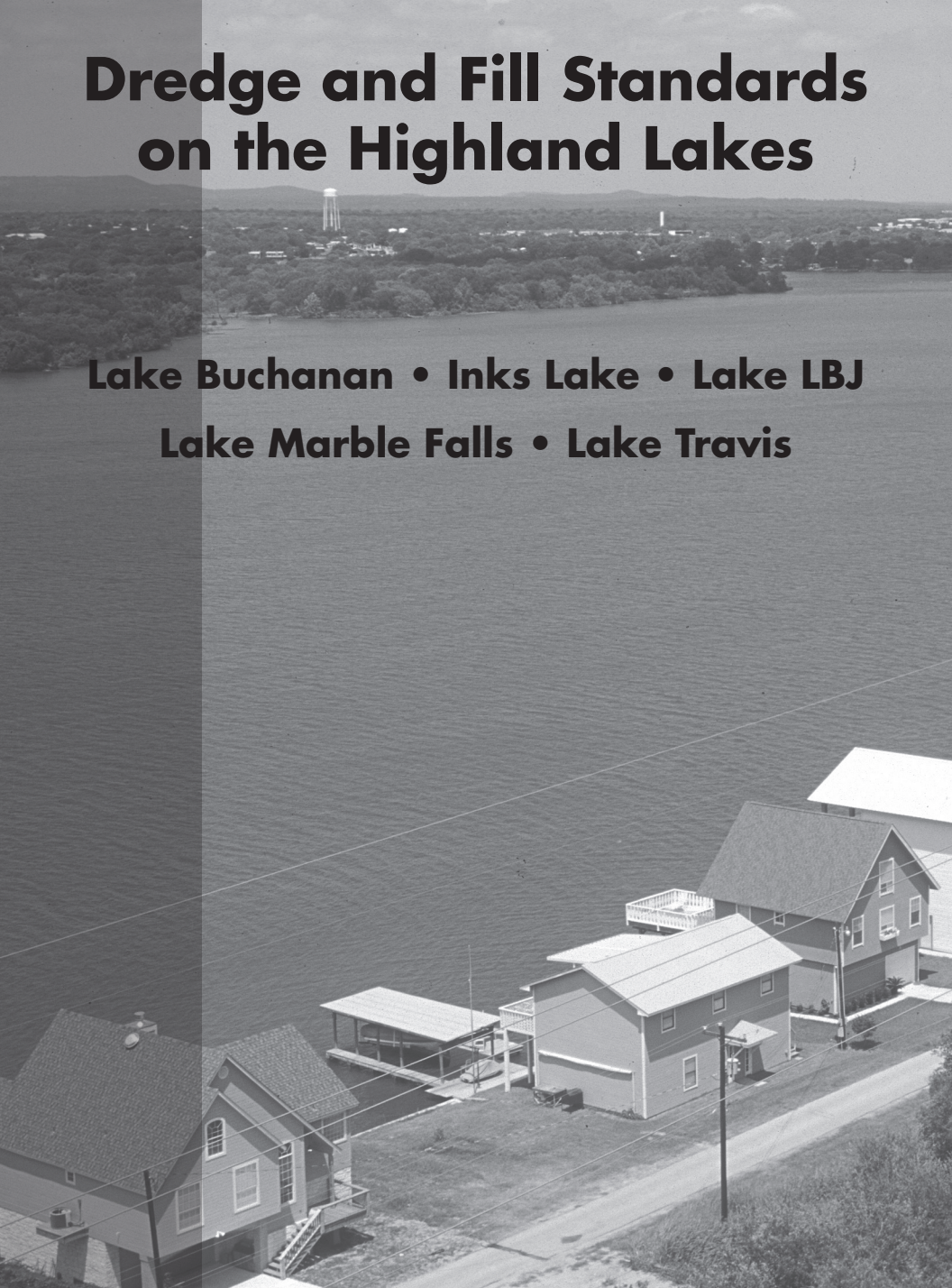


Dredge and Fill Standards on the Highland Lakes

**Lake Buchanan • Inks Lake • Lake LBJ
Lake Marble Falls • Lake Travis**



Introduction

The Lower Colorado River Authority (LCRA) no longer requires that property owners obtain an LCRA permit for dredge and fill projects. However, LCRA has the authority to enforce these standards, and will evaluate violations of the standards on a case-by-case basis. **Property owners are still required to comply with requirements of Section 404 of the Clean Water Act and notify the U.S. Army Corps of Engineers (USACE) prior to beginning a project.**

LCRA developed these Dredge and Fill Standards as a companion to the USACE requirements. LCRA designed the standards to help shoreline property owners and contractors avoid problems and situations associated with dredge and fill practices in the Highland Lakes.

By complying with the USACE requirements and LCRA's Dredge and Fill Standards, shoreline owners can help protect their property from erosion, maintain navigability and ensure the protection of the Highland Lakes.

LCRA does not assess fees as part of implementing these standards.



Lower Colorado River Authority

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The summary below highlights key components found in the Dredge and Fill Standards.

- All fill and shoreline stabilization work must follow the existing shoreline, unless otherwise authorized by LCRA. Reclamation of lost property due to erosion is not allowed.
- LCRA does not allow encroachments or unauthorized fill on LCRA property. Approval from LCRA is required before dredging on LCRA land.
- All dredged material needs to be removed from lakebed and placed above lake elevations listed on page 5.
- Contact LCRA to obtain work checklist if the length of shoreline work exceeds 500 feet or if the volume of dredged material exceeds 500 cubic yards (see example calculation Figure F-4, Page 12).
- Shoreline activity above lake elevations listed on page 5 may require a development permit.

For additional copies of these standards, or to address questions or concerns, please contact LCRA Water Resource Protection at 1-800-776-5272, Ext. 2324.

For information on U.S. Army Corps of Engineers (USACE) requirements, please see contact information listed below.

U.S. Army Corps of Engineers, Ft. Worth District
P.O. Box 17300, Ft. Worth, Texas 76102
Phone: 1-817-886-1731
www.swf.usace.army.mil (click on "Permits")

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Definitions

Words used in these standards but not defined in this section will have their ordinarily accepted meaning. For the purpose of these standards, the following words and phrases are defined.

Contractor: Any person, other than the owner, engaging in land development and construction activities.

Dredge: The removal or disturbance of material from below the stated normal conservation pool elevations of the lakes.

Erosion: The detachment and movement of soil, sediment or rock fragments by wind, water, ice or gravity.

Erosion Control: Devices such as silt fence, rock berm and soil protection blankets that prevent soil migration from the site. See LCRA's Erosion Control Guide for more information, available by calling 1-800-776-5272, Ext. 2324.

Fill: Any material, structure, wall, riprap or revetment below the stated normal conservation pool elevations of the lakes.

Highland Lakes: Include Lake Buchanan, Inks Lake, Lake LBJ, Lake Marble Falls and Lake Travis on the Colorado River within the LCRA district.

Lakewide Permit: A permit issued by LCRA that allows for expedited permitting of certain activities under certain conditions when work is performed on Highland Lakes property during lake drawdowns. Because lakewide permits are reissued from time to time, the actual permit number may change.

Shoreline: The line at which the water surface of each Highland Lake intersects the land at any given time. The shoreline will move as the surface elevation of a lake changes.

Dredge and Fill Activities

Dredge and fill activities are most common among property owners constructing stabilization projects on a single-family waterfront lot. Although construction of retaining walls and removal of sediment from the lakebed are the most typical activities that fall under LCRA's Dredge and Fill Standards, the standards also address:

- Bulkhead, rock riprap or revetment construction and repair that include backfilling behind the wall and installing toe protection or tiebacks. **Retaining walls must follow the existing shoreline.**
- Use of a bulldozer, front-end loader or backhoe to move sediment from areas normally below the lake elevation listed in this booklet to an area above the lake elevation listed in this booklet.
- Construction or maintenance of shoreline protection systems.
- Construction or maintenance of recessed boat slips.
- Construction or maintenance of boat ramps.
- Contact LCRA to obtain checklist, if the length of shoreline work exceeds 500 feet or the volume of dredged material exceeds 500 cubic yards (see example calculation Figure F-4, Page 12).
- Contact LCRA prior to all dredging activities on LCRA property.

Other Regulations

Compliance with the Dredge and Fill Standards 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 other sections of LCRA's Highland Lakes Watershed Ordinance, LCRA's Safety Standards for residential docks, 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.

Highland Lakes Elevation Levels

LCRA's Dredge and Fill Standards apply to work below the following stated lake elevations on the Highland Lakes:

Lakes Travis (681' mean sea level)

Lake Marble Falls (738' mean sea level)

Lake LBJ (825' mean sea level)

Inks Lake (888' mean sea level)

Lake Buchanan (1,020' mean sea level)

Property Ownership

The water surface is public domain. LCRA is responsible for protecting water quality, enforcing safety and regulating use of the Highland Lakes. The right to do work along the shoreline or dredge in the lakebed depends on who owns the land where the work will take place.

Privately Owned Land

LCRA requires that the property owner, who will be performing the dredge and fill activities, own the land where all such activities will take place.

It is the property owner's responsibility to determine land ownership and the boundaries of that ownership. Information on the boundaries of ownership can be obtained from a variety of sources, such as county deed records, title companies and appraisal districts.

If there is a dispute over the placement of fill or construction of shoreline stabilization structures over land not controlled by the property owner doing the work, the dispute must be settled in a court of competent jurisdiction. LCRA has no jurisdiction regarding the litigation of these matters.

Publicly Owned Land

Some land under the Highland Lakes could be owned by a city or county, the state or another public entity such as LCRA. Each of these entities may have its own requirements for dredge and fill activities over land they own.

Property owners must determine which public entity owns the land and what type of permission is needed before conducting work. Property owners are responsible for complying with any requirements imposed by an entity that has jurisdiction over the property. You may determine ownership through the county courthouse or tax appraisal offices. When researching ownership, use the most recent existing survey or plat.

If you are located on Lake Travis or Lake Buchanan, you will need to take particular notice of ownership below the lake elevations as listed in this booklet and avoid encroaching on LCRA property.

LCRA does not allow encroachment on LCRA land; all activities must be conducted on the property owner's land. Dredging on LCRA property requires approval from LCRA before beginning work. Any unauthorized fill placed on LCRA land will be subject to removal at land owner's expense. For help determining LCRA ownership of shoreline land, please contact LCRA's Real Estate Services at 1-800-776-5272, Ext. 7986.

Land Reclamation — Not Allowed

Property owners are not permitted to reclaim lost property resulting from the natural erosion process or a flood event. All shoreline stabilization projects and fill work must be conducted on or above the lake elevations listed in this booklet.

Water Quality Protection

Dredging material from a lakebed, installing retaining walls or other bank stabilization structures, and conducting other site disturbances can temporarily impact Highland Lakes water quality. Such projects may require removing a substantial amount of material. To reduce erosion and sediment in the lakes or tributaries during construction projects or other land-disturbing activities, take the following steps:

- Place dredged material above the lake elevations listed in this booklet in a manner that will prevent material from re-entering the lake through runoff.
- Perform work in a manner that prevents runoff of fill material, dredged material and pollutants into the waters of the High-

land Lakes. Minimize removal of natural vegetation, revegetate the disturbed area as soon as possible, and provide temporary erosion and sedimentation controls during the project. For more information on the use of erosion and sedimentation controls contact LCRA Water Resource Protection at 1-800-776-5272, Ext. 2324.

- Dredging in submerged conditions may require special techniques such as coffer dams or turbidity curtains. Contact LCRA for more information. Dredging should be performed in dry conditions during a scheduled lake lowering or other low water level conditions.
- Keep erosion controls in place and maintain them until vegetation in the fill area is at least 70 percent established.
- Gradually slope dredged areas to blend the newly dredged area into the existing channel bottom contour. Smooth dredged areas to prevent any irregular surfaces or cuts that might collapse (see example calculation Figure F-5, Page 13).
- Limit fill material to native soils obtained at the work site, concrete, sand, gravel, rock or other coarse aggregate material. Fill material must be free of waste, scrap metal products, organic materials and unsightly debris.
- Dredging in a cove that is fed by a creek may increase erosion, especially on flood control lakes. Contact LCRA to discuss if this condition is present.

Ensuring Navigability of Waters

All work must not interfere with others' reasonable access to, or use of, navigable waters. Retaining walls must be designed and built to adequately control erosion and not present a hazard to navigation.

To ensure navigability, the fill for the retaining wall must follow the existing shoreline and be limited to the minimum required to stabilize the shoreline. The wall must not exceed the length of the

Table 1: Riprap Size for Wave Protection

(Source: HEC-11 Chart 7. Hudson Relationship for Riprap Size Required to Resist Wave Erosion)

$$D50 = 0.57H / \cot 1/3 q$$

$$H = \text{Wave Height (ft)}$$

$$D50 = \text{Median Riprap Size (in)}$$

$$q = \text{Bank Angle with Horizontal}$$

		bank side slope (horizontal:vertical)					
D50, in	2:1	2.5:1	3:1	4:1	5:1	6:1	
H, ft							
1	5	5	5	4	4	4	
2	11	10	9	9	8	8	
3	16	15	14	13	12	11	
4	22	20	19	17	16	15	
5	27	25	24	22	20	19	
6	33	30	28	26	24	23	

example: H = 3 feet, side slope = 2 horizontal to 1 vertical
 result - use rock with D50 of 16 inches

Table 2: Wave Run-Up Height for Angular Rock Riprap

(Source: HEC-11 Chart 8. Wave Run-up on Smooth, Impermeable Slopes and Table 9. Correction for Wave Run-up)

$$R = \text{Wave Run-up Height (ft)}$$

$$q = \text{Bank Angle with Horizontal}$$

$$H = \text{Wave Height (ft)}$$

$$Cf = \text{Correction Factor (0.6 for angular rock riprap)}$$

		bank side slope (horizontal:vertical)					
R, ft	2:1	2.5:1	3:1	4:1	5:1	6:1	
H, ft							
1	1.7	1.9	2.0	2.2	2.2	2.2	
2	3.4	3.7	4.0	4.3	4.3	4.3	
3	5.0	5.6	5.9	6.5	6.5	6.5	
4	6.7	7.4	7.9	8.6	8.6	8.6	
5	8.4	9.3	9.9	10.8	10.8	10.8	
6	10.1	11.2	11.9	13.0	13.0	13.0	

example: H = 3 feet, side slope = 2 horizontal to 1 vertical
 result - wave run-up extends 5 feet above water level

property owner's waterfront property line.

Shoreline Protection Techniques

Managing the effects of wave heights and run up should be incorporated into the design of shoreline protection. The design should minimize the effects when shoreline protection fails and overtopping occurs. For guidance on shoreline protection parameters, see Tables 1 and 2, page 8.

Research has shown that a ski boat traveling at 20 miles per hour (mph), 100 feet from shore can generate a 3-foot wave. Likewise, a 50 mph wind across a lake from shore to shore measuring a distance of 10,000 feet generates a 3-foot wave. These are typical examples of wave height that could overtop your shoreline protection (see Figures 1 and 2, page 10).

Use of retaining walls and riprap to stabilize eroded shorelines

- Walls and riprap must be placed along the existing shoreline. Reclamation of land is not allowed.
- Walls may match existing retaining walls to minimize debris collection and maintain a consistent shoreline. However, walls should be angled back to match the existing shoreline to avoid reclamation.
- Construct the wall using stone, concrete blocks, poured concrete, rock, gabions (rock wrapped with wire mesh that is commercially manufactured for erosion control) or other course aggregate material.
- Place rock riprap at the base of the retaining wall (see Figure 2, page 10) to protect the wall from being undermined, which can lead to wall collapse, and to ensure maintenance of aquatic habitat.
- Use riprap material that is natural or quarry-run stone.

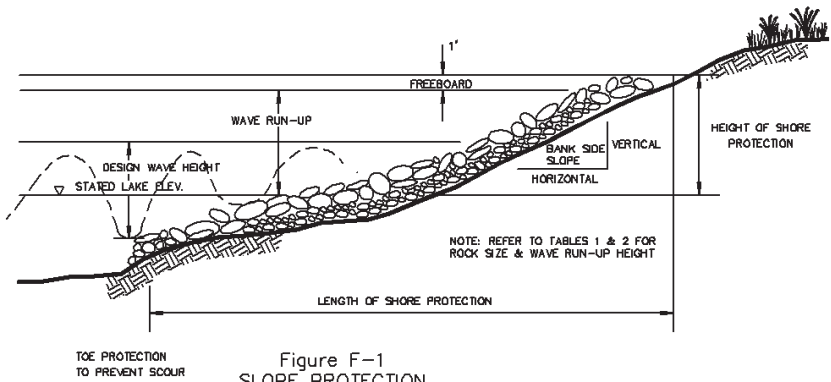


Figure F-1
SLOPE PROTECTION
USING ROCK RIPRAP

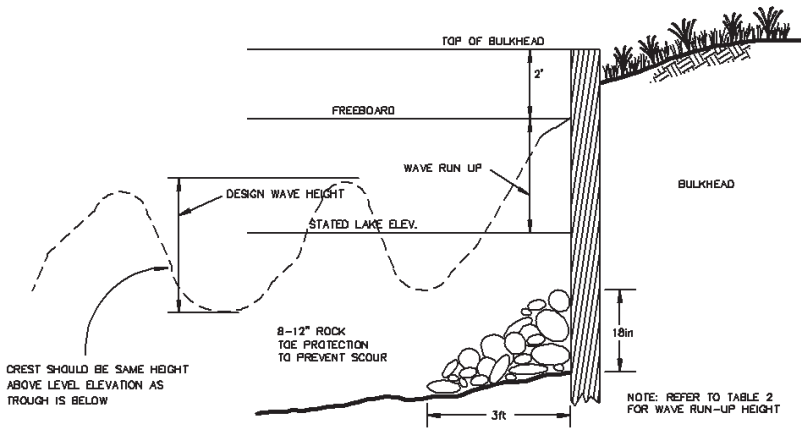


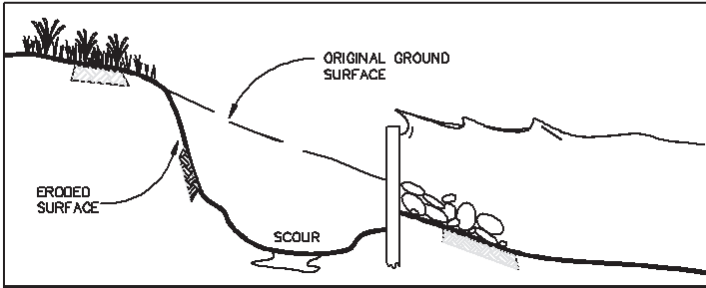
Figure F-2
VERTICAL PROTECTION
USING RETAINING WALL

Design Example for Vertical Retaining Wall

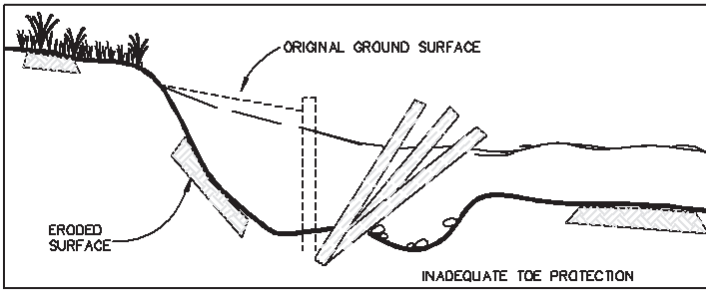
Top of Wall = Stated Lake Elevation (pg. 4) +.5 (anticipated wave height) +2 ft. of Freeboard
example: 825' msl (Lake LBJ) +.5 (3 ft. wave height) +2 ft.

Top of Wall = 828.5' msl

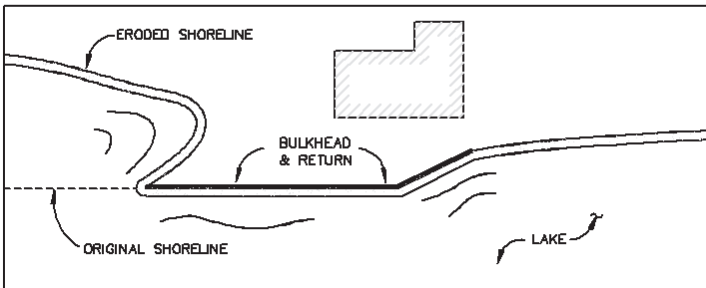
Figure F-3
FAILED SHORELINE PROTECTION SYSTEMS



EROSION BEHIND STRUCTURE – WAVES LAP OVER TOP
SIDE VIEW



SLUMPING DUE TO TOE SCOUR
SIDE VIEW



PLAN VIEW -- FLANK EROSION

FIGURE F-4
DETERMINING THE CUBIC YARDS
OF DREDGED MATERIAL

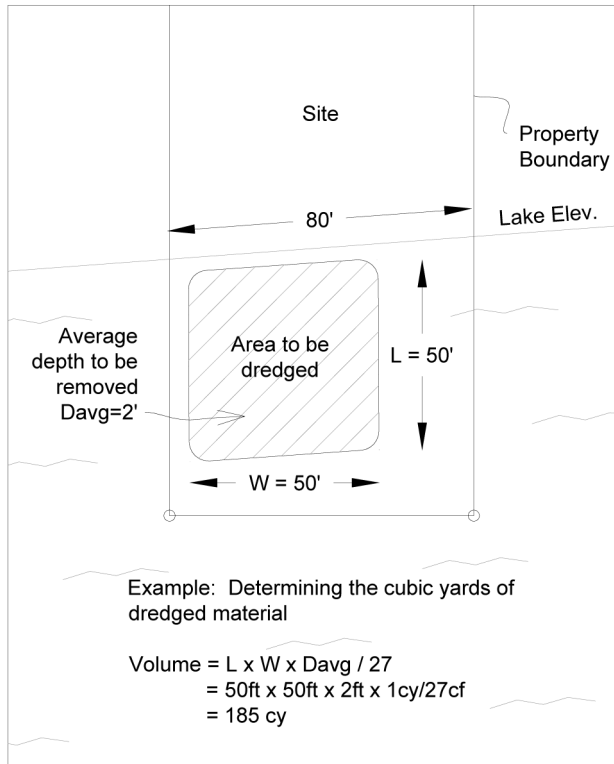
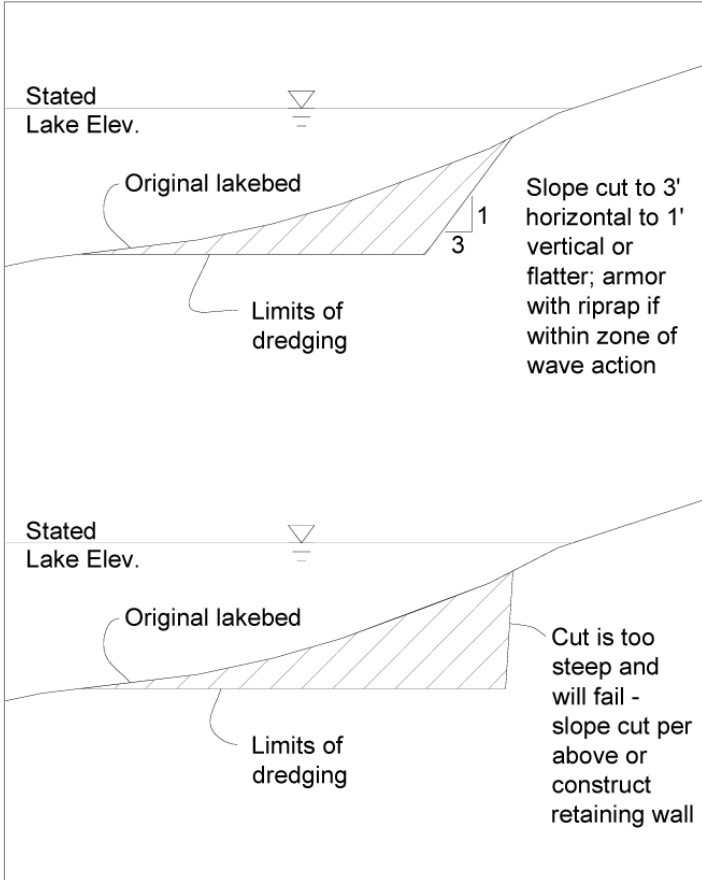


FIGURE F-5
CUT SLOPE FOR DREDGED AREA



- Do not use concrete rubble or other debris salvaged from construction sites to stabilize shorelines.
- Limit site preparation to the work necessary to obtain adequate slope and stability of the riprap material.
- Perform site preparation to follow the existing contour of the land.

For examples of inadequately designed shoreline protection systems, see Figure 3, page 11.

The three pictures show erosion behind the structure (scouring), slumping that results from the scouring, and flank erosion.

Enforcement of Dredge and Fill Standards

An agent or employee of LCRA may inspect dredge and fill activities in response to a complaint of possible violation of LCRA's Dredge and Fill Standards. LCRA will try to provide advance notification for inspections. The owner or owners representative is encouraged to be present during an inspection. LCRA typically conducts inspections during normal LCRA business hours unless other arrangements are made.

When a violation of LCRA's Dredge and Fill Standards occurs, an authorized agent or employee of LCRA will issue a Notice of Violation stating the nature of the violation or violations. The notice will be provided by:

1. Posting in a prominent location on the site and
2. Sending a copy of the notice to the property owner, if known, by certified mail.

The property owner will have 30 business days from the date that the notice of violation is posted to comply with the standards. The property owner may submit to LCRA a written request for an extension of that time frame. In the written request, the property owner must explain in detail the need for additional time and what measures are being taken to correct the violation. LCRA staff has discretion to grant an extension of time; the approval will be in writing.

Nothing in LCRA's Dredge and Fill Standards prevents LCRA from seeking injunctive relief or another remedy in law or equity at any time against any person allegedly violating the standards.

When more than one entity imposes standards for dredge and fill activities, the rules that are more restrictive or impose higher standards or requirements are the ones that must be observed.

U.S. Army Corps of Engineers Requirements

In addition to complying with LCRA's Dredge and Fill Standards, you are required to comply with any other federal, state and local requirements, including Section 404 of the Clean Water Act. Under Section 404, you must have a permit from the U.S. Army Corps of Engineers (USACE) for any discharge of dredged or fill material into waters of the United States. The Highland Lakes, all streams that flow into the Highland Lakes, and wetlands that are adjacent to the above areas are examples of waters of the United States under Section 404. In some cases, you may be authorized to do work under a general permit without notifying the USACE. However, in many cases you must notify the USACE and receive either a verification of authorization under a general permit or an individual permit before beginning work.

For more information on USACE requirements, please see the USACE Web site listed below. You may also call or write the USACE Fort Worth District office.

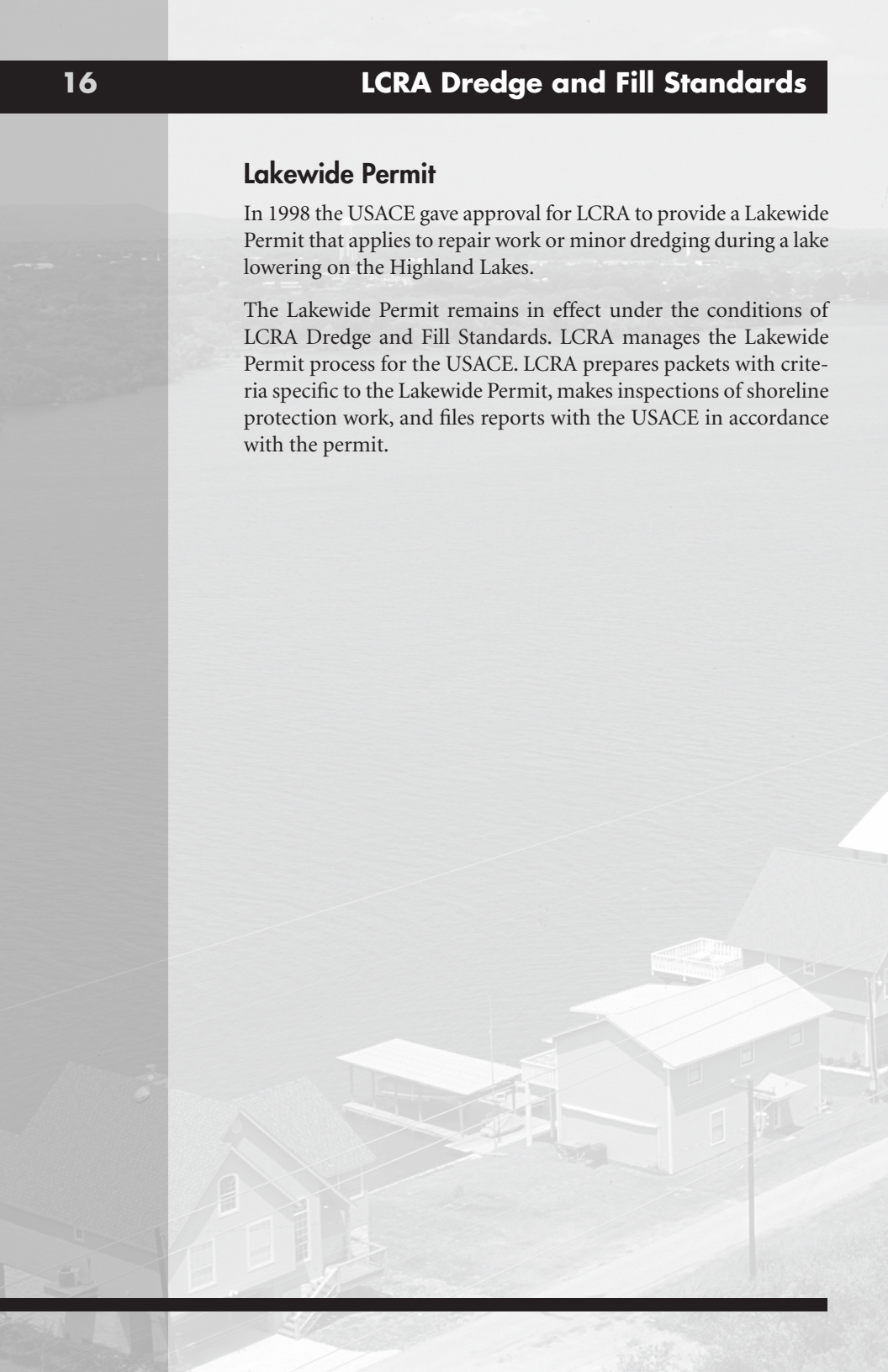
U.S. Army Corps of Engineers, Fort Worth District
P.O. Box 17300, Fort Worth, Texas 76102
Phone: 817-886-1731
www.swf.usace.army.mil (click on "Permits")

Please keep in mind that it is necessary to obtain permission from other government agencies (local, state, federal) before beginning any work involving dredge and fill activities.

Lakewide Permit

In 1998 the USACE gave approval for LCRA to provide a Lakewide Permit that applies to repair work or minor dredging during a lake lowering on the Highland Lakes.

The Lakewide Permit remains in effect under the conditions of LCRA Dredge and Fill Standards. LCRA manages the Lakewide Permit process for the USACE. LCRA prepares packets with criteria specific to the Lakewide Permit, makes inspections of shoreline protection work, and files reports with the USACE in accordance with the permit.





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