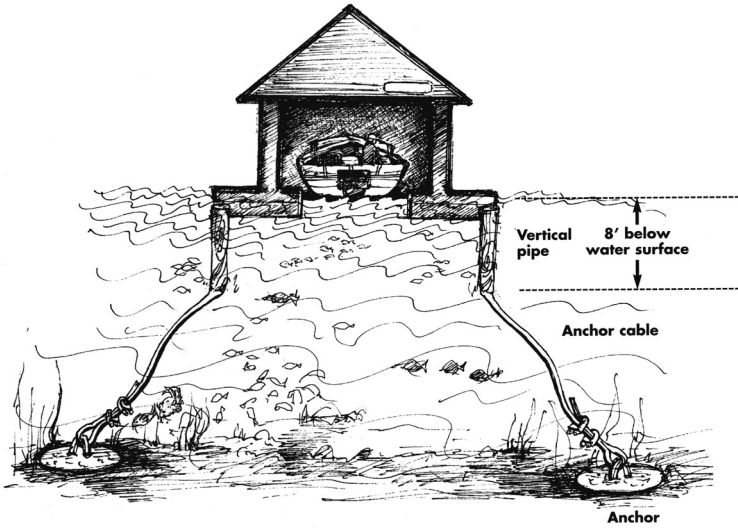
One of the challenges of maintaining a floating dock is keeping it in its intended location. Boat wakes, wind and wave action, fast-moving water and debris create challenges for owners of floating docks.

A dock must be maintained so that it is secure under any conditions. In addition, anchor cables must not create a navigation hazard or tripping hazard. Cables that are corroded or have broken strands are weakened and should be replaced. Chafing and corrosion can cause anchor cables to weaken and fail prematurely.

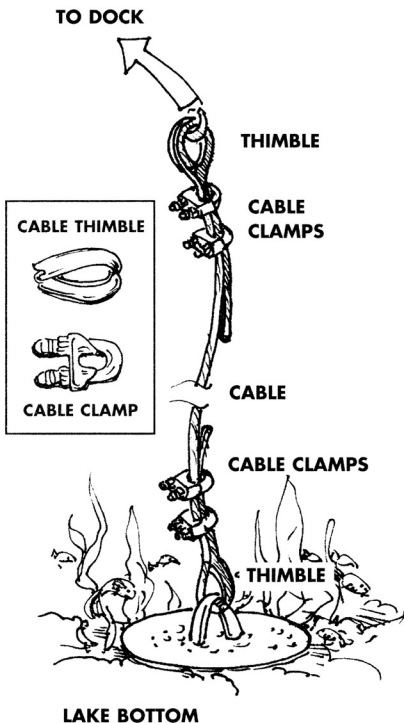
Anchoring a dock to a tree is detrimental to the tree. It is not uncommon for docks anchored to a tree to pull the tree into the water during a storm. Other types of vegetation offer poor anchor points.

Anchors are a part of the dock and should be placed only over property that is owned, leased or otherwise controlled by the owner. Dock owners should plan anchor locations before placing a dock on the water surface, especially in coves where docks have to be moved to accommodate varying lake levels.

MAINTAINING A DOCK



Anchor cables should be placed in vertical pipes that extend downward from the dock floor and into the water to prevent them from becoming a tripping hazard or causing hazards for watercraft.



Anchor cables may be made from a variety of materials, such as galvanized or stainless steel. Cable size varies, depending on working load, but at a minimum is required to maintain a working load of 1,000 pounds. A professional engineer should be consulted to determine the type of cable that is best for a dock. Petroleum-coated cables are not recommended.

Cable anchors are usually made of concrete with a pin attached. Submerged concrete loses about 50 percent of dry weight, so a 250-pound anchor may weigh only 125 pounds once submerged.

A professional engineer should be consulted to determine the right size, type and weight of an anchor for a dock.

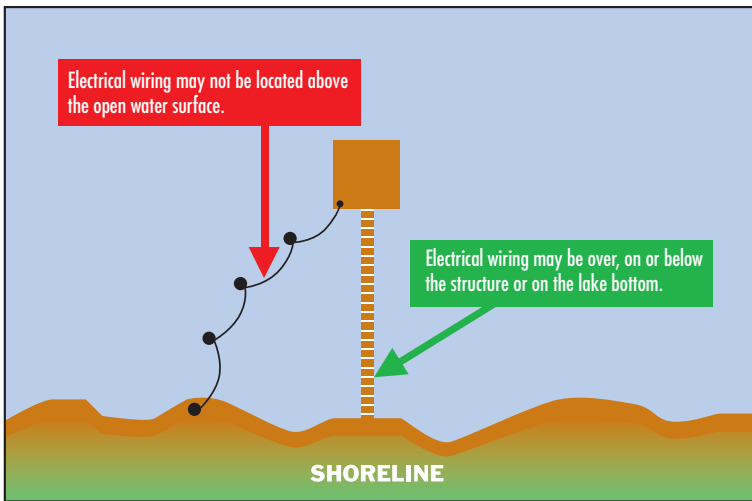
MAINTAINING A DOCK

Chafing protection is required for anchor cables because chafing is a common problem. Without thimbles or other protection, anchor cables can fail prematurely.

A thimble is an inexpensive piece of hardware that fits between the anchor cable and anchor point. Anchoring to a rounded object, such as a piling, may also provide chafing protection and can extend the life of the cable.

ELECTRICAL

The only electrical requirement included in the standards is the prohibition of electrical wiring over the open water surface. A dock owner is responsible for protecting the safety of family and guests on the dock.



Electrical wiring must be placed correctly.

LCRA recommends that an electrical system on a residential dock be installed and maintained in compliance with the NEC (National Electrical Code), and the NESC (National Electrical Safety Code). In addition, a master electrician should be consulted to determine the requirements for safe electrical systems on a residential dock.

Electrical Systems

LCRA recommends that electrical installations for existing docks comply with the National Electric Code (NEC), with particular attention given to Articles 250, 553 and 555. It is also recommended that National Fire Protection Association (NFPA) 303 Marinas and Boat Yards be used as a guideline. Residential dock electrical systems should be designed and installed by a licensed electrician.

- Wiring methods, equipment, and materials should be listed and approved for use in wet and damp locations.
- Electrical equipment, cables, and conduit should be firmly attached to the surface on which they are mounted to ensure their support and integrity.
- Only copper conductors should be used.
- Enclosures or guards should be installed in locations where electrical equipment, conduit, or cables may be exposed to physical damage.
- Wiring methods should allow flexibility between adjoining walkways and any other structural connection.
- A junction box should be installed at each wiring splice connection point, receptacle, switch or light fixture for the connection of conduit; non-metallic sheathed cable or other cables.
- All unused openings in boxes and conduit should be closed.
- Accidental contact with energized parts and physical damage to parts and insulation should be prevented by installing suitable covers on all boxes and similar enclosures.
- Electrical cables installed in the water should be only Type G, Type W, or Marina and Boatyard Cable. A strain relief device should be installed at all termination points.
- Extension cords should never be used in place of permanently installed electrical wiring or allowed to droop into the water.
- Low-voltage (*not battery operated*) and solar-powered systems (photovoltaic) are recommended where installed in accordance with the National Electric Code.

Electrical Service

The service equipment for a dock should be located on shore adjacent to but not in or on the dock. Overhead electrical service is not recommended for use on docks or any structure that is located on or over water. On floating docks an extra hard usage portable power cable such as Type G or W that is listed for both wet locations and sunlight resistance should be used where flexibility is required. Wiring on fixed docks should be installed in conduit, run with the structural components and secured firmly to the structure.

Remember: No docks on the Highland Lakes may have overhead wiring spans over the open water surface.

Dock owners should check with the appropriate electric service power company for any additional requirements. For floating docks, additional “slack” should be provided to allow for changes in lake levels, especially on lakes Travis and Buchanan. The main electrical disconnect should be located at a safe elevation on the shore adjacent to the dock. Such a location will allow supply conductors to be disconnected in an emergency, such as during a storm or flood.

Specific safe elevations for the main electrical service at each lake are:

Lake Buchanan	Above 1,022 feet msl
Inks Lake	Above 903 feet msl
Lake LBJ	Above 837 feet msl
Lake Marble Falls	Above 757 feet msl
Lake Travis	Above 722 feet msl

Grounding

Ground continuity is of utmost importance for docks and other structures that are on or over the surface of the water because of the exposure to water and dampness. Improper grounding may cause stray currents to become introduced to a dock’s components.

All branch circuits should have an insulated equipment grounding conductor terminated at a grounding terminal in a panel box. The grounding conductor should be no smaller than No. 12 AWG and should have a continuous outer finish that is either solid green or green with one or more yellow stripes.

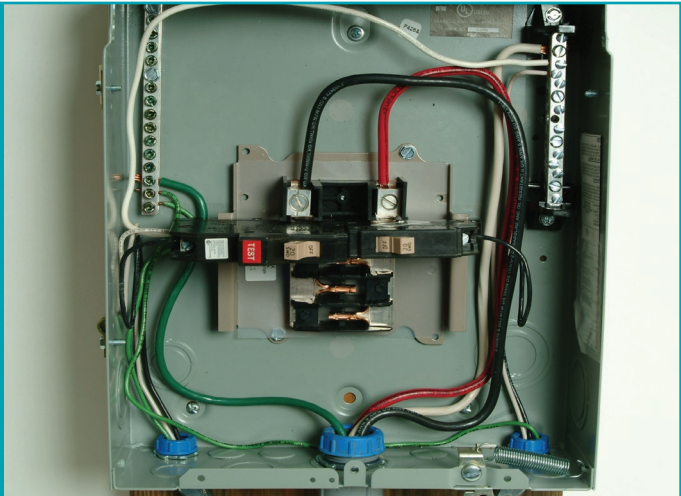
These items should be connected to an equipment-grounding conductor:

- Metallic boxes, cabinets, and other enclosures.
- Grounding terminals of receptacles.
- Metal frames of equipment (boat lifts, refrigerators, etc.)

For subpanels, an insulated equipment-grounding conductor should extend from a grounding terminal in the main panel box to a grounding terminal in the subpanel.

When metal and nonmetallic equipment (such as metal boxes and PVC conduit) are used together, all metal components should be connected by insulated equipment grounding conductors to the equipment grounding terminal bar located inside the panel box.

A properly wired,
bonded and grounded
subpanel with GFCI
breaker



Electrical system protection (overcurrent protection)

Docks should have overcurrent protection that will open the circuit for conductors and equipment to prevent excessive or dangerous temperature in conductors or insulation.

Circuit breakers or fuses should open all ungrounded conductors of the circuit and should be enclosed in a panel box that is readily accessible. Combustible material should not be located near circuit breakers or fuses. Enclosures or a panel box listed and approved for installation in damp or wet locations should be used for circuit breakers or fuses.

Circuit breakers or fuses for branch circuit copper wiring and equipment should have a rating or setting of not more than 20 AMPs for 12 AWG; 30 AMPs for 10 AWG; 40 AMPs for 8 AWG; and 50 AMPs for 6 AWG. Each circuit breaker should be labeled at the panel box to identify the specific circuit it controls.

Electrical receptacles

Receptacles that provide shore power (conversion of AC current to DC current to power boats while at mooring) for boats should be on individual branch circuits, rated no less than 20 AMPs and of the twist-lock type. All other receptacles should be 15 or 20 AMPs, 125 volts, and protected by ground fault circuit interrupters (GFCI). Receptacle covers and boxes should be the appropriate type suitable for either wet or damp locations. If installed in open, outdoor areas, covers and boxes should be approved for wet locations.



A properly installed GFCI receptacle should be tested monthly to ensure proper operation.

FLOTATION

Flotation is the foundation of a floating dock and must be properly installed and maintained to ensure that the dock performs as intended. Loss or degradation of flotation can result in toppling, submersion, and



Vegetation causes unencased flotation to deteriorate quickly.

increased stress on the structure.

There are many types of flotation, including but not limited to concrete encased, rotomolded and injected floats, wood, fiberglass encased and steel pontoons. The standards require that as of Feb. 18, 2004, all **new** docks using flotation use only encased flotation. In addition, if the flotation is being replaced in conjunction with the replacement of the structures of the residential dock in its entirety, encased flotation must be used.

The lifespan of flotation differs from type to type. Careful consideration should be given to the cost effectiveness of the type of replacement flotation used. Exposed foam may be the least expensive initial investment, but would have to be replaced or encased in its entirety by Feb. 18, 2014.

Metal barrels are not allowed for flotation and must be replaced by Feb. 18, 2007. Plastic barrels are allowed if barrels are properly cleaned and the contents were not toxic to the environment.

Facts about flotation:

- At least 25 percent of the flotation should be above the water surface.
- The lifespan of nonencased flotation is approximately eight to 10 years; however, encased flotation may exceed 20 years.
- Caution should be exercised when attaching flotation so that it does not become damaged in the process.
- Flotation should be kept free of vegetation. Vegetation growing in flotation increases the rate of deterioration and encourages the presence of snakes, beavers, nutria and other wildlife.
- Animals may burrow into nonencased flotation, allowing snakes and other animals to live inside.
- Nonencased flotation is very susceptible to damage from petroleum products and once exposed, may deteriorate quickly.
- LCRA recommends consulting with a professional engineer to determine the proper amount and type of flotation for a dock.
- Dispose of old flotation properly so that it can't be reused for another dock or deteriorate and wash ashore forming a "bathtub ring" effect commonly seen around lakes.

INSURANCE

LCRA recommends that a dock owner on the Highland Lakes maintain comprehensive general or public liability insurance providing a minimum coverage of \$300,000 per person per occurrence bodily injury and \$100,000 of property damage or \$300,000 combined single limit.

In many cases, this can be inexpensively accomplished by obtaining a rider to the homeowner's insurance policy. Coverage limits and applicable terms are conditions of individual policies. Having a homeowner's insurance policy without a specific rider most likely will not include any structure located over the water.

The Federal Emergency Management Agency has specific rules regarding structures located in the floodplain. Contact your county floodplain administrator and your insurance agent to discuss these regulations.

POLLUTION

LCRA is committed to keeping the Highland Lakes safe and clean. You can help by becoming environmentally conscious and by minimizing the impact and effect of pollution on the lake.

Here are some tips to help keep the lake clean and safe:

- Rest room facilities on a residential dock must comply with the LCRA On-Site Sewage Facility (OSSF) Ordinance or be connected to a sewer tap. For more information, contact LCRA On-Site Sewage Facilities Program at 1-800-776-5272.
- Store fuel in approved containers in vented storage areas. Do not leave fuel containers on an open deck where they could enter the lake by accident and discharge fuel into the water. Hazardous materials, such as batteries, fuel, oil, cleaners, and antifreeze, should not be stored on the dock.
- Boats should be removed from over the water for cleaning below the water line. A minimal amount of cleaning products should be applied and they should be phosphate free and biodegradable.
- Instead of spraying, hand paint or stain a dock so that the product does not enter the water. Use environmentally friendly products.
- Boats with sewage holding tanks must use approved sewage pump out facilities which are available at many marinas on the Highland Lakes.
- A boat which is submerged or partially submerged at a dock may contain gasoline, batteries, oil and other hazardous chemicals. If you notice a submerged boat, call the pollution hotline at 1-800-776-5272, Ext. 6843.
- Any pollution concerns may be reported to the pollution hotline.
- Antifreeze is detrimental to water quality and fish habitat. It should be applied appropriately and disposed of properly.
- Properly dispose of litter and trash. It is unsightly and can pollute the lake.
- Report fuel spills to Texas Commission on Environmental Quality emergency spill hotline at (512) 239-2507.



A b o u t L C R A

LCRA is a conservation and reclamation district created by the Texas Legislature in 1934. LCRA provides Energy, Water, and community services to the people of Texas. It cannot levy taxes, but funds its operations with income from the sale of electricity, water and other services.

LCRA generates electricity and sells it wholesale to 42 customers, including city-owned utilities and cooperative that serve more than 1 million people in Texas. LCRA also builds and operates transmission projects through a nonprofit corporation it created, manages and protects the lower Colorado River, provides water and wastewater utilities, owns and operates parks, and offers economic and community development assistance to communities.



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