CESWL-CO-L

DEPARTMENT OF THE ARMY
Little Rock District, Corps of Engineers
P. O. Box 867
Little Rock, Arkansas 72203-0867

LRDOM 1130-2-21

Office Memorandum
No. 1130-2-21

15 February 1989

Project Operations
BUOYS, MARKERS, AND WARNING DEVICES

1. Purpose. This memorandum specifies policy and procedures for installing buoys, markers, and warning devices for identifying hazards and for establishing zoning restrictions. These procedures will promote water safety and protect the public from hazardous conditions.

2. Applicability. This memorandum applies to all projects in the Little Rock District. It does not apply to Coast Guard buoys or markers placed on the Arkansas River.

3. References.

a. SWDR 1130-2-7 dated 1 November 1978.

b. Uniform State Waterway Marking System.

c. ER1130-2-400 dated 1 June 1986, Paragraph No. 16.

d. EM 1110-1-400 dated 31 July 1987, Paragraphs Nos. 2-6 and 7-4.

e. U.S. Army Corps of Engineers Sign Standards Manual.

f. LRDOM 1130-2-24 dated 18 April 1988.

4. Policy.

a. Lakes will be marked as described herein with approved buoys, markers, and warning devices to promote safe water-oriented sports and activities.

b. Buoys will comply with the Uniform State Waterway Marking System, and buoys shall be the product of a manufacturer regularly engaged in the manufacture of buoys.

This memorandum supersedes LRDOM 1130-2-21 dated 4 June 1986.

c. Buoys, markers, signs, and warning devices will comply with guidance contained in the above-referenced documents and as described herein.

d. Buoys will be placed at swimming areas, boat launching ramps, commercial dock areas, dams, water intake structures, bridges, or other areas of danger or where boats are prohibited. Buoys located within commercial concession lease areas shall be furnished, installed, and maintained by the lessee in accordance with LRDOM 1130-2-24.

e. Where it is considered to be essential, old bridge piers, narrow channels, or openings through obstructions, stumps, dead timber, or pinnacles of rock in the main body of a lake or in boating channels may be marked by buoys or other appropriate means. Once these hazards have been marked, we have a moral and possibly legal obligation to assure that they continue to be marked as long as the hazards exist or until circumstances change that would merit removal of the markers. Any removal of markers must be approved by Chief, Construction-Operations Division, and given wide publicity through news media. All new proposals to mark previously unmarked hazards shall be requested by the Resident Engineer/Manager and approved by Chief, Construction-Operations Division. Buoys shall be identified by type, color, size, number, and location on a buoy map submitted by the Resident Engineer/Manager.

f. Installation or removal of buoys on waters of Missouri must be approved by the Missouri Department of Public Safety, Division of Water Safety.

g. All signs will be approved by the Chief, Construction-Operations Division, and designed and installed in accordance with the U.S. Army Corps of Engineers, Sign Standard Manual, EC 1130-2-200 dated 20 November 1987.

h. Signs will be installed at all Corps operated and maintained boat launching ramps and swimming areas to warn the public of potential hazards. Properly worded warning signs will also be furnished, installed, and maintained by the Corps at docks and boat ramps leased or licensed by the Corps. Signs shall include applicable safety messages.

i. Folder maps should show the location of significant boating hazards such as submerged or exposed points located in heavily-used boating lanes or high-density boating areas. A note on the folder map will caution boaters that other hazards may exist and alert them to unknown hazards resulting from variations in water levels. On the Arkansas River, boaters should also be encouraged to purchase navigation charts that indicate location of dikes and revetments.

j. Signs and warning devices such as horns or sirens will be installed at dams to notify public of rapidly changing water levels downstream of locks, dams and powerhouses. Signs shall comply with the U.S. Army Corps of Engineers Sign Standards Manual, EC1130-8-200 dated 20 November 1987.

k. The Resident Engineer/Manager shall assure that all buoys, signs, markers and warning devices are installed in compliance with this memorandum, and shall maintain accurate records of their installation. Buoys shall be numbered for identification purposes as an aid to determining their approved location. Non-typical buoys that do not meet the type, size, and color requirements specified in Appendix A, shall not be used.

5. Installation of Buoys.

a. Buoys will be anchored with appropriate sized concrete anchors, cables, chains, swivels and connectors to maintain them in the desired position. All metal parts shall be of corrosion-resistant materials, such as stainless steel, galvanized, or plastic-coated steel.

b. Anchor cables and chains shall be of sufficient length to maintain the buoy in position with changes in water levels. The length of cable should be at least equal to 1.3 times the depth of water at conservation pool elevation. Additional cable length may be provided to reduce the frequency at which buoy anchors must be adjusted due to changing lake levels. Multiple anchors may be used in areas without submerged trees to maintain the buoy in position where large fluctuations in lake levels are experienced. Judgment shall be exercised in selecting the appropriate length of anchor cable for hazard buoys to assure that the buoy stays on position without excessive drift.

c. Typical buoy details are shown in Appendix A.

d. Buoy decals and messages shall be clearly legible.

6. Responsibilities. The Chief, Construction-Operations Division, shall be responsible for program implementation and assuring that buoys, signs, markers and warning devices are properly designed in compliance with this memorandum. The Resident Engineer/Manager shall assure compliance with this memorandum at the project level as described herein.

ANTHONY V. NIDA
Colonel, Corps of Engineers
District Engineer

Appendix A
APP A Buoy Installation Details

DISTRIBUTION A

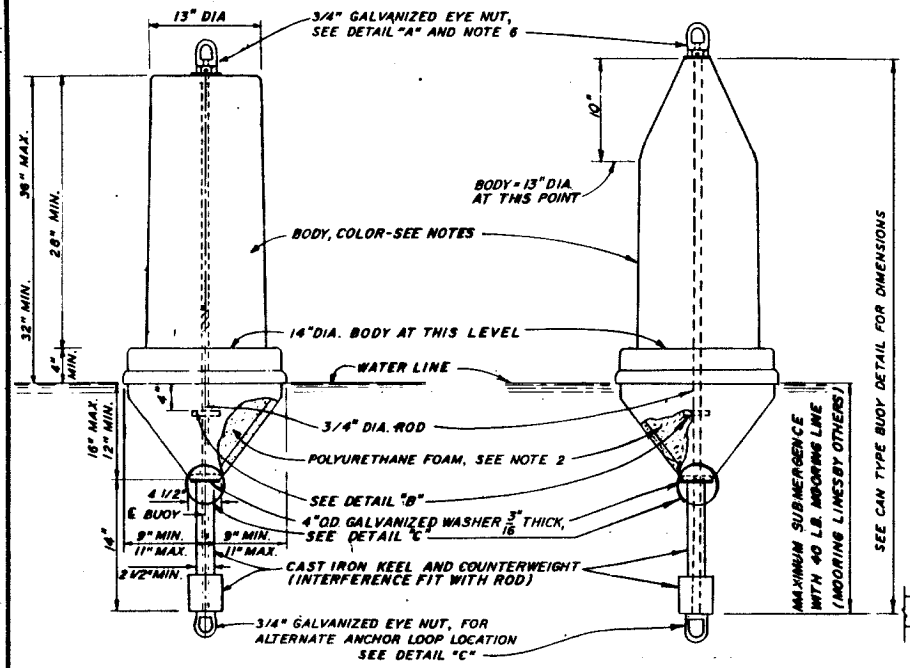
APPENDIX A

Buoy Installation Details

This appendix presents details on buoys approved for placement within LRD project waters. Examples of installation details are included for reference.

Buoy Details

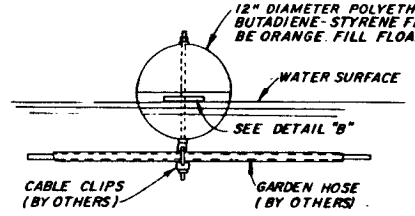
Buoy Type	Color	Size	Location or Areas of Use
Barrier Line	Orange	3" diameter gas pipe	Swim area safety line
Barrier Float	Orange	12"-13" diameter ball	Swim area safety line float
Barrier Float	Blue/White	5" diameter X 9" long	Wading area float
Barrier Float	White/Orange Symbols	18" diameter X 30" long	Swim area safety line
Barrier Float	Orange	24" diameter X 36" long	Dam area log boom
Can Type	White/Orange Symbols	9" to 12" diameter X 32" min exposure	Regulatory buoys with symbols: a. Swim areas b. Boat launching ramps c. Dams d. Intake structures e. Submerged hazards f. Exposed points g. Fish attractors h. Marinas and docks i. No ski areas j. Highway and railroad bridges
Can Type	Red and white vertical stripes	9" to 12" diameters X 32" min exposure	Mid-channel markers
Can Type	Black or green	Same	Channel marker
Nun Type	Red	Same	Channel marker



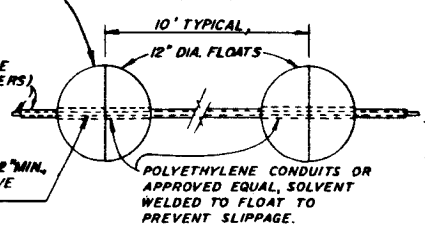
CAN TYPE BUOY

CLASS "A"

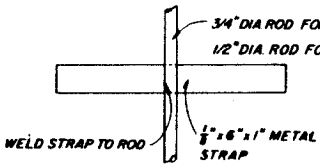
NUN TYPE BUOY

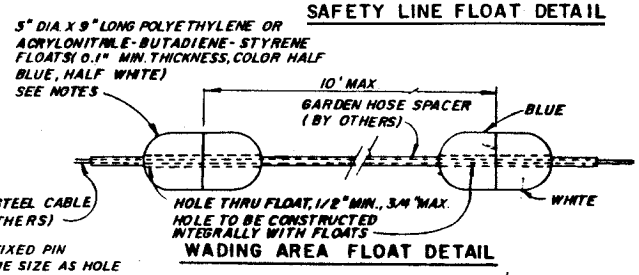


DETACHABLE FLOAT DETAIL



SAFETY LINE FLOAT DETAIL

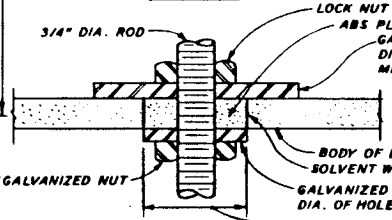




WADING AREA FLOAT DETAIL

RETAINER STRAP

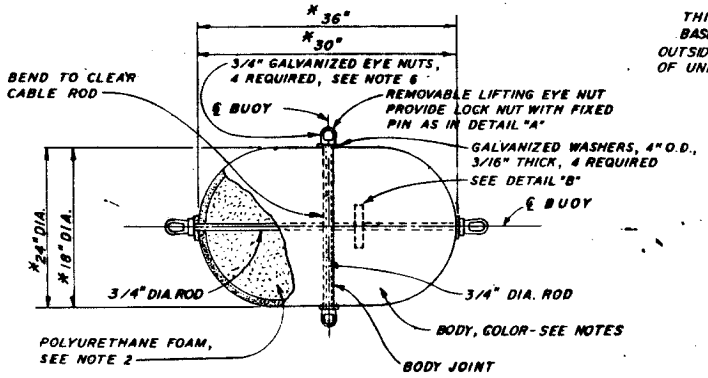
DETAIL "B"



DETAIL D

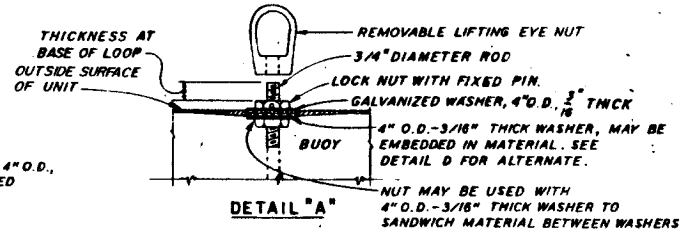
NOTES:

1. BODY OF BUOYS SHALL BE MOLDED OF ACRYLONITRILE-BUTADIENE-STYRENE, 1/8" MINIMUM WALL THICKNESS. TOP AND FLOAT SECTIONS OF NUN AND CAN TYPE BUOYS SHALL BE BONDED TO PREVENT MOVEMENT BETWEEN THE TWO UNITS.
2. ENTIRE BODY OF ALL BUOYS AND FLOATS SHALL BE FILLED WITH POLYURETHANE FOAM.
3. COLOR OF BUOYS AND FLOATS SHALL BE UNIFORM THROUGHOUT THE MATERIAL. COLORS SHALL BE AS INDICATED ON THE DRAWING, OR AS OUTLINED IN THE SPECIFICATIONS.
4. NUN AND CAN BUOYS SHALL BE PROVIDED WITH A RADAR-REFLECTIVE MATERIAL APPLIED TO INTERIOR SURFACES OF BODY EXTENDING ABOVE WATER LINE.
5. COUNTERWEIGHT AND KEEL SHALL BE CAST IRON, WEIGHING NOT LESS THAN 35 POUNDS NOR MORE THAN 40 POUNDS FOR EACH UNIT.
6. ALL EYE NUTS SHALL BE GALVANIZED, MARINE TYPE WITH 1 1/2" MINIMUM DIAMETER OPENING. ALL EXCEPT REMOVABLE LIFTING EYE NUTS SHALL BE LOCKED IN PLACE WITH FIXED PIN. RODS SHALL NOT EXTEND MORE THAN 1/8" THROUGH EYE NUT THREADS.
7. ALL FERROUS METAL PARTS OF BUOYS AND FLOATS SHALL BE GALVANIZED AFTER FABRICATION.
8. WHERE ROD PASSES THRU WALLS OF NUN AND CAN TYPE BUOYS, FINISHED HOLES IN BODY OF BUOY SHALL BE 13/16" MAXIMUM DIAMETER.

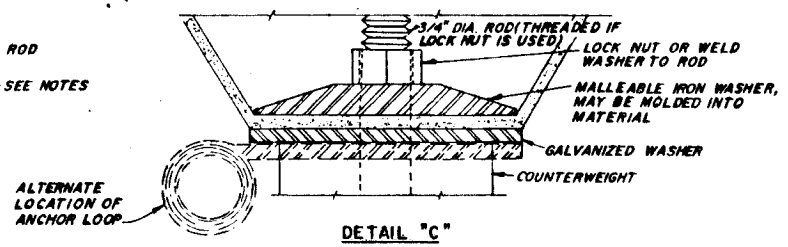


TANK TYPE BUOY

* SIZE TO BE 18"X30" OR 24"X36" AS APPLICABLE



DETAIL "A"



DETAIL "C"

RESERVOIR NAVIGATION AIDS AND MARKERS

SCALE: NONE

CORPS OF ENGINEERS, LITTLE ROCK DISTRICT, JAN., 1973

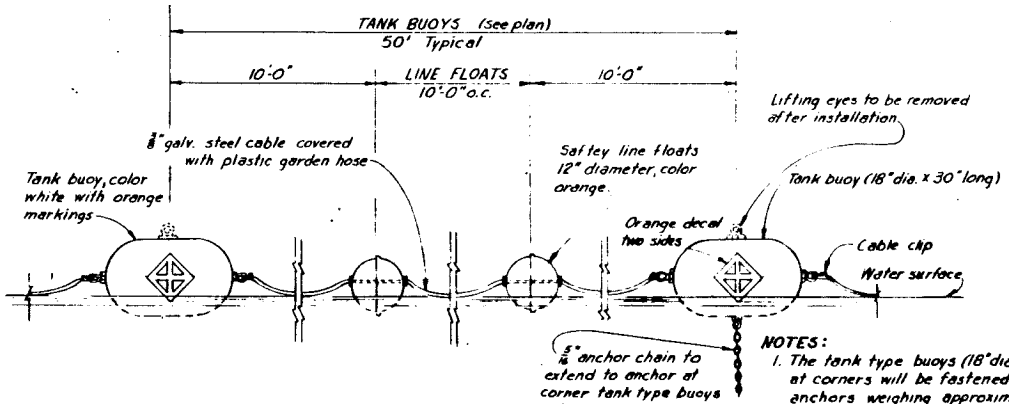
SHEET 1 OF 1

SERIAL 9228
114/338

A-3

LRDM 1130-2-21
15 Feb 89

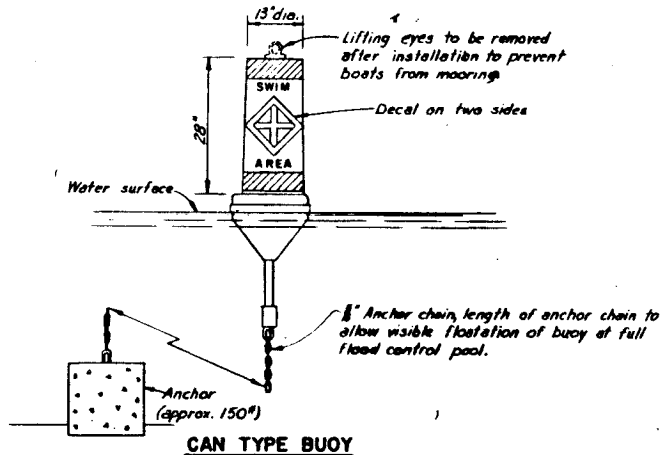
ORIGINAL



ELEVATION OF SWIMMING AREA SAFETY LINE

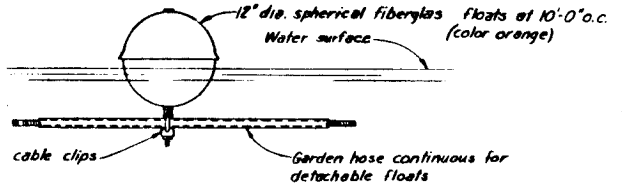
SCALE: NONE

NOTES:
1. The tank type buoys (18" diam. x 30") located at corners will be fastened to concrete anchors weighing approximately 250 pounds.
2. All anchor chains to be long enough to allow visible flotation of buoys at full flood control pool.
3. Attach the bottom of tank buoys at the sides of the swimming area with cable clips so that buoy can be removed during periods of low water.



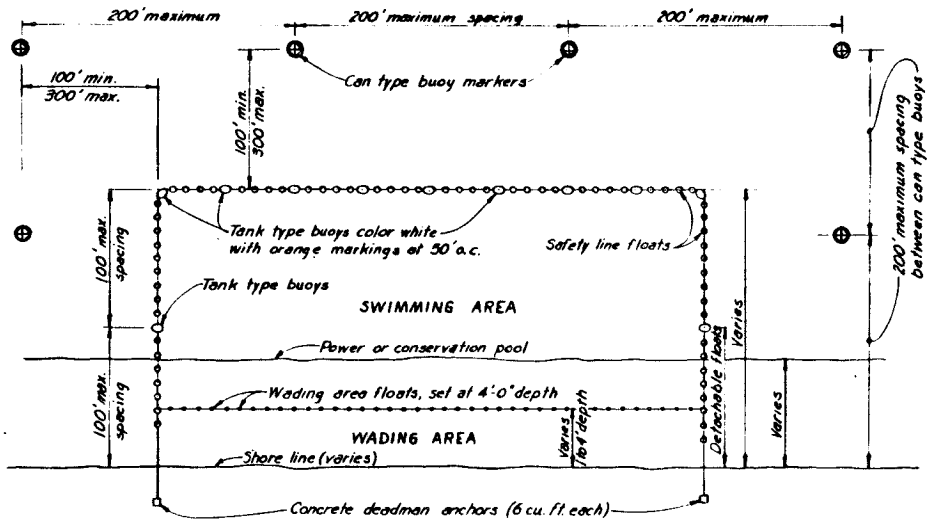
CAN TYPE BUOY

SCALE: NONE



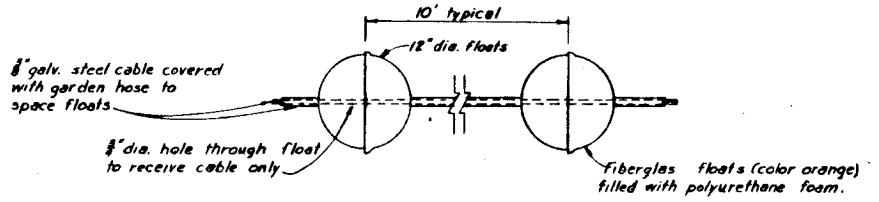
DETACHABLE FLOAT DETAIL

SCALE: NONE



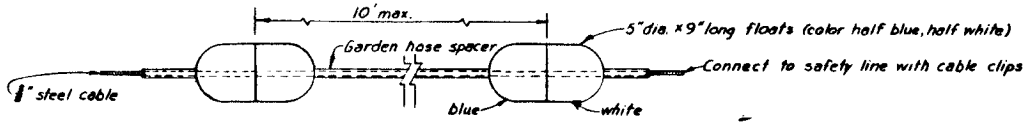
SWIMMING AREA LAYOUT

SCALE: NONE



SAFETY LINE FLOAT DETAIL

SCALE: NONE



WADING AREA FLOAT DETAIL

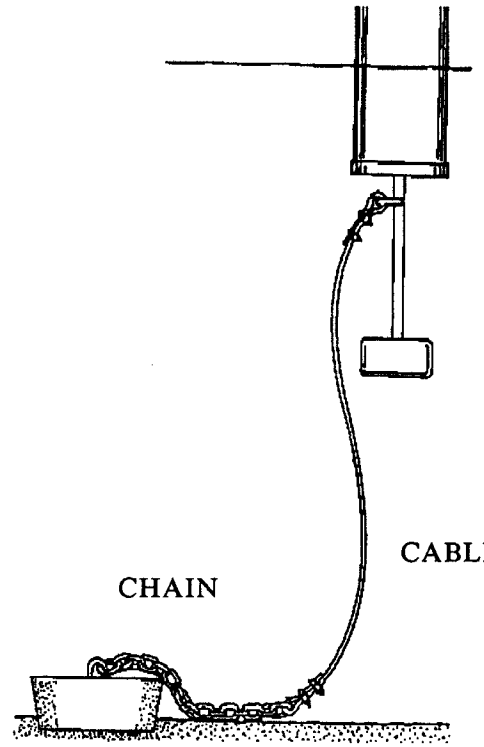
SCALE: NONE

LITTLE ROCK DISTRICT CORPS OF ENGINEERS

RESERVOIR NAVIGATION AIDS
SWIMMING AREA DETAILS
AUGUST 1968

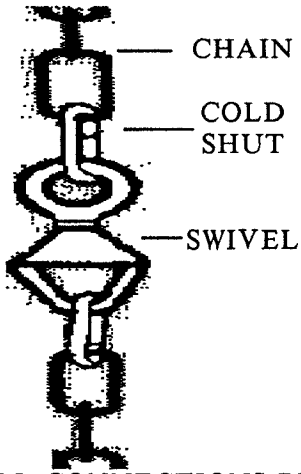
A-4

ORIGINAL



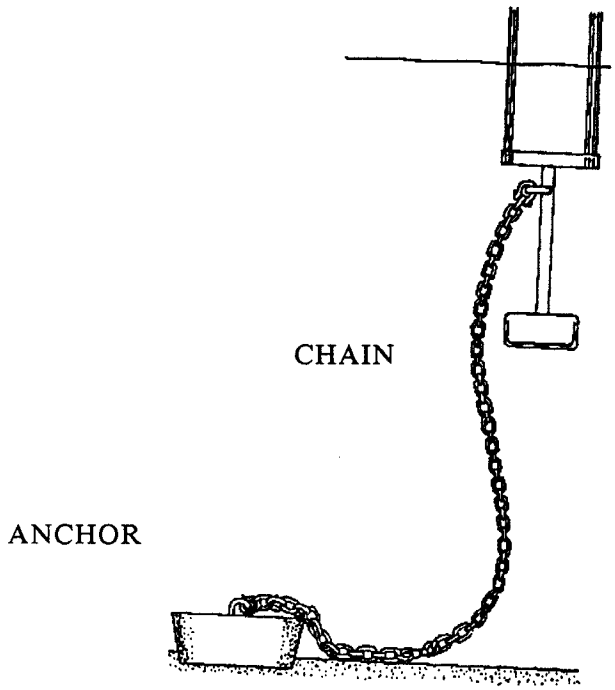
CABLE AND CHAIN TYPE INSTALLATION FOR DEEP WATER

SWIVEL CONNECTION DETAIL



ALL CONNECTIONS BETWEEN CHAIN AND CABLE, ANCHOR, AND BUOY SHOULD HAVE SWIVELS.

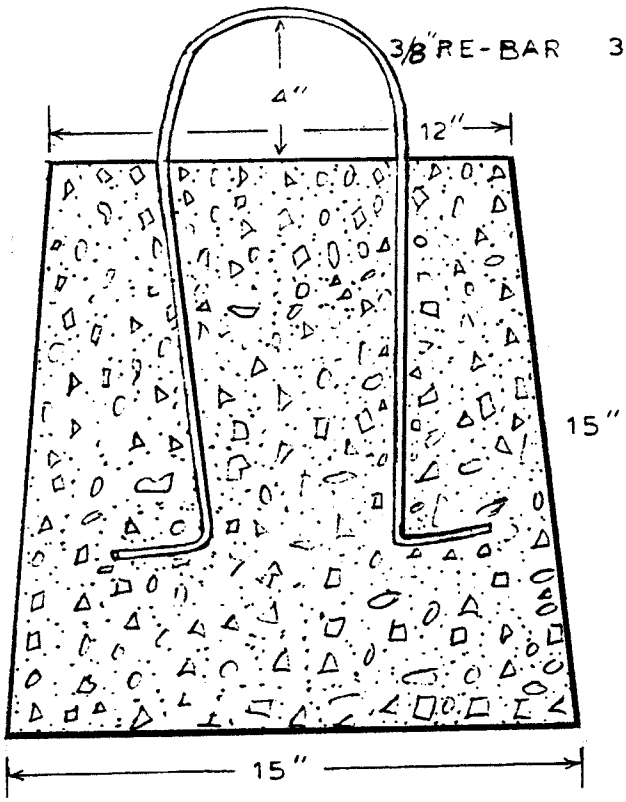
A SECONDARY ANCHOR MAY BE USED AT THE CONNECTION OF THE CABLE AND CHAIN TO HOLD THE BUOY AT NORMAL WATER LEVELS. THE CHAIN SHOULD BE LONG ENOUGH TO HOLD THE BUOY IN HIGH WATER CONDITIONS.



CHAIN TYPE INSTALLATION FOR SHALLOW WATER

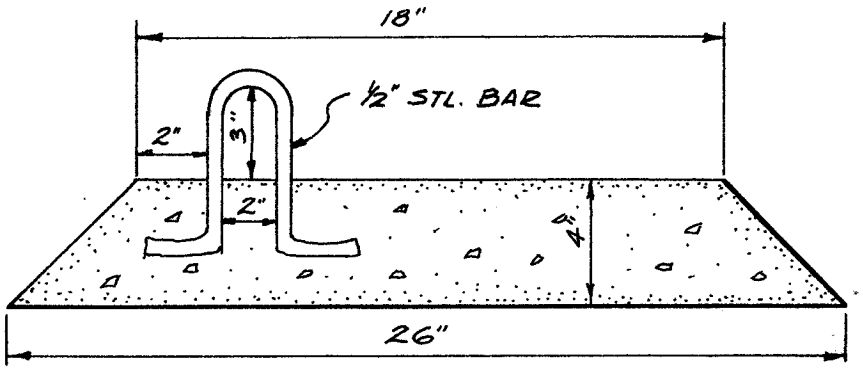
DRAWING BY:
MOUNTAIN HOME RESIDENT OFFICE

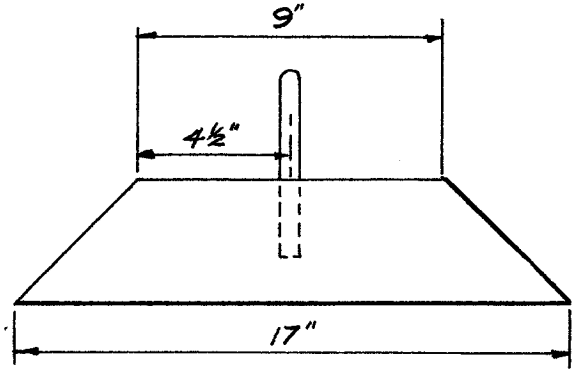
TYPICAL BUOY ANCHOR



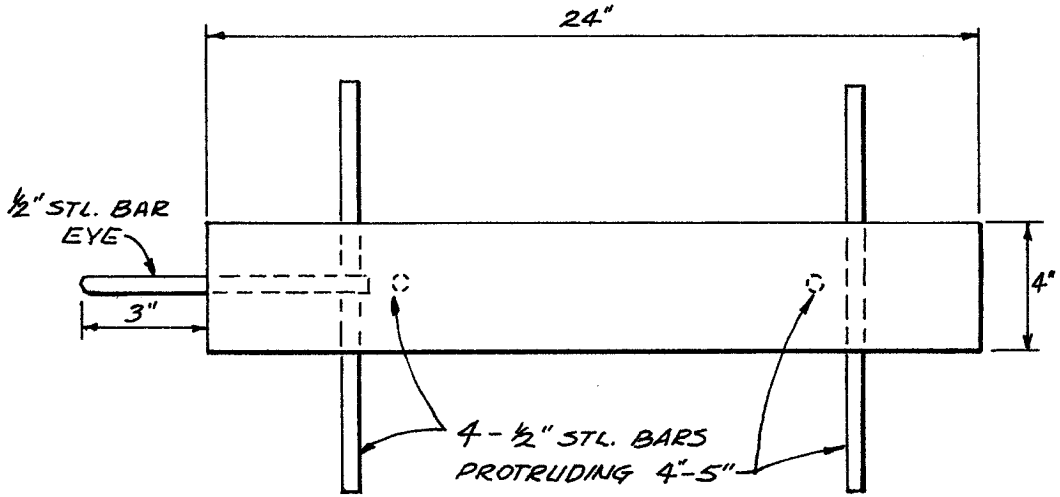
SWIM BEACH ANCHOR
CONCRETE
SCALE 1" = 0.5'

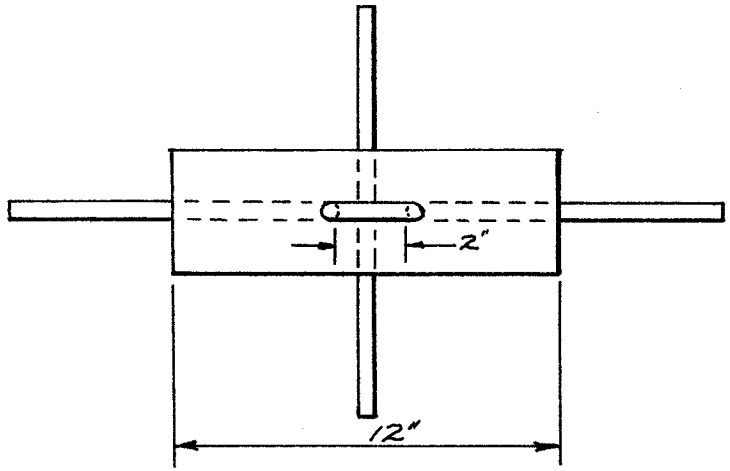
DRAWING BY:
MOUNTAIN HOME RESIDENT OFFICE





SMOOTH BUOY ANCHOR (no bars)





HORNEY BOUY ANCHOR (with bars)

SCALE: Approx. 2"=1'

DRAWING BY:
GREERS FERRY RESIDENT OFFICE

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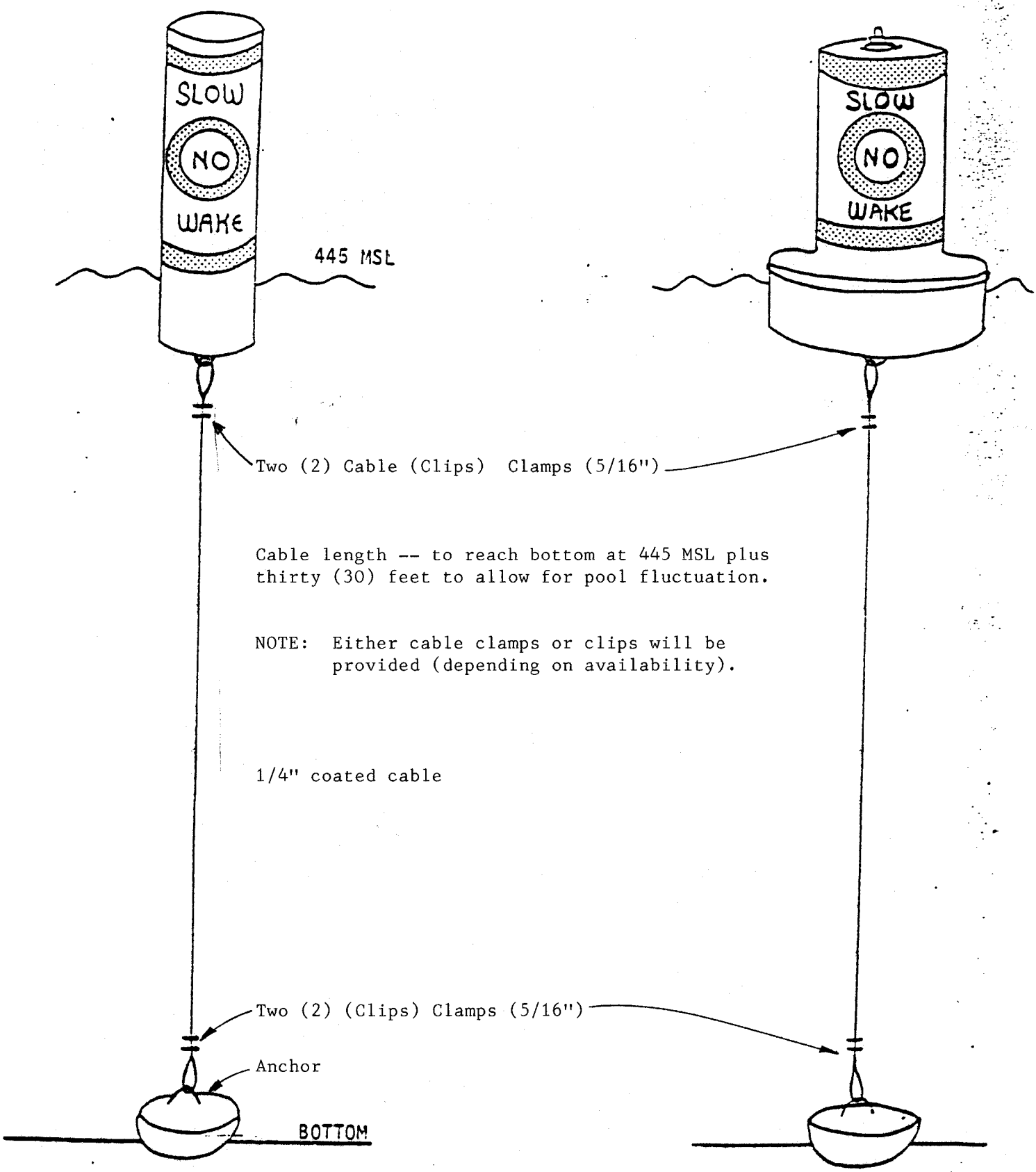
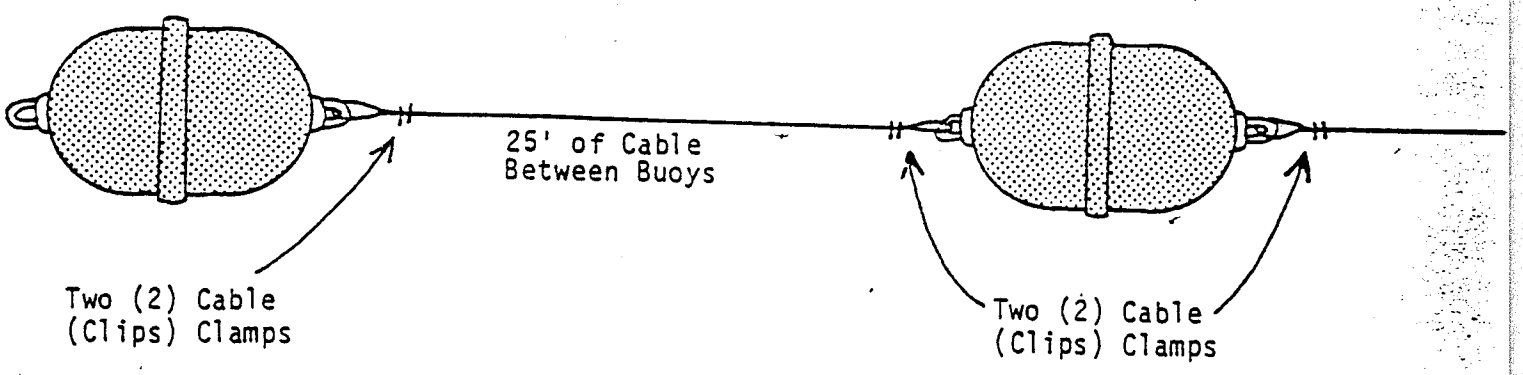
(Clearwater Lake)

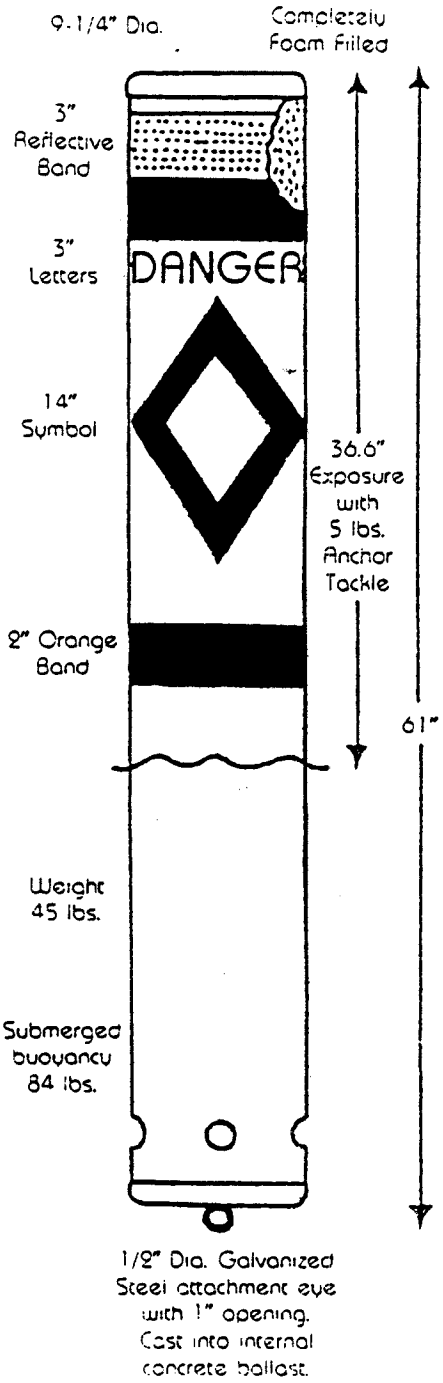


(Clearwater Lake)



Corners of beach buoy line are connected to cables which are attached to concrete anchors.

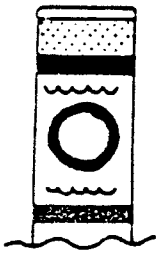
NOTE: Either cable clamps or clips will be provided (depending on availability).



(Clearwater Lake)

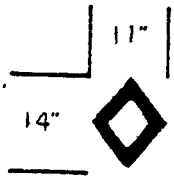
SYMBOLS. MESSAGES (Clearwater Lake)

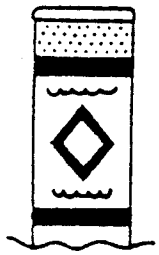
CONTROLLED AREA



SLOW 5 MPH
SLOW NO WAKE
SKI AREA
NO SKI
SLOW 10 MPH
SPEED ZONE
CONTROLLED AREA

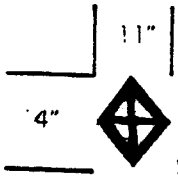
HAZARD WARNING

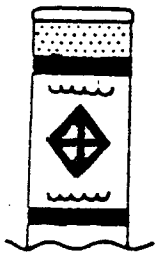




ROCK
DANGER
RAPIDS
SHOAL
STUMP
SHALLOW AREA
HAZARD AREA

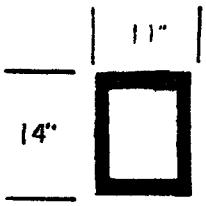
RESTRICTED AREA

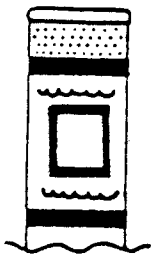




SWIM AREA
SPEED OUT
NO BOATS
BOATS KEEP OUT
WATERFOWL REFUGE AREA
NO BOATING

INFORMATION

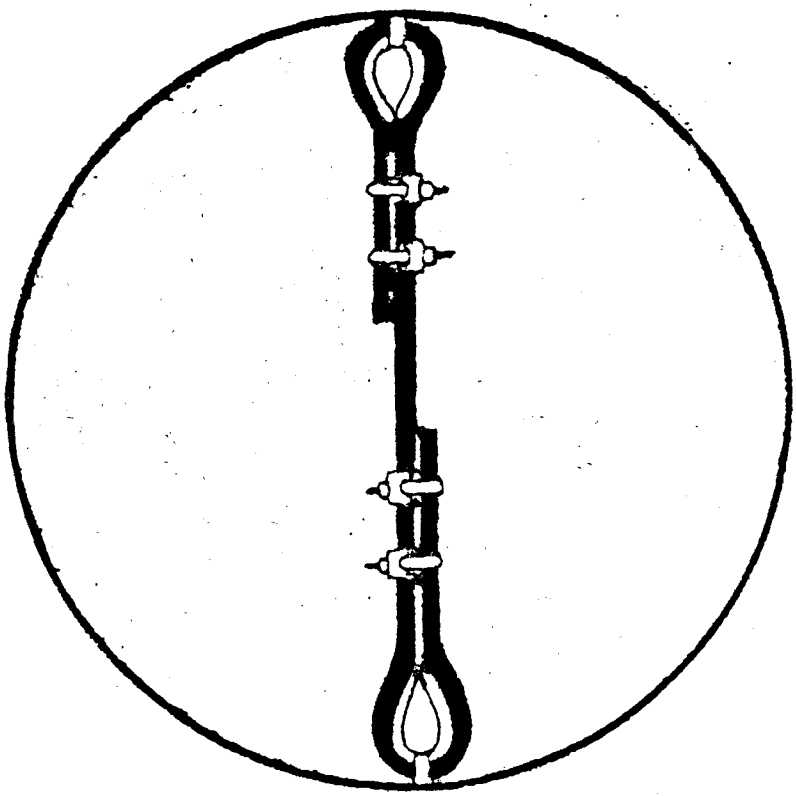




REST AREA
STATE AREA
MARINA ENTRANCE
FISH COVER

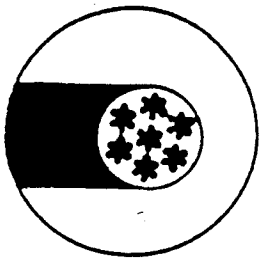
Information buoys usually require special markings

(Clearwater Lake)



CORRECT CABLE CLAMP ASSEMBLY — Note from the above sketch that the cradle is tightened against main cable. This is the correct assembly method to insure against the clamps slipping while in service. Be sure to tighten nuts down, alternating from side to side frequently. Thimbles should be assembled so that they are firmly trapped within the cable loop.

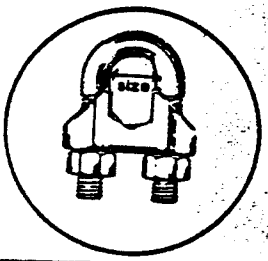
(Clearwater Lake)



Heavy Duty Plastic Coated Steel Cable

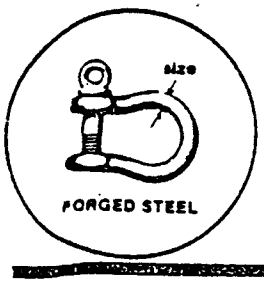
SIZE	COVER	PROOF TEST IN LBS.	WEIGHT PER FOOT IN LBS.
5/16" O.D.	Polypropylene	5100	12

Wire Rope Clamps



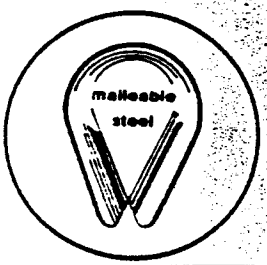
FOR CABLE SIZE	FINISH	WEIGHT EACH IN LBS.	MATERIAL
5/16"	GALV	4	STEEL

Screw Pin Chain Shackles



SIZE	FINISH	WEIGHT EACH IN LBS.	MATERIAL
3/8	GALV	3	FORGED STEEL

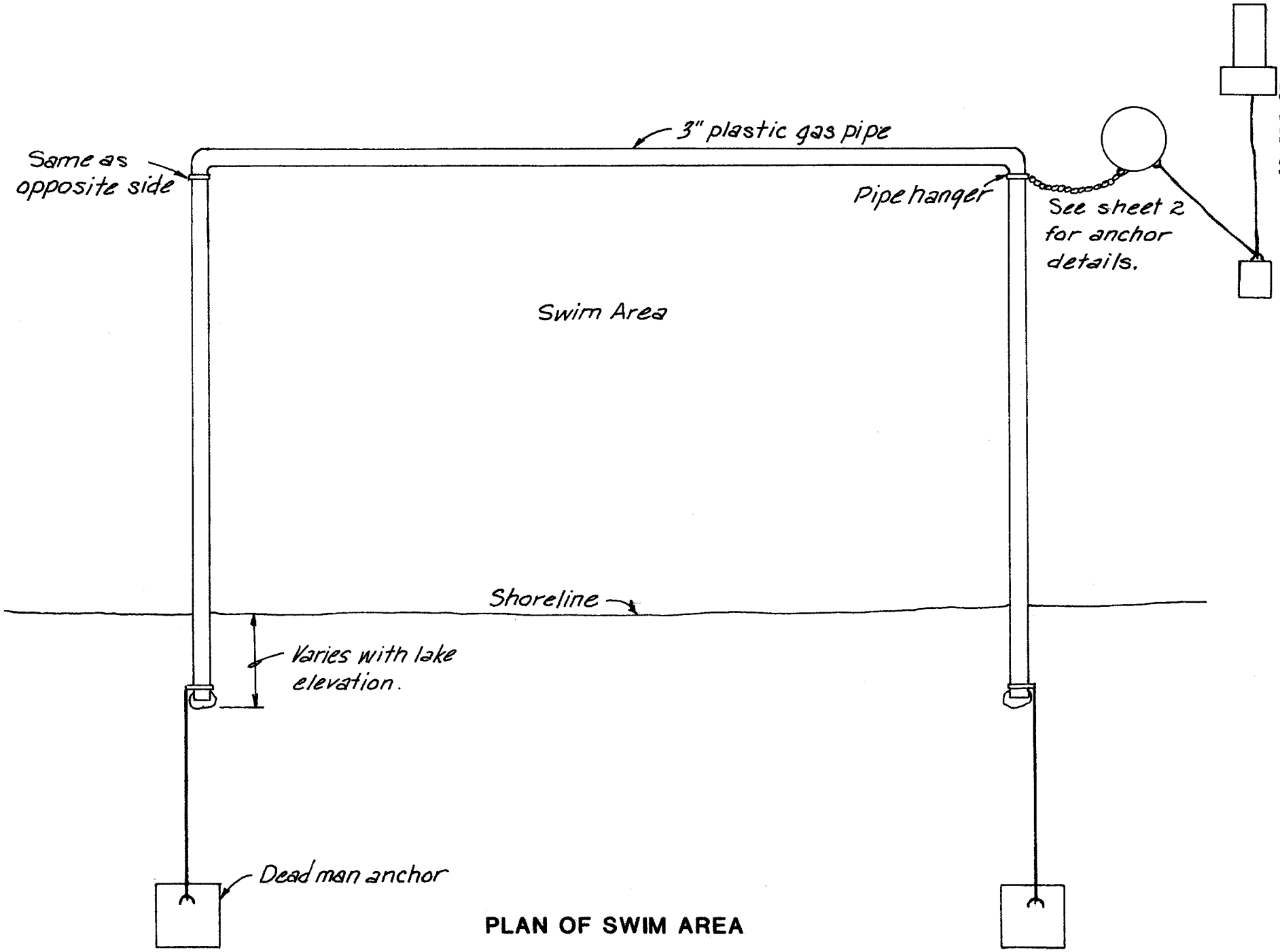
Heavy Duty Wire Rope Thimbles



FOR ROPE SIZE	FINISH	WEIGHT EACH IN LBS.	MATERIAL
5/16"	GALV	05	STEEL

Concrete Anchors

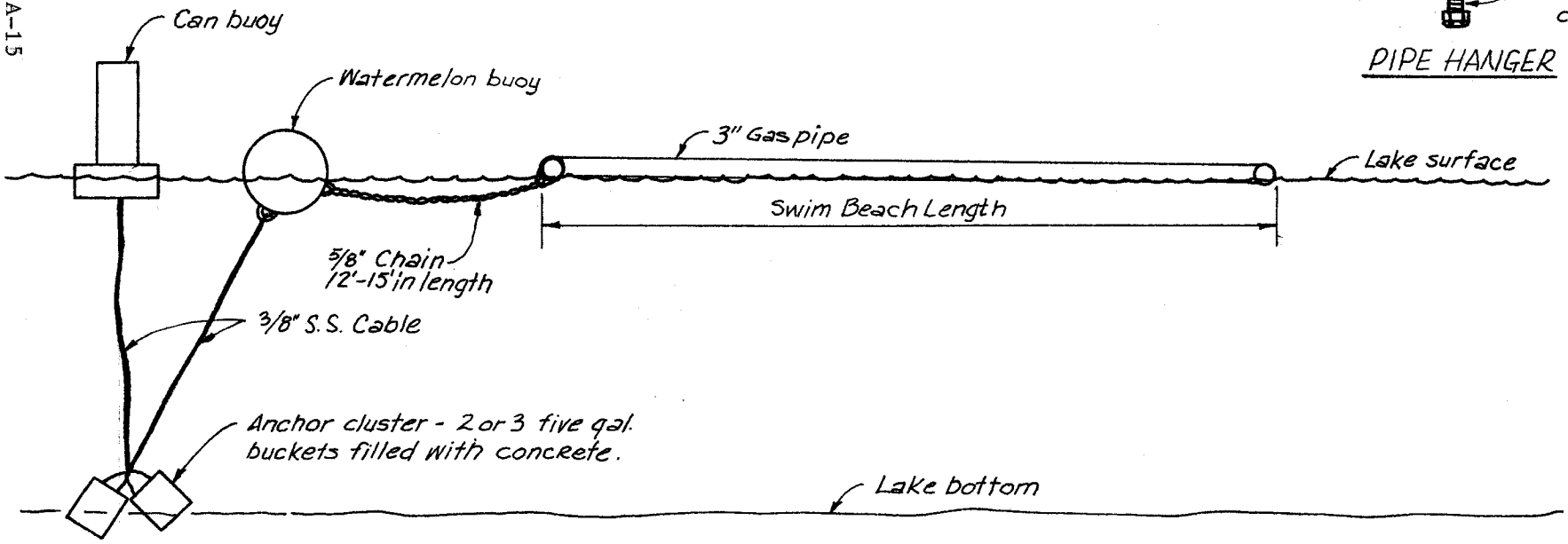
WEIGHT	ATTACHMENT STYLE	MATERIAL
350/1lbs.	rebar wire	CONCRETE

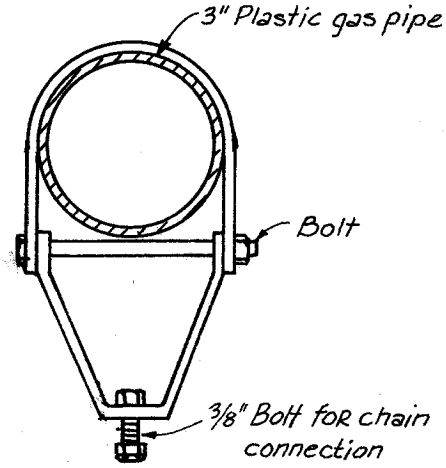


PLAN OF SWIM AREA

BEAVER RESIDENT OFFICE

CORNER ANCHORING OF PIPE





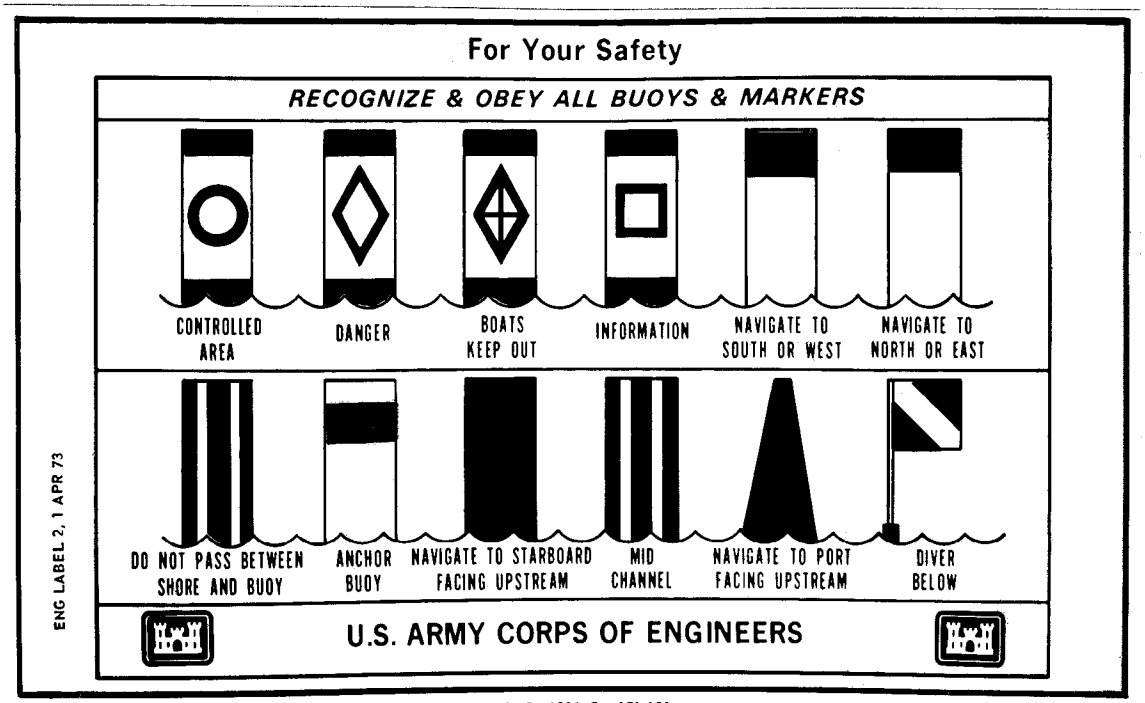
PIPE HANGER

BEAVER RESIDENT OFFICE

SHEET 2 OF 2

A-15

LRDOM 1130-2-21
15 Feb 89



☆ GPO: 1986 O—151-120

SYMBOLS & LEGENDS

USCG Standard Inland Waterway Markings

MEANS:
CONTROLLED AREA

SPEED ZONE
NO WAKE - IDLE SPEED
SLOW - NO WAKE
NO SKI
SKI AREA
NO SWIMMING

MEANS:
WARNING

ROCK
HAZARD
SHOAL
WRECK
DAM
SNAG
SHALLOW
LOW BRIDGE

MEANS:
BOAT EXCLUSION

INTAKE
DAM
RAPIDS
SWIM AREA
BOATS KEEP OUT
CLOSED AREA
NO BOATS

MEANS:
INFORMATION

STATE PARK
PUBLIC RESTROOM
PECAN BAYOU
BYRD STORE ONE MILE
FISH AREA
FISH REEF
TELEPHONE
BROWN MARINA

Symbol is approximately 14″ high & proportionate to buoy size.
(Wording shown are examples)