

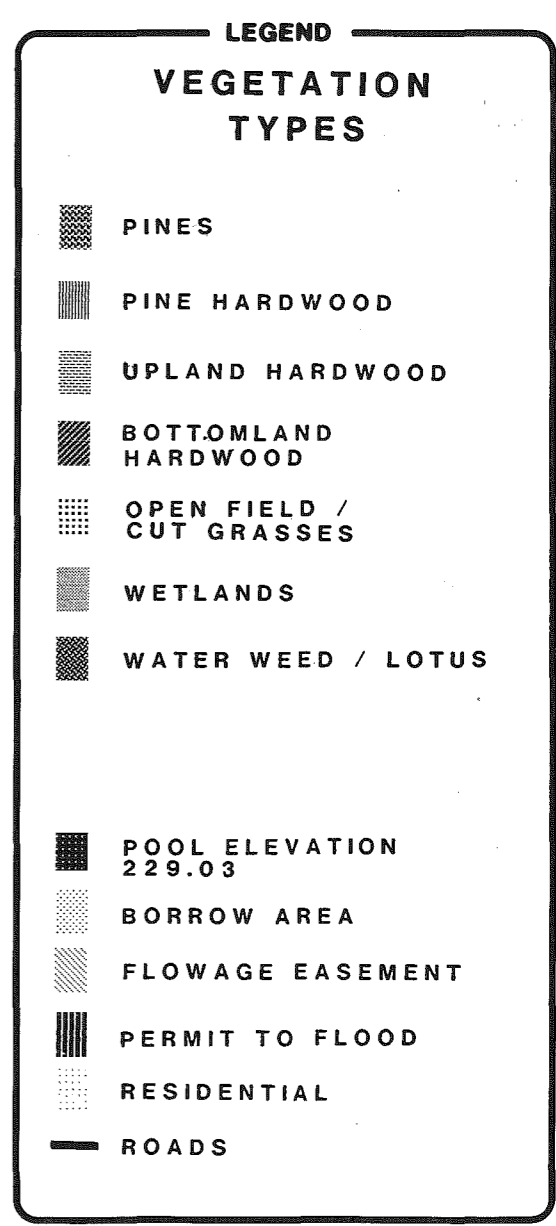
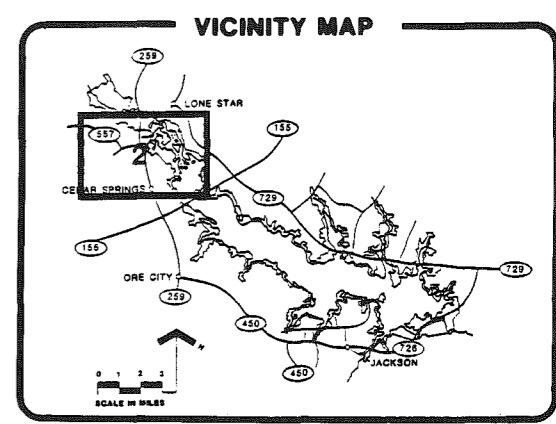
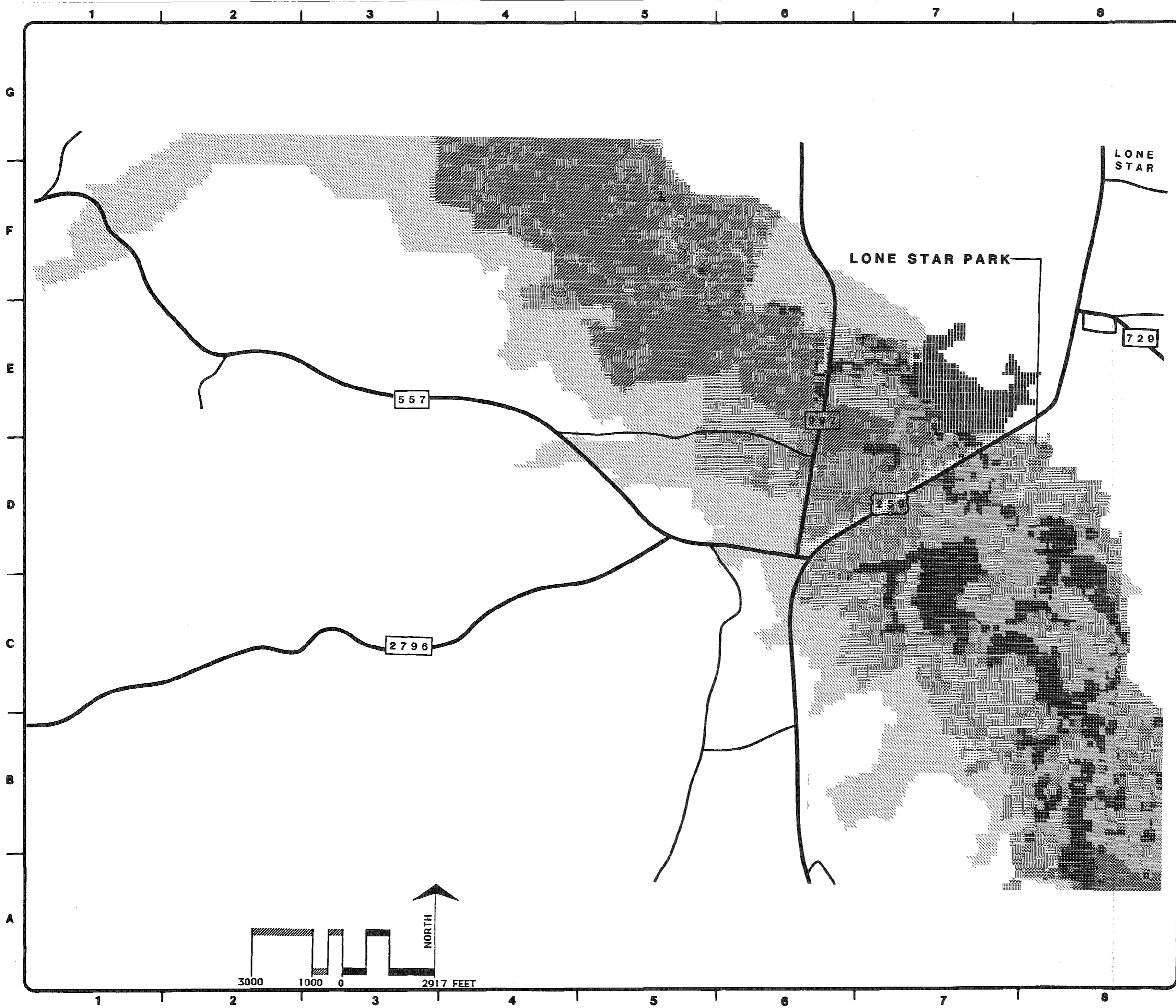
U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: _____
DRAWN BY: _____
REVIEWED BY: _____

LAKE O' THE PINES
CYPRESS RIVER, TEXAS

VEGETATION MAP

INVITATION NO. _____ DATE: _____
CONTRACT NO. _____ SHEET NO. 1 of 7 SEQUENCE 3RD 2
DRAWING NUMBER _____



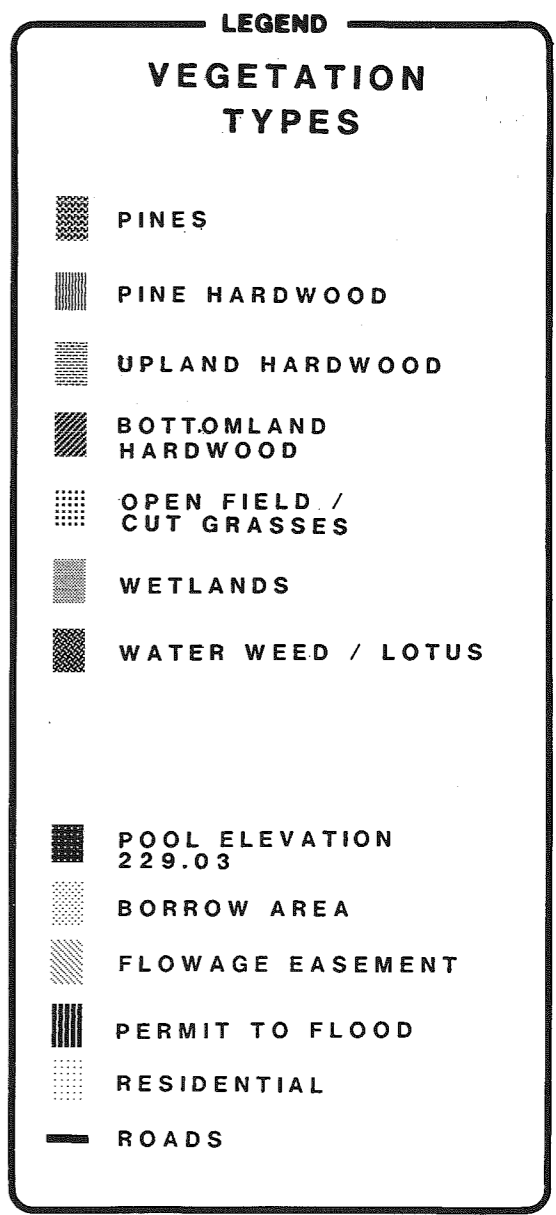
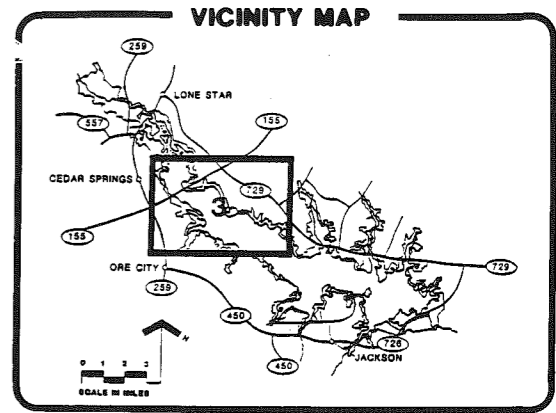
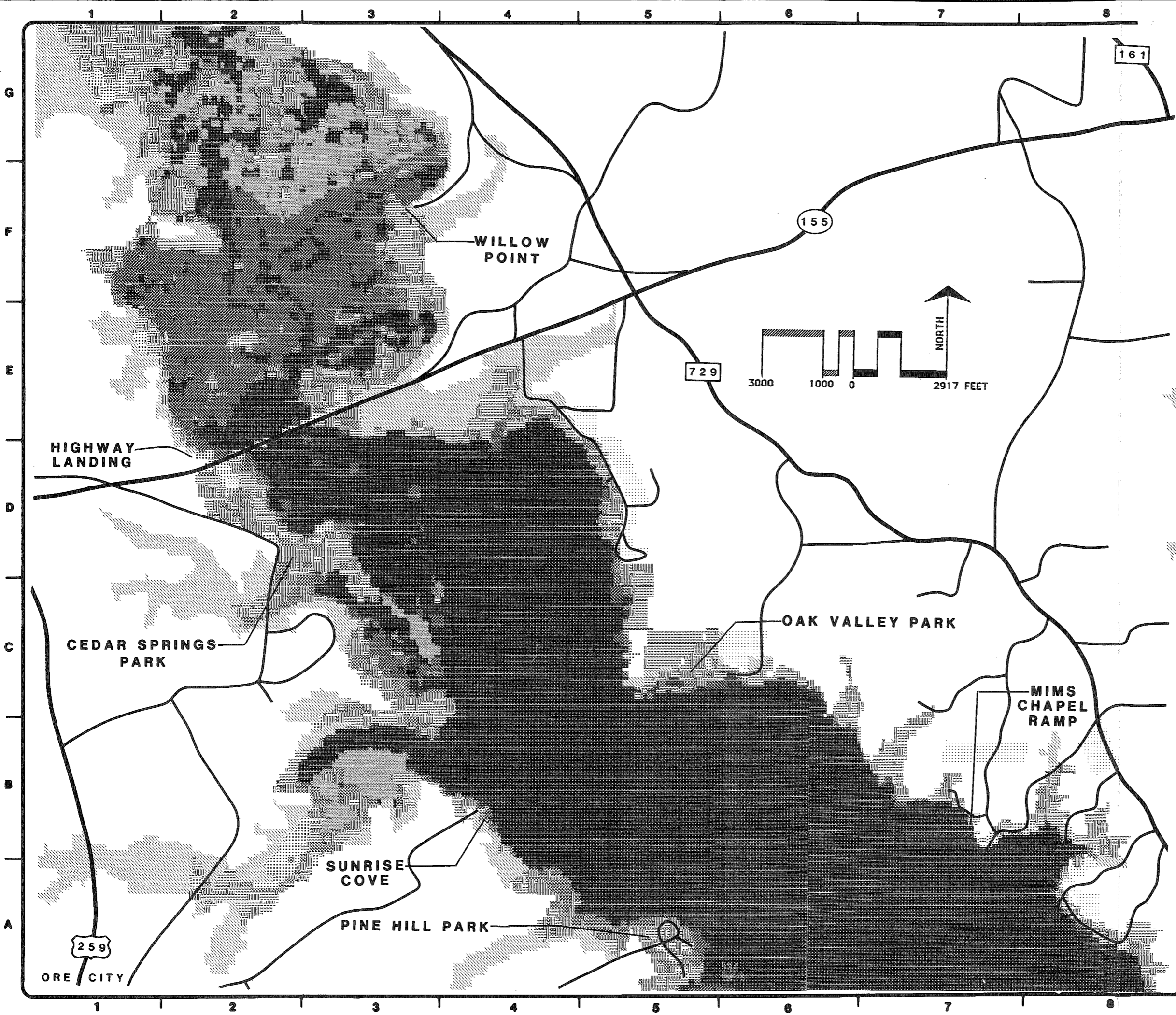
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FORT WORTH, TEXAS

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LAKE O' THE PINES
CYPRESS RIVER, TEXAS

VEGETATION MAP

INVITATION NO.	DATE:
CONTRACT NO.	SHEET NO. SEQUENCE
DRAWING NUMBER	2 of 7 3-2



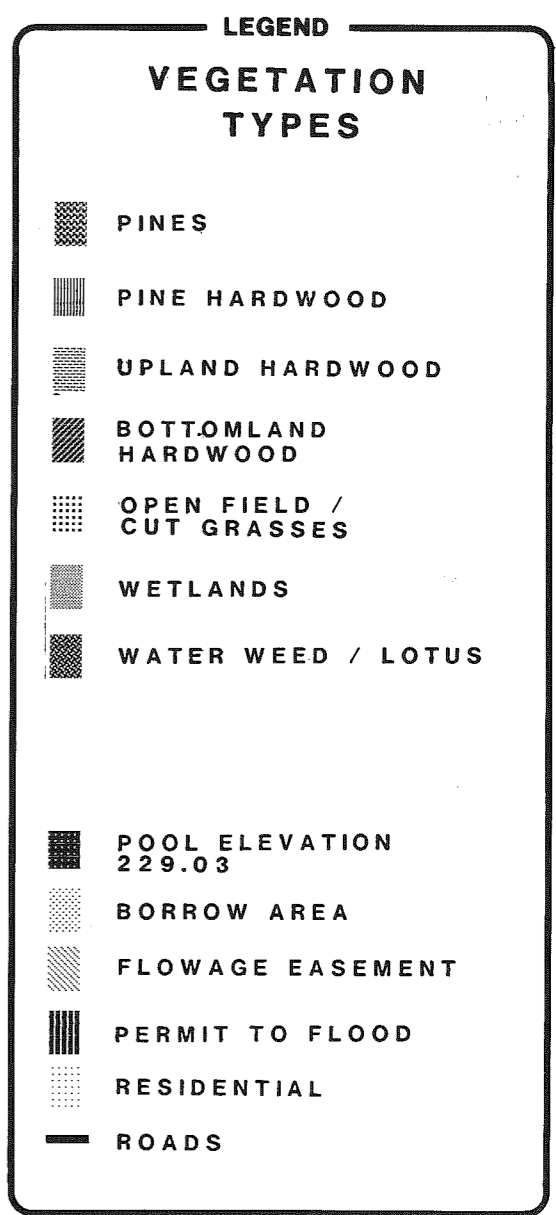
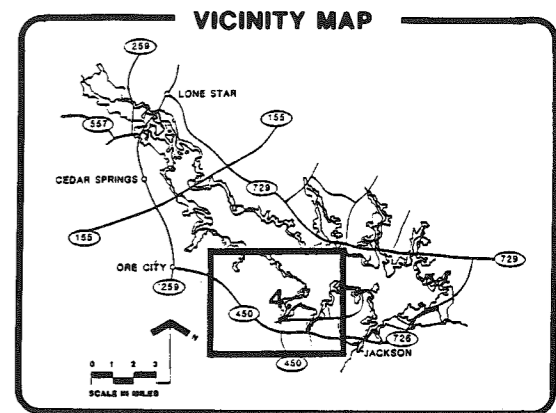
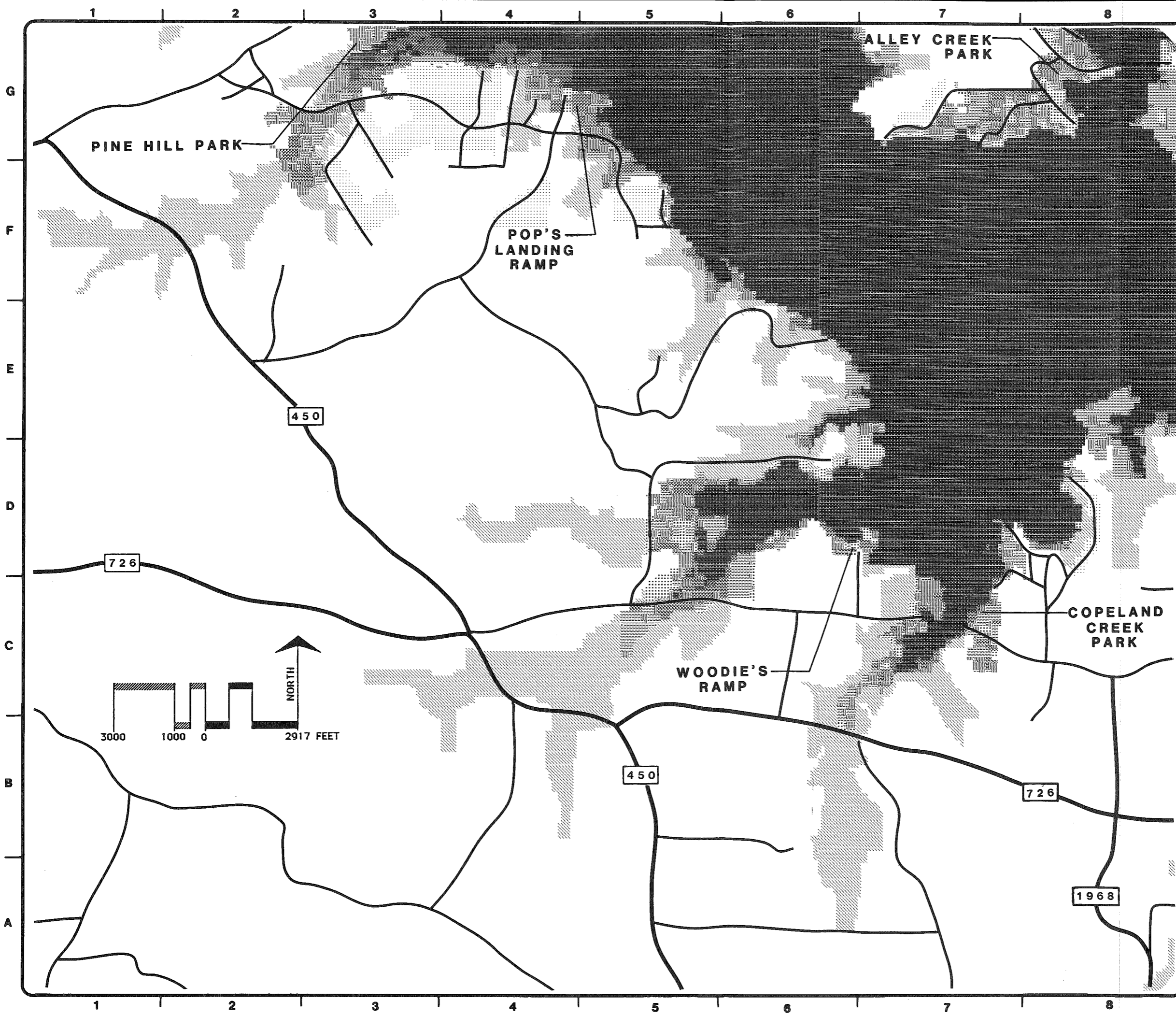
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CORPS OF ENGINEERS
FORT WORTH, TEXAS

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REVIEWED BY: _____

LAKE O' THE PINES
CYPRESS RIVER, TEXAS

VEGETATION MAP

INVITATION NO. _____ DATE: _____
CONTRACT NO. _____ SHEET NO. 3 of 7
DRAWING NUMBER _____



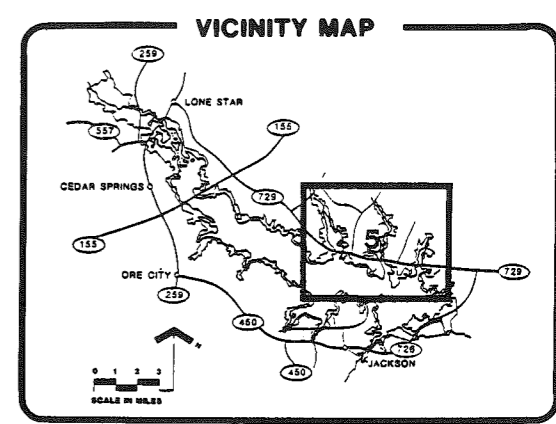
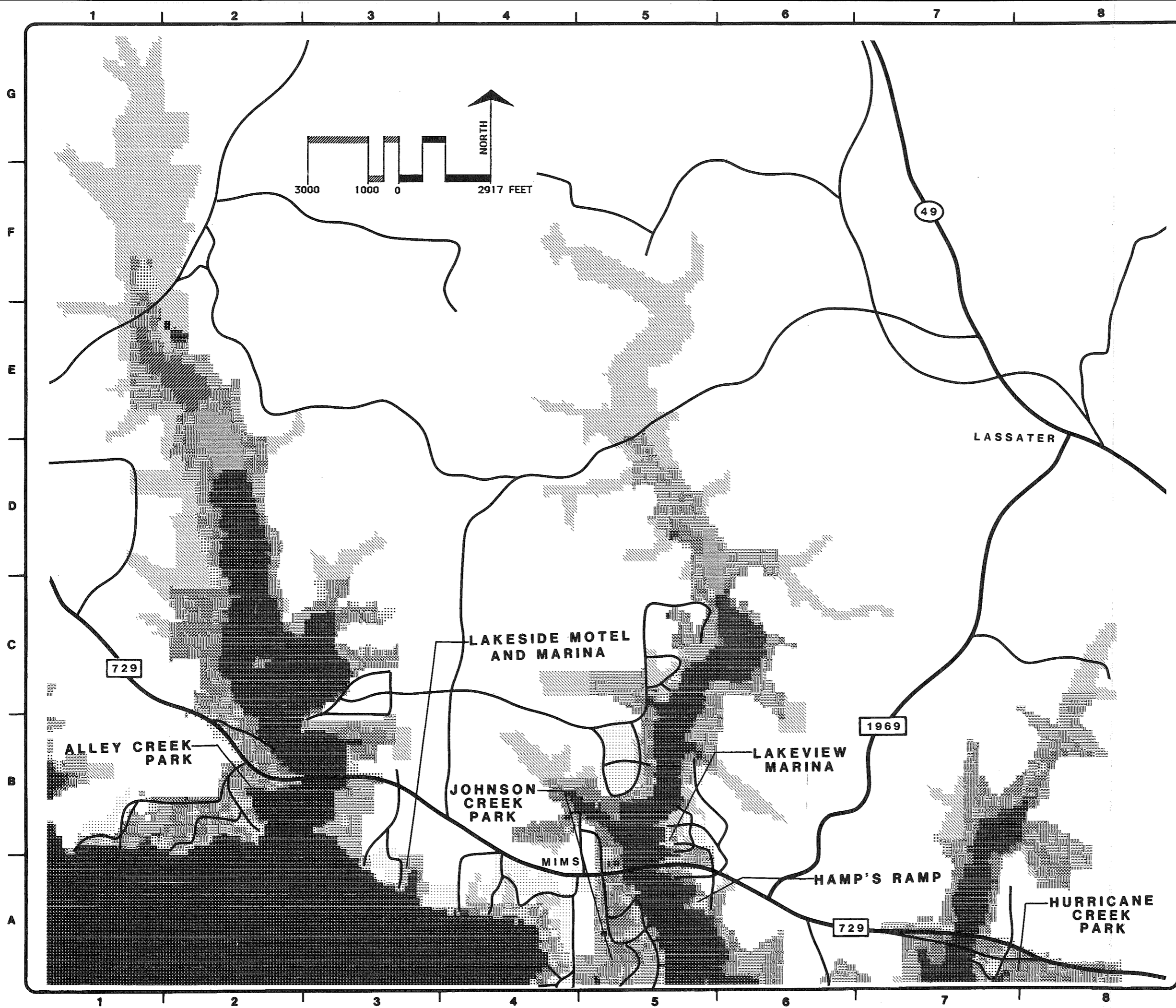
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FORT WORTH, TEXAS

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REVIEWED BY: _____

LAKE O' THE PINES
CYPRESS RIVER, TEXAS

VEGETATION MAP

INVIATION NO. _____ DATE: _____
CONTRACT NO. _____ SHEET NO. SEQUENCE
DRAWING NUMBER 4 OF 7 3^{NO}-2



LEGEND

VEGETATION TYPES

- PINES
- PINE HARDWOOD
- UPLAND HARDWOOD
- BOTTOMLAND HARDWOOD
- OPEN FIELD / CUT GRASSES
- WETLANDS
- WATER WEED / LOTUS
- POOL ELEVATION 229.03
- BORROW AREA
- FLOWAGE EASEMENT
- PERMIT TO FLOOD
- RESIDENTIAL
- ROADS

U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: _____

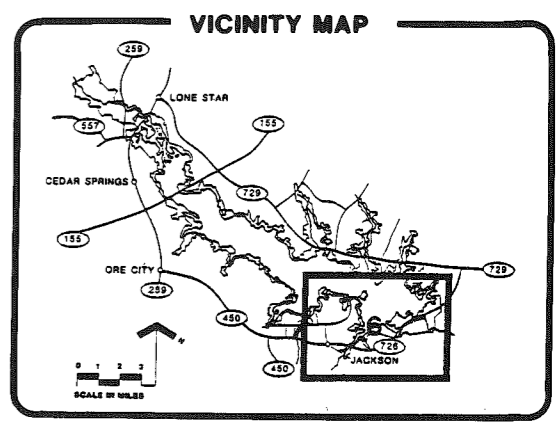
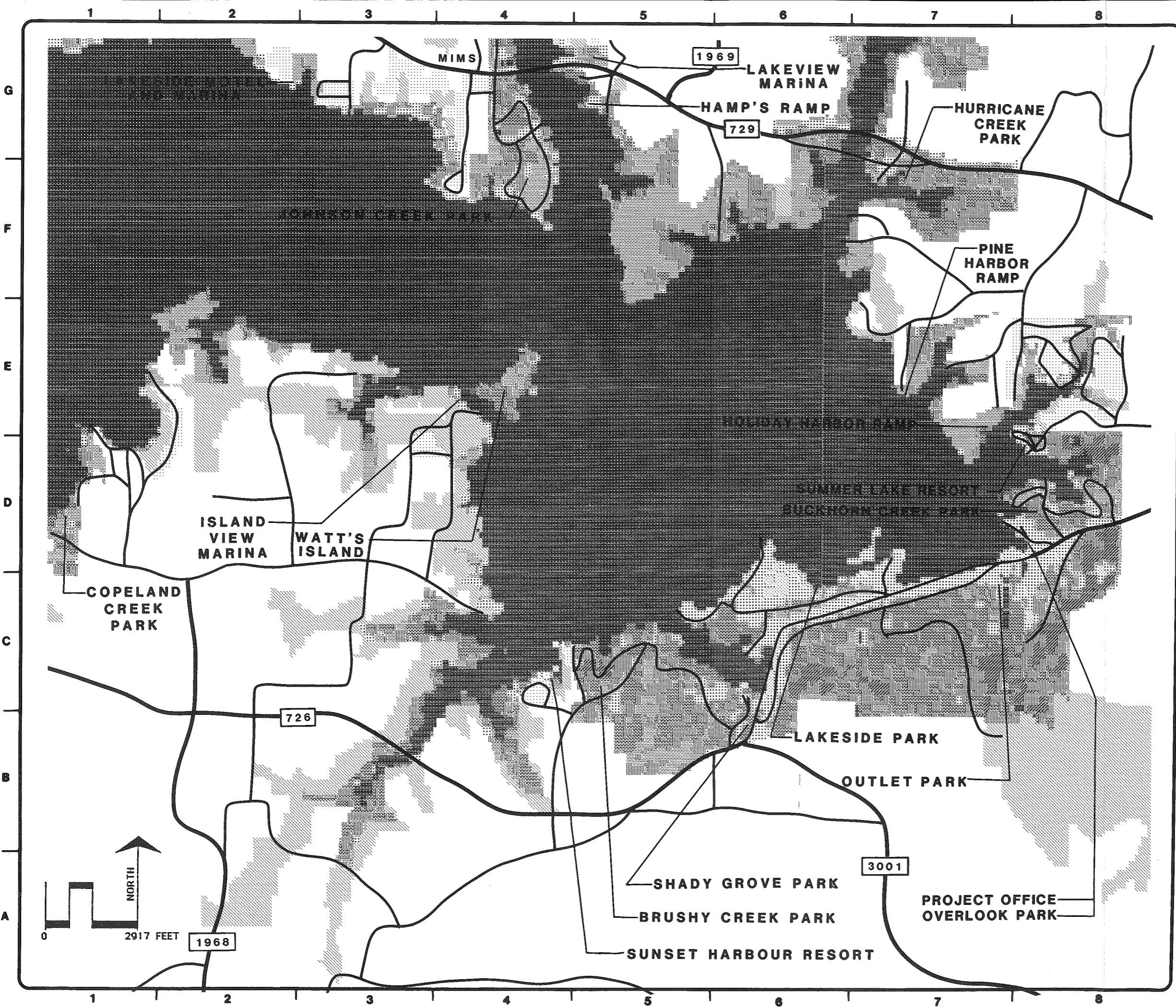
DRAWN BY: _____

REVIEWED BY: _____

LAKE O' THE PINES
CYPRESS RIVER, TEXAS

VEGETATION MAP

INVITATION NO.	DATE:
CONTRACT NO.	SHEET NO. SEQUENCE
DRAWING NUMBER	5 of 7 3-2



LEGEND

VEGETATION TYPES

- PINES
- PINE HARDWOOD
- UPLAND HARDWOOD
- BOTTOMLAND HARDWOOD
- OPEN FIELD / CUT GRASSES
- WETLANDS
- WATER WEED / LOTUS

- POOL ELEVATION 229.03
- BORROW AREA
- FLOWAGE EASEMENT
- PERMIT TO FLOOD
- RESIDENTIAL
- ROADS

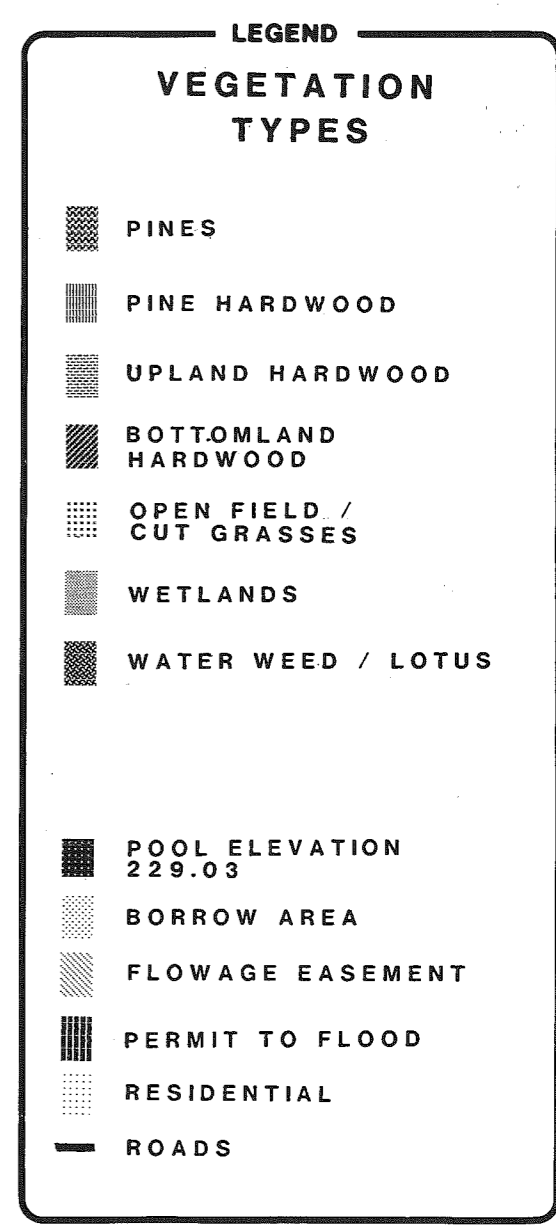
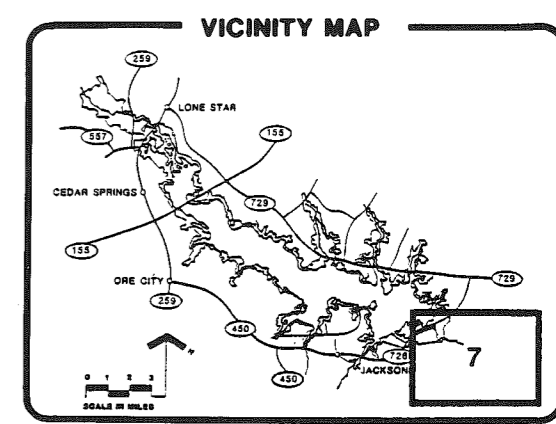
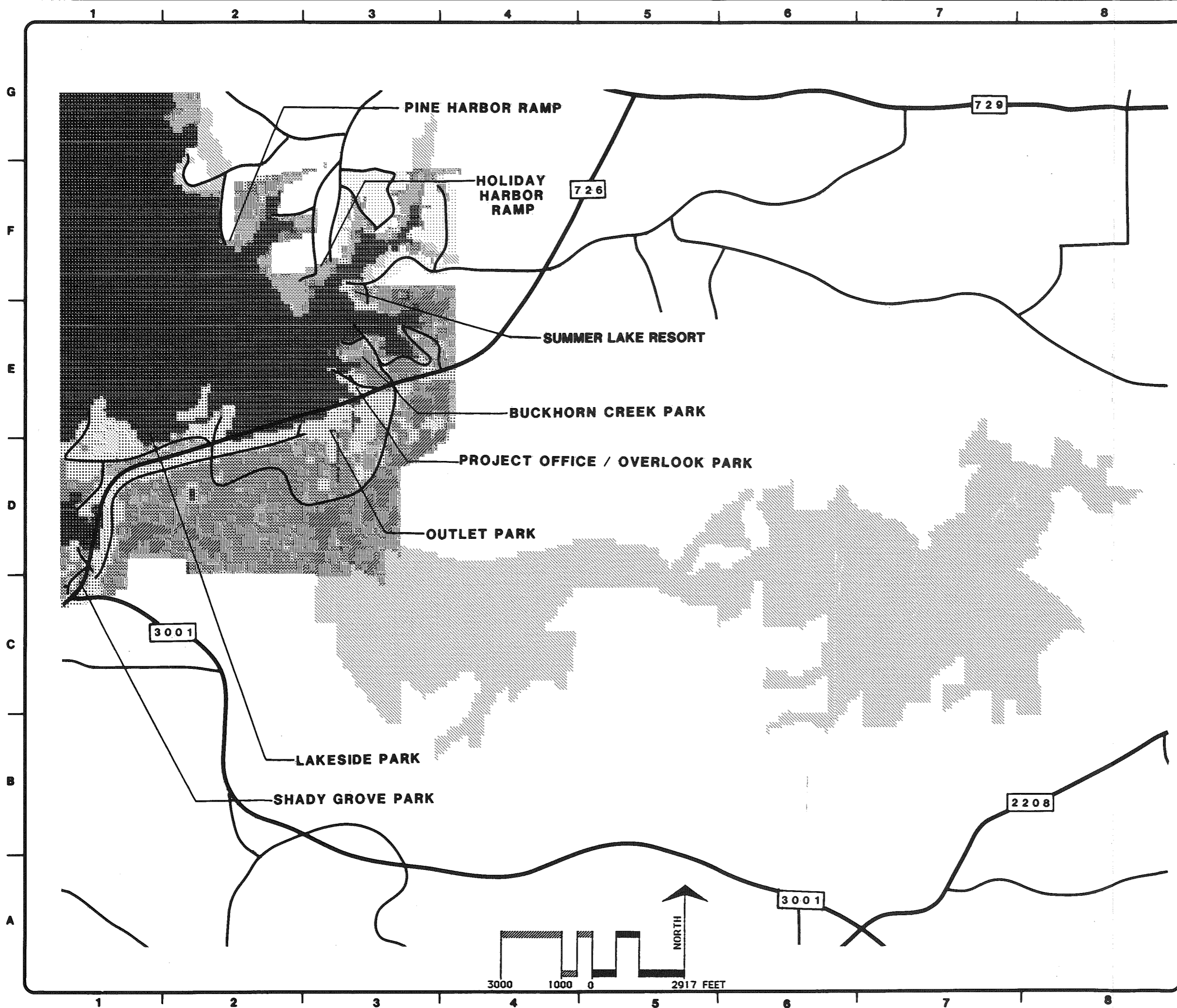
U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: _____
DRAWN BY: _____
REVIEWED BY: _____

LAKE O' THE PINES
CYPRESS RIVER, TEXAS

VEGETATION MAP

INVITATION NO.	DATE:
CONTRACT NO.	SHEET NO. SEQUENCE NO.
DRAWING NUMBER	6 of 7 3-2



U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: _____
DRAWN BY: _____
REVIEWED BY: _____

LAKE O' THE PINES
CYPRESS RIVER, TEXAS

VEGETATION MAP

INVITATION NO. _____ DATE: _____
CONTRACT NO. _____ SHEET NO. 7 of 7 SEQUENCE NO. 3-2
DRAWING NUMBER _____

d. **Bottomland Hardwood (1298 acres)**. The bottomland hardwood type is found in wet soils of the alluvial flood plain and terrace flats. The more common tree species include overcup, willow and water oaks, American and cedar elm, black willow, sweetgum, water locust, ash, cottonwood, pecan, sycamore, bois d'arc, flowering dogwood, sugarberry, bald cypress, and loblolly pine. Associated understory and ground cover plants include dewberry, coralberry, dallis grass, switchgrass, bermudagrass, switch cane, rattan vine, poison ivy, and swamp privet.

e. **Open Field/Cut Grasses (1021 acres)**. Most of these areas represent open fields which are mowed regularly. Examples of this are the embankment and turf areas in parks.

f. **Wetlands (783 acres)**. The term wetlands is not absolutely defined and is described by complex physical, biological, and legal classifications. For the purposes of this study wetlands are at least periodically saturated with or covered by water, and support plants and animals particularly adapted to life in water or in saturated soil. Wetlands can generally be thought of as lands transitional between aquatic and terrestrial systems and are frequently covered by water or have the water table usually at or near the land surface. At Lake O' the Pines, wetlands may or may not have trees, and those trees present are species tolerant of sustained inundation such as bald cypress. Even where trees are present the wetland type has an open canopy and vegetation of water tolerant sedges, grasses and shrubs.

g. **Lotus/Aquatic Weeds (930 acres)**. Most of the plants in this group are located in waters up to ten feet in depth. Lotus is the dominant aquatic plant in this group. Other plants which may be found growing in this vegetation type area include Hydrilla and Elodea populations.

h. **Borrow Area (33 acres)**. Soils were removed from these areas for construction of the embankment. Attempts have been made to reforest these areas with pine. Most of the borrow areas have sparse stands of pine and will require a sustained effort to achieve adequate re-vegetation.

3-08 WILDLIFE RESOURCES

Most of the birds and mammals found at Lake O' the Pines are found in similar habitats in the surrounding Pineywoods region. Most of the reptiles, amphibians, and many of the birds are year-round residents of the area. Additional species of birds will occur in the area as migrants or winter residents. Many of the birds and mammals will use two or more of the vegetation communities in the project area, and much of their activity will be along the edges between two adjacent habitats. Many of the species, including waterfowl, upland gamebirds, and beaver, using the riparian habitat also will use the bottomland hardwoods.

a. Federally Listed Endangered or Threatened Species. Resident species listed as endangered by the US Fish and Wildlife Service (USFWS) (Federal Register May 20, 1980) and known to occur within the Cypress Bayou Basin include the American alligator (*Alligator mississippiensis*), and red cockaded woodpecker (*Picoides borealis*). Bald eagles (*Haliaeetus leucocephalus*) are sighted with some regularity wintering near major impoundments in the basin. Peregrine falcons (*Falco peregrinus*) are infrequently sighted during migration within the basin. Interior populations of least tern (*Sterna antillarum*) may migrate though the project area.

According to USFWS two Federally threatened birds may occur at Lake O' the Pines. The Arctic peregrine falcon (*Falco peregrinus tundrius*) and piping plover (*Charadrius melodus*) may migrate through the project area.

b. State Listed Protected Non-game and Endangered Species. Several State listed species may occur in the project area. These are Rafinesque's big-eared bat (*Plesotus rafinesquii*), southeastern bat (*Myotis austroriparius mumfordii*), osprey (*Pandonion haliaeetus carolinensis*), wood stork (*Mycteri americana*), swallow-tailed kite (*Elanoides forficatus*), and river darter (*Hadropterus shumardii*). The northern bald eagle migrates into and overwinters at the Lake O' the Pines area. Since these roost and hunt near good lake fishing spots critical habitat cannot be identified.

c. Texas Natural Heritage Program. Bob Murphy of TPWD Texas Natural Heritage Program determined no unique rare plants, animals or rare communities have been identified on Lake O' the Pines fee lands.

d. Common Wildlife at Lake O' the Pines. Common game species at the project include; white tailed deer, fox and gray squirrel, mourning dove, northern bobwhite, wood duck, mallard, ring-necked duck, lesser scaup, green-winged teal, opossum, gray fox, bobcat, and coyote. All types of wildlife contribute to some form of

outdoor recreation, be it hunting or non-hunting. Non-consumptive use, such as bird watching or nature study, is generally associated with nongame wildlife. However, game species offer non-consumptive uses as well. Lake O' the Pines provides opportunities to experience nature and hundreds of bird, mammal, fish, reptile, and amphibian species. The Big Cypress Wildlife Unit, A Characterization of Habitat and Wildlife by Joseph J. Campo, TPWD, 1986 was used as a reference in describing common species and associated habitat for paragraphs 1-7.

1. **White-Tailed Deer.** The white-tailed deer is the most numerous big game animal in Texas and the Big Cypress Wildlife Unit. The deer that inhabit the Unit are largely an intergradation of Texas white-tails and Kansas white-tails.

2. **Squirrel.** The squirrel is the most numerous and most important small game animal in the Unit. The range of the gray squirrel is almost entirely in the eastern portion of the state, however the fox squirrel inhabits almost all the timbered areas in Texas. The gray squirrel, sometimes called cat squirrel, is abundant wherever suitable habitat is found. However, most are found in the mixed hardwood bottomland forests. The highest populations of fox squirrels are associated with the hardwood-pine forest type and post-blackjack oak forest type. Availability of food is the most important factor influencing squirrel populations. While populations fluctuate periodically, they normally range from one squirrel per two acres to two squirrels per acre. The quality of the habitat, amount and availability of food will determine whether the squirrel population is near the lower or upper end of the density range.

3. **Mourning Dove.** Doves nest throughout the area, however, the greatest proportion of doves are migratory from their breeding areas in the northern United States. The early successional stage of the young pine/mixed hardwood forest provide the best dove habitat at the project.

4. **Northern Bobwhite.** The bobwhite quail was more abundant in the area when small open fields with brushy fence rows and cultivated fields interspersed with woodland pastureland provided early successional stages of plants. Pine plantations, old field conversion to natural forest, and expansive pastureland have replaced most of the farmland in the area. These habitat types do not provide the weed seeds and cover necessary to support quail in large numbers. Where suitable habitat exists or the habitat is managed to provide suitable food and cover for quail, the native broodstock of quail is sufficient to reestablish populations.

5. **Waterfowl.** The wood duck is a common resident and nests in the area, however, the majority of wood ducks and other duck species are migratory from northern nesting areas. Wintering

waterfowl at the project depend on the major creeks, flooded bottomland hardwood forests, and the lake surface to provide suitable habitat. Waterfowl foods, primarily acorns, along the major creeks and flooded bottomland hardwood forests are not produced consistently from year to year. At Lake O' the Pines, aquatic vegetation is the primary food source for waterfowl. The primary waterfowl species that use the wetlands at Lake O' the Pines include wood duck, mallard, ring-necked duck, lesser scaup, and green-winged teal.

6. **Furbearers.** There are thirteen species of furbearing animals found at Lake O' the Pines. The racoon is the most economically important furbearer at the project. Other furbearers at the project include Virginia opossum, gray fox, bobcat, and coyote. These species occur throughout the project on all of the vegetative types.

7. **Turkey.** TPWD has stocked turkey in east Texas including Marion and Harrison county but not specifically at Lake O' the Pines. Turkey are prospering in pine and pine hardwoods. They prefer roosting in the proximity of small grain fields or early successional stage seed plants for feed. There may be potential for development of habitat for turkey at Lake O' the Pines. Any turkey stocking effort at Lake O' the Pines would require a cooperative effort between the Corps of Engineers and Texas Parks and Wildlife Department.

3-09 AQUATIC RESOURCES

Initial impoundment of Lake O' the Pines inundated many trees which now provide good habitat for certain fish species. Many sport fish species, primarily crappie and large mouth bass, frequent these areas. Since initial impoundment the majority of the tops of these trees have broken at and below elevation 228.5; and, the branches were deposited on the lake bottom. Aquatic vegetation, found throughout the upper end of the lake, additionally provides excellent nursery areas for young game fish and cover for sport and rough fish.

The responsibility for management of fisheries at Lake O' the Pines rests with the Texas Parks and Wildlife Department (TPWD). The TPWD Fisheries District Management Supervisor provided the following general information concerning major species, description of the peak fishing seasons, and areas within the reservoir where each species is consistently caught. Specific data concerning species abundance, growth, and population structure is available from TPWD. Refer to Appendix D for the most recent Performance Report on Fisheries and a record of the Inland Fisheries Reservoir Stocking History since 1980 at Lake O' the Pines.

Primary sport fish present in Lake O' the Pines include largemouth bass, spotted bass, white bass, yellow bass, red-ear sunfish, bluegill, channel catfish, flathead catfish, and black crappie. Creel survey data, showing fishing pressure or harvest for each species, is not available. Most of the following information is based on TPWD observations of the Lake O' the Pines fisheries and is not based upon collected data.

Largemouth bass are popular year-round, with good fishing available from spring through fall. Late summer-early fall fishing is usually best as largemouth bass congregate and feed actively on threadfin shad. Largemouth bass exceeding 10 pounds have been harvested.

Lake O' the Pines provides some of the best spotted bass fishing in east Texas. Spotted bass are most active during early spring and fall. Most spotted bass are caught along rocky areas in the lower 1/3 of the reservoir. The current state record spotted bass (5 pounds 9 ounces) was caught at Lake O' the Pines in 1966.

White bass and yellow bass are popular year-round with late summer, fall and winter providing the best fishing. Both species are abundant and can be caught throughout the reservoir. Most white bass average 3/4 to 1 pound, with yellow bass somewhat smaller.

Red-ear sunfish and bluegill provide excellent fishing from late spring through summer. Frame net surveys conducted during fall 1986 and fall 1987 indicate a high percentage of quality-size sunfish in the population. Bluegill and red-ear sunfish can be caught throughout the reservoir.

Channel catfish are found throughout the reservoir with summer providing the best fishing. Recruitment (survival to harvestable size) is poor however, making channel catfish more difficult to locate than other species.

Flathead catfish are present with individuals up to 60 pounds harvested. Few anglers seek flathead catfish, and the majority of the harvest is comprised of incidental catches. Those seeking flathead catfish have their greatest success during early spring and late fall, primarily in the mid-portion of the reservoir.

Black crappie are popular year-round with the best fishing from fall through early spring. Crappie are found throughout the reservoir. They concentrate during winter and can be readily caught if located. Most crappie range from 7 to 12 inches in length.

TPWD analyzes data collected during surveys to determine what, if any, management needs are required. Lake O' the Pines was last surveyed in 1982 (Toole 1983). Management techniques used to improve the quality of a fishery include harvest regulations (size and bag limits), stocking, habitat improvement, and species introductions.

3-10 RECREATION DEVELOPMENT

Land allocated for recreation purposes includes 11 areas totalling approximately 1,660 acres. Additional project lands are also utilized to provide public access areas with boat ramps. According to the Recreation Resource Management System, The Corps, counties and concessionaires presently manage areas totalling 813 acres.

There are presently four fee camping areas, five day use areas, and eight boat ramp areas operated by the Corps, four boat ramp areas managed by Marion County and nine marinas owned and managed by concessionaires. All of the recreational facilities shown on Table 3-5 are located on Corps fee land and reported by the project through the Recreation Resource Management System. The managing entity of each of these parks is identified at the left margin of the table.

Table 3-5

LAKE O' THE PINES
RECREATION AREA FACILITY COUNT

PARK NAME	PICNIC SITES	CAMP SITES	ELECTRIC HOOKUPS	GROUP CAMP AREAS	GROUP PICNIC AREAS	BOAT RAMP	# OF LANES	SWIM BEACHES	BATH CHANGE HOUSES	PARKING LOTS	# OF CAR SPACES	# OF TRAILER SPACES	PAVED ROADS MILES	UNPAVED ROADS MILES	HIKING TRAILS	NATURE TRAILS	BICYCLE TRAILS	HORSE TRAILS	AMPHI-THEATER	GOLF COURSE	COURTESY DOCKS	
CORPUS MANAGED	LONE STAR	0	0	N	0	0	1	3	0	0	2	20	20	1	0	0	0	0	0	N	N	N
	OVERLOOK	3	0	N	0	0	1	3	0	0	3	39	39	1	0	0	0	0	0	N	N	N
	SHADY GROVE	27	0	N	0	1	1	2	1	0	4	75	35	2	0	0	0	0	0	N	N	N
	OUTLET	0	0	N	0	0	1	2	0	0	1	175	50	1	0	0	0	0	0	N	N	N
	LAKE SIDE	73	0	N	0	1	1	2	2	1	6	291	35	4	0	0	0	0	0	N	N	N
	BRUSHY CREEK	0	111	Y	0	0	1	3	1	0	4	25	30	2	1	0	1	0	0	N	N	N
	PINE HILL	0	0	N	0	0	1	3	0	0	2	10	10	1	0	0	0	0	0	N	N	N
	BUCKHORN CREEK	0	100	Y	0	1	1	3	0	0	3	75	38	2	1	0	1	0	0	N	N	N
	COPELAND CREEK	0	0	N	0	0	1	2	0	0	2	30	6	1	0	0	0	0	0	N	N	N
	ALLEY CREEK DAY	24	0	N	0	0	1	3	1	0	3	38	19	2	0	0	0	0	0	N	N	N
	CEDAR SPRINGS	0	28	N	0	0	1	3	1	0	5	45	35	1	1	0	0	0	0	N	N	N
	OAK VALLEY	0	15	N	0	0	1	2	0	0	1	12	12	1	1	0	0	0	0	N	N	N
	HURRICANE CREEK	0	23	N	0	0	1	2	0	0	6	75	23	1	1	0	0	0	0	N	N	N
	JOHNSON CREEK CAMP	0	85	Y	0	0	1	2	1	0	3	79	39	3	0	0	1	0	0	N	N	N
ALLEY CREEK CAMP	0	55	Y	0	0	0	0	1	0	2	32	16	1	1	0	0	0	0	N	N	N	
HIMS CHAPEL	0	0	N	0	0	1	2	0	0	1	18	18	1	0	0	0	0	0	N	N	N	
JOHNSON CREEK DAY	39	0	N	0	1	1	3	1	1	5	75	50	1	0	0	0	0	0	Y	N	N	
** Subtotal **	166	417		0	4	16	40	9	2	53	1114	475	26	6	0	3	0	0				
LEASE TO MARION CO.	HOLIDAY HARB RP	0	0	N	0	0	1	2	0	0	1	0	25	0	0	0	0	0	0	N	N	N
	POPS LDG RAMP	0	0	N	0	0	1	2	0	0	1	20	10	1	0	0	0	0	0	N	N	N
	PINE HARBOR RMP	0	0	N	0	0	1	2	0	0	1	5	5	1	0	0	0	0	0	N	N	Y
	WOODIES RAMP	0	0	N	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	N	N	N
	** Subtotal **	0	0		0	0	4	7	0	0	3	25	40	2	0	0	0	0	0			
LEASE TO PRIVATE CONCESSIONAIRE	SUMMER LAKE BS	0	30	Y	2	3	1	1	2	0	1	15	10	1	2	0	0	0	0	N	N	N
	LAKEVIEW MARINA	16	0	N	0	0	1	2	0	1	3	50	20	1	1	0	0	0	0	N	N	N
	HAMP'S RAMP	0	0	N	0	0	1	1	0	0	1	20	5	0	1	0	0	0	0	N	N	Y
	LAKE SIDE NO/MAR	0	0	N	0	0	1	2	0	0	1	10	10	1	1	0	0	0	0	N	N	Y
	SUNSET HARBOUR	0	0	N	0	0	1	2	0	0	1	30	30	1	1	0	0	0	0	N	N	Y
	ISLANDVIEW LAND	0	5	Y	0	0	1	2	0	0	1	15	8	0	2	0	0	0	0	N	N	Y
	SUNRISE COVE	5	5	Y	0	0	1	3	0	1	1	10	5	0	1	0	0	0	0	N	N	N
	WILLOW POINT	0	2	Y	0	0	1	2	0	0	1	10	4	0	1	0	0	0	0	N	N	N
	HIGHWAY LANDING	4	0	N	0	0	1	1	0	0	1	26	12	1	0	0	0	0	0	N	N	N
	** Subtotal **	25	42		2	3	9	16	2	2	11	186	104	5	10	0	0	0	0			
*** Total ***	191	459		2	7	29	63	11	4	67	1325	619	33	16	0	3	0	0				

3-11 ARCHEOLOGICAL AND HISTORIC RESOURCES

Cultural resources can be defined as the material record of man's past and present activities. Under Federal law, cultural resources are usually represented by historic homes and buildings, prehistoric Indian sites, and areas of specific association with famous people or events. They can be as unspectacular as the ill-repaired remains of a 1930s tenant farm or a scatter of a few stone tools, or as spectacular as prehistoric mound sites and historic forts from America's frontier heritage. Cultural resources represent the irreplaceable legacy of historic and prehistoric events, peoples, and places, which shape the lives and the views of all Americans.

The uniqueness and fragility of cultural resources has been recognized by the Federal government with protective legislation dating to the Antiquities Act of 1906. The Archeological Resources Protection Act (Public Law 96-95), passed in 1979, strengthened the commitment of the Federal Government to preserve and protect cultural resources on Federal property. The Archeological Resources Protection Act (ARPA) is the primary jurisdictional tool to protect cultural resources, and includes civil and criminal penalties for violators. Section 110 of the National Historic Preservation Act, as amended (Public Law 96-515), established a program by which Federal agencies must inventory and assess cultural resources under its jurisdiction. The goal of this section of the National Historic Preservation Act (NHPA) is to locate and nominate sites to the National Register of Historic Places (NRHP). These laws, as well as other supporting laws and regulations, have recently been combined into a single document for Corps of Engineers' operating lakes. It is entitled "Project Construction and Operation, Historic Preservation Program" (ER 1130-2-438) and detailed guidance for fulfilling legal obligations for cultural resources. For specific legislation refer to the following legal references.

1. Executive Order 11593, Protection and Enhancement of the Cultural Environment.
2. Reservoir Salvage Act of 1960 (P.L. 86-523; 33 U.S.C. 701n, 69 Stat 186), as amended.
3. National Historic Preservation Act of 1966 (P.L. 89-665; 80 Stat. 915) as amended (16 U.S.C 470 et seq).
4. National Environmental Policy Act of 1969 (P.L. 91-190; 83 Stat. 852; 42 U.S.C. 4321 et seq).
5. American Indian Religious Freedom Act of 1978 (P.L. 95-341; 92 Stat. 469; 42 U.S.C. 1996).
6. Archeological Resources Protection Act of 1979 (P.L. 96-95; 93 Stat. 721; 16 U.S.C. 470 et seq).

7. Advisory Council on Historic Preservation, Protection of Historic Properties (36 CFR 800).

8. Department of Defense, Archeological Resources Protection Act of 1979, Final Uniform Regulations (32 CFR 229).

9. National Register of Historic Places, Nominations by State and Federal Agencies (36 CFR 60).

10. Department of the Interior, National Park Service, Waiver of Federal Agency Responsibility Under Section 110 of the National Historic Preservation Act (36 CFR 78).

11. ER 1130-2-438 Project Construction and Operation, Historic Preservation Program.

12. ER 1130-2-433 Project Operations, Storage and Curation of Archeological and Historic Data.

13. EP 1105-2-55 Planning, Environmental Resources, Chapter 3, Historic Preservation.

J. P. Thurmond (1981) provides a synopsis of archeological work undertaken at the reservoir. Thurmond notes that cultural resources work at Lake O' the Pines actually began as early as 1951, but was concentrated at the time of construction, generally 1957 and 1958 (reference J.P. Thurmond Archeology of the Cypress Creek Drainage Basin, Northeastern Texas and Northeastern Louisiana, 1981). At the time of work primary funding was acquired first through the Smithsonian Institution River Basin Survey, then through the National Park Service. A total of 64 prehistoric and historic sites were located during the survey phase of work. Some level of excavation of 30 of the recorded sites ensued. This work primarily concentrated on large Caddo Indian settlements, including mound sites, which were to be inundated by the reservoir. By modern standards the work was inadequate in that it generally emphasized a single cultural phase (Caddo Indian). Evidence from other sites and artifacts recovered at the lake indicates a 10,000 year sequence of human occupation in the area. While the Caddo Indian sites may have been the most visible sites prior to impoundment, older sites, more difficult to find and assess, were generally not identified. Likewise, historic resources were poorly documented. Again, this was more standard procedure in the late 1950's, and is inadequate with the benefit of 20-20 hindsight.

Story (1981) summarized the cultural periods present in East Texas:

Paleoindian	10,000-6,000 B.C.
Archaic	6,000-200 B.C.
Early Ceramic	200 B.C.-700 A.D.
Late Prehistoric	700-1700 A.D.
Historic	1700 A.D.-Present

Story notes these delineations mark technological and subsistence changes and are necessarily arbitrary in duration (reference D.A. Story, *An Overview of the Archeology of East Texas*, 1981). While all of these phases are present at Lake O' the Pines from artifact evidence, actual sites have not been investigated, or in some cases even identified, for each phase. Work at the lake in the 1950's was concentrated in investigations of the Late Prehistoric Caddo mound sites which were inundated by the lake. Briefly, each cultural period represents the following:

a. **Paleoindian.** This phase represents the initial radiation of people into the East Texas area. Once widely characterized as a "big game hunting" (mammoths, giant buffalo, etc.) type of existence, recent work indicates Paleoindian peoples actually exploited a wide range of plants and animals for subsistence. Generally, this phase represents the transition from Pleistocene-age animals and climate, to the establishment of more modern flora, fauna, and weather. No definitive Paleoindian sites (or components of multi-occupation sites) have been identified or investigated at Lake O' the Pines.

b. **Archaic.** During the Archaic, populations expanded throughout East Texas and began to more fully utilize the resources available. This period is not well known from Lake O' the Pines (or East Texas), but is represented by excavations at the Jake Martin Site in 1958 (reference W.A. Davis and E.M. Davis, *The Jake Martin Site, an Archaic Site in The Ferrell's Bridge Reservoir Area, Northeastern Texas*, 1960). This time period precedes the bow and arrow and pottery. People at this time were very mobile, moving frequently in response to available resources. Dart points, more familiar to most people as arrowheads, were used on short spears and propelled by an "atlatl", or spear thrower. The diet was predominately plant foods, however. Research on Archaic sites is a current priority in East Texas prehistoric archeology.

c. **Early Ceramic.** Story (1981) describes this period as the introduction of ceramic vessels into East Texas. Though direct evidence is lacking for the introduction of agriculture, some domestic plants (such as sunflowers and squash) may have been utilized. This is probably the earliest time in which people began to inhabit semi-permanent or permanent settlements. Story characterizes this phase as one of transition, with the present evidence still indicating great continuity with the Archaic subsistence patterns.

d. Late Prehistoric. Sites of this period are most visible and most widely investigated of the types represented in East Texas. Mound sites are the most spectacular of these Late Prehistoric manifestations. These large village sites represent the large-scale use of ceramics, the introduction of the bow and arrow (represented by "bird points", actually true arrow points), permanent settlements, and the use of domestic cultigens such as maize. Many of these late prehistoric sites are attributed to the Caddo Indians. Numerous descendants of the Caddo still live in Texas and Oklahoma. Of the 30 sites tested or excavated in the late 1950's, five were mound sites and 19 were major Caddo settlements. The Harroun Site (reference E.B. Jelks and C.C. Tunnell, The Harroun Site, a Fulton Aspect Component of the Caddoan Area, Upshur County, Texas, 1969), is a good published example of this type of site.

e. Historic. Historic resources are largely unrecorded in the Lake O' the Pines area. Interestingly, the original name of the lake was Ferrell's Bridge Reservoir, an historic bridge spanning Big Cypress Bayou. European settlement in the area was not widespread until the middle and late 19th century. Several historic trails and trading routes passed near the lake prior to extensive European settlement. Development of a good historic chronology of the Cypress basin is currently not addressed in the archeological literature.

Non-inundated and periodically inundated sites represent the present challenge in management of cultural resources at Lake O' the Pines. Shoreline erosion since 1959 has destroyed numerous sites; sandy soils along the Cypress drainage are unfortunately prone to rapid erosion. Vandalism is the single most destructive force on the resource. Illegal artifact collecting has obliterated several dozen sites on Federal property and remains a problem in spite of increased enforcement efforts by Corps of Engineers personnel. Enforcement actions are currently based on provisions of 36 CFR 327.14, with more serious violations to potentially be handled under the Archeological Resources Protection Act.

Establishment of a successful program of cultural resources management at Lake O' the Pines will require a series of steps.

1. Identification of sites eligible for the National Register of Historic Places. These sites will receive primary attention in protective and interpretive programs. Resurvey of portions of Corps of Engineers property may be necessary, as well as reassessment of existing properties for potential to answer regional research questions.

2. Protection of certain sites in eroding shoreline area through natural or engineered structures. Some sites of particular importance are located above the conservation pool and will require protection from vandalism.

3. Educational and interpretive programs to increase public awareness of the fragility, uniqueness, and importance of the resource.

4. Clear definition of research goals with which to fill data gaps resulting from the late 1950's work.

3-12 SCENIC AND AESTHETIC RESOURCES

Lake O' the Pines is a major attraction in the local area due in part to the scenic nature of the lake with its surrounding deciduous and evergreen forested landscape. The visual impact of the long doglegged dam has been reduced with pine plantings along the entire lower side and retention of forested park areas on the immediate upper side of the dam.

For some residents and visitors, the Ferrells Creek Dam is an impressive man-made feature. The dam is a major visual element as seen from portions of Lakeside Park, Shady Grove Park, and the Outlet Area.

Lake O' the Pines is a series of large and small irregular spaces with strong visual boundaries. The landscape surrounding Lake O' the Pines is relatively closed with 30-50 foot tall forests bordering the lake and access roads to park areas. Hills in the vicinity of Oak Valley and Mims Chapel rise 200 feet above the lake surface.

Most of the lake shoreline is eroding to some extent. These eroded areas are visually distracting. Eroded cut banks range from two feet to more than 20 feet high. The upper side of the dam and some of the shoreline in park areas have been rip-rapped but the majority of the lakeshore areas have not. Development of vegetation plantings around some of the shoreline with flood tolerant species may improve the project's overall visual appearance.

factors influencing the use of resources
Chapter 4



CHAPTER 4

FACTORS INFLUENCING THE USE OF RESOURCES

4-01 Introduction

This section provides an overview of the key administrative, social and cultural factors that influence and sustain present and future options for use, management and development of land and water resources at Lake O' the Pines. This information supplements the discussion of the capabilities and constraints of project physical resources presented in chapter three. Considered together with regional needs and desires (see chapter 2) these factors determine the most appropriate uses of project resources.

4-02 Effects of Lake Fluctuation on Recreation and Resource Management.

The principles and procedures for storage and release of water in Lake O' the Pines to meet authorized purposes are summarized in Chapter 1, Project Operations and Chapter 3, Hydrology. The effects of those operations, particularly as evidenced by water level fluctuations, on project resource management, use, and development are described below.

a. Recreational Resources. Current recreational development is affected very little by normal lake fluctuation because of the difference of only 1.5 feet in the water supply (winter) and recreational (summer) pool levels. This authorized plan of operation is very conducive to recreation facilities development and lends itself ideally to most types of water-oriented recreational activities. The normally slight fluctuation in the lake level provides excellent access to the water along most reaches of the shoreline and gives Lake O' the Pines a high potential for continued development of public recreation facilities. Lower than normal water stages adversely affect the recreational potential of the lake by decreasing accessibility along the shoreline and by increasing dangers to boating in certain shallow areas of the lake. Higher lake levels adversely affect recreational potential of the lake because of boating hazards from old timber which may become partially or fully submerged in uncleared areas of the lake and from drift or other floating debris which may accompany high reservoir inflows. In addition, the higher water stages expose new areas of the lakeshore to possible wave generated erosion, and subject all facilities located along or in the proximate area of the normal shoreline to possible damage, displacement or destruction as a result of flooding and/or wave action.

Although the relatively small normal lake draw down at Lake O' the Pines does not produce conditions favorable to the reduction of aquatic vegetation along the shoreline, submerged vegetation is a serious problem only in some isolated coves and inlets, and in the upper reaches of the lake. Efforts are made to control noxious aquatic growth in and around public swimming beaches, at points of access, and in other areas where it is necessary for boat operation and other recreational activities.

The activity most sensitive to reductions in lake surface area is motorized boating since this activity requires the most space. Most of the lake surface area lost to recreation use through normal operations is at the upper ends of Lake O' the Pines. These areas are relatively shallow and contain a great deal of timber. Therefore, normal draw downs affect motorized boating and waterskiing more acutely. In addition to lost surface area, draw downs expose muddy, sometimes steep and eroded reservoir banks that are aesthetically unappealing, restrict accessibility for shoreline fishing, and are not conducive to high quality recreation experiences.

The existing boat ramps at Lake O' the Pines are designed to be usable from an elevation of 225 to 236. Future swimming beaches should also be usable from elevation 225 to 236. Private docks should be usable from elevation 228 to 238. Marina boat docks should be usable from elevation 225 to 238. Actual design elevations may need to vary depending on site conditions.

b. Forest Management. Normal lake fluctuations have virtually no effect on forest management at Lake O' the Pines. All forest lands above the 10-year flood frequency elevation are managed intensively and lake draw downs have no effect. Lands between elevation 228.5 and 230.0 feet are flooded frequently and support only a few water-tolerant species. Lands above elevation 230.0 feet N.G.V.D. support mixed stands of hardwoods and pines in the draws and bottoms, as well as pure pine stands along the ridges. Forest management activities at the project are conducted in accordance with the Operational Management Plan.

c. Fish and Wildlife. Maintaining Lake O' the Pines between maximum controlled pool (elevation 249.5) and bottom of conservation pool (elevation 201) provides sports fishing and wildlife benefits. Maintaining minimum releases of 25 cfs between 20 May and 15 September stabilizes and maximizes pool levels, enhancing fish and waterfowl habitat. The lake has provided a significant increase in the quantity and quality of fishing over that which was available in Cypress Creek prior to project construction. Texas Parks and Wildlife supports the improved fishery in Lake O' the Pines with occasional stocking of sports fish.

d. **Shoreline Vegetation.** Construction of Lake O' The Pine resulted in the loss of riparian habitat. While re-vegetation of the shoreline can provide substantial additional habitat, water level fluctuations may minimize the success of shoreline plantings. Any vegetation planted around the shoreline should be capable of surviving periodic inundation during controlled flood events.

4-03 Project Operations and Maintenance Activities

The project was constructed primarily for flood control and water supply. Although recreation is another project purpose, it should not conflict with the primary purposes. To ensure, continuous and efficient operation, public access to most of the project flood control structures or features must be restricted or prohibited.

a. **Ferrells Bridge Dam.** While road access across the dam is permitted, public access into and on the dam is prohibited unless visitors are accompanied by project personnel. This includes the dam, crest and spillway. The public has fishing access to the stilling basin from walkways surrounding the basin. A boat ramp allows boat access to Cypress Creek below the stilling basin.

b. **Project Office and Compound.** The project office and compound is the focal point for day-to-day operations and maintenance activities. It also contains most of the support facilities required to operate and maintain the project, including the project office/administrative facilities, equipment storage, maintenance areas, and materials stockpiles. The front office of the project building is set up to receive visitors and to disseminate information about the lake.

4-04 Project Personnel

Lake O' the Pines is staffed by 29 employees, 9 full time GS, 4 full time WG, 5 full time GW, 8 part time GS and 2 part time WG. Their responsibilities include on-site operation of Ferrells Bridge Dam, and day-to-day operation and maintenance of the intake and outlet works. Major repair work on the project equipment is performed by the project maintenance crew or by contract. They also have responsibility for grounds maintenance and on-site natural resource management. The maintenance men do not have citation authority. There are 4 rangers for off peak and 12 rangers for peak seasons available to enforce rules and regulations set forth in the Code of Federal Regulations, Title 36, Chapter III, part 327. Local law enforcement agencies, under contract, are relied on to keep law and order on project lands.

4-05 Project Land Status

The status of Lake O' the Pines lands is described in detail in Chapter 1. In the following sections the influences and constraints placed on resource use, management and development by project land status is discussed.

a. Fee Simple Lands. Of the total project acreage of 45,217 acres, 29,030 acres are owned in fee by the United States of America under jurisdiction of the Corps of Engineers for the Lake O' the Pines Project. Fee simple ownership is the estate in real property by which the owner has the title of real property without limitation or end. The Corps of Engineers has ultimate management authority and responsibility for fee acquired lands.

All project lands were acquired for project operations purposes or recreation. No separable project lands were acquired for fish and wildlife or mitigation purposes, however. This does not preclude managing those lands for purposes other than allocated purposes. As discussed in Chapter 5, project lands allocated for operations purposes can be further classified for recreation, or as environmentally sensitive areas, and multiple resource management use.

b. Flowage Easement Lands. The project area includes 16,063 acres of flowage easement lands. Although they are considered as part of the project area, the only interest or privilege the Corps has in those lands is the right to periodically inundate them during controlled flood events. The landowner has the primary authority and responsibility for management of flowage easement lands.

c. Permit to Flood Lands. Lone Star Steel permits the Corps to periodically inundate 124.54 acres during controlled flood events. The owner has the primary authority and responsibility for management and retains rights to develop permit to flood lands.

d. Leases, Easements and Licenses. Within the project fee lands there are 10 leases (103.54 acres), 68 easements (428.04 acres), and 9 licenses (.95 acres) which grant use of the project lands for various purposes. The acres of some of these agreements overlap. They convey varying rights and responsibilities for management of project land.

4-06 State and Federal Agency Input

During the development of this master plan, every effort was made to evaluate, and when practical, incorporate the ideas of other state and federal agencies regarding the overall development and management of project resources.

a. U.S. Fish and Wildlife Service Input. The U.S. Fish and Wildlife Service (FWS) has submitted a number of position papers in recent years concerning Lake O' the Pines. See Appendix C for recent letters. The following paragraphs summarize their position on a variety of issues expressed earlier in letters of 22 January 1981 and 11 February 1986.

The Corps should prepare a Fish and Wildlife Management Plan to provide specific guidelines and direction for CE employees in the improvement of habitats for game and non-game species. Presently, no plan has been developed.

Wildlife management would benefit from the creation of a green tree reservoir (artificial wetland) for waterfowl in the upper reaches of the project lands. Wetlands, especially bottomland hardwood forests, in the Cypress Bayou Basin provide extremely valuable fish and wildlife habitat. An assessment of location, abundance, and values of wetland areas associated with Lake O' the Pines would facilitate their protection and optimum use.

The Corps should prepare a Fisheries Management Plan with the help of FWS and TPWD to preserve, improve, and maintain the aquatic environment. The plan should pay particular attention to fish spawning requirements and methods of avoiding disruption of spawning caused by lake level fluctuations. Also, downstream releases should be addressed. An optimum flow schedule of minimum continuous discharge ranges from 25 to 90 cfs would improve the quality of downstream habitat for aquatic species, including popular game fish.

b. Texas Parks and Wildlife Department Input. The Texas Parks and Wildlife Department has expressed interest in managing tracts of land in excess of 2000 acres under the Type II Hunting program. Under this program only those people who purchase a Type II license (cost \$35) are permitted to hunt on Type II lands around the state. TPWD would manage the lands and distribute any profits back to landowners. The bottomland hardwoods area above Highway 259 is approximately 3000 acres and offers potential for introduction into this program. The Corps would need to assess the effects on existing hunting patterns, and impacts to adjacent landowners and determine if this program would be beneficial to those using the lands.

4-07 Public Input

Two approaches have been used to achieve an understanding of how the public views the management and development of Lake O' the Pines. An input workshop, public notice and mail questionnaire revealed complaints as well as constructive criticism which were useful in the development of this plan. Specific comments by the public are summarized in Appendix C.

a. Input Workshop. This workshop focused primarily on lake management, recreation uses and facilities that local residents desired at the lake. The following comments are characteristic of the input of individuals related to lake level management and other recreation type issues.

Sustain a higher pool level during the winter and early spring months. Make gate adjustments from the lake early in the week rather than toward the weekend. Reduce flood pool levels more rapidly. Higher winter and early spring pool levels would cover uncleared timber, allow easier access for fishing and canoeing and allow more fish spawning/hatching.

Releases started during the first of the week and continued through the weekend would allow those canoeing or boating Cypress Creek to predict weekend water flow conditions.

Marina and private boat dock owners would like flood pool levels to be reduced as soon as possible after a flood to reduce shoreline erosion.

Watt's Island should be used as a primitive group camping area for scout groups and other clubs or organizations. It has been used and enjoyed by several organizations for group camping already.

Two local equestrian groups indicated they were interested in equestrian trails and campgrounds. The equestrian trail would be useful for pleasure riding and endurance events if a 25 mile round trip trail could be established.

Provide better access for hunting. Fishing access is good.

Prevent hunting close to subdivisions and areas where bald eagles are roosting. Keep out three wheelers and dirt bikes.

Enhance project lands for wildlife, particularly for waterfowl, deer, and turkey.

Control the aquatic weed problems around boat lanes, marinas and the upper end of the lake.

b. Survey Questionnaire. The following information is based on a survey conducted by the Corps of Engineers (see Appendix C). Responses were received from 40 people or 9 percent of the total 447 surveys mailed out. Public Notices, were published in the newspapers at Longview, Jefferson, and Tyler encouraging the public to participate in the input process.

The bulk of the respondents to the survey were from the cities of Longview, Jefferson, Pittsburgh, Ore City, Gilmer and Tyler, in that order. Other cities with 1 response each included Shreveport, LA., Tahoka, Denton, Diana, Marshal, Linden and Austin, TX.

The average number of visits per year, not including those who live on the lake, was 24 times per year. The majority of these visits were day trips lasting an average of 7 hours. The average number of camping visits per year was 4 times with an average of 4 nights per visit. Eight respondents lived on or near the lake.

The most common activity engaged in was picnicking (66 percent of the respondents), followed by fishing, swimming, sightseeing, boating, and RV camping (52 to 34 percent of the respondents). Other notable pastimes included skiing, hunting, hiking and birdwatching.

Specific comments and suggested improvements and additions are listed below for each of the following parks:

Alley Creek Park - 10 respondents

- o Improve picnic, playground, restrooms and all parking facilities.
- o Add fish cleaning stations, covered picnic, RV camping, and softball areas.
- o Better park management needed.

Brushy Creek Park - 9 respondents

- o Add trails/hiking, restrooms, fishing piers, fish cleaning stations, and courtesy dock and boat ramp parking.

Buckhorn Creek Park - 6 respondents

- o Add trails/hiking, restrooms, fishing piers, fish cleaning stations, courtesy dock and boat ramp parking.

Cedar Springs Park - 8 respondents

- o Improve restrooms.
- o Add RV camping and covered picnic areas.
- o Improve paved roads.

Copeland Creek Ramp - 5 respondents

- o Improve restrooms and parking.
- o Add fish cleaning stations, group camping, picnic, covered picnic areas, and tent camping.
- o Repave boat parking area-too many holes.

Hurricane Creek Park - 2 respondents

- o Add trails and covered areas.

Johnson Creek Park - 10 respondents

- o Improve restrooms, picnic area and tables.
- o Add trails/hiking, group camping, horseback trails/camp, fishing piers, courtesy dock and fish cleaning station.

Lakeside Park - 11 respondents

- o Improve restrooms and picnic tables
- o Add trails, restrooms, covered picnic areas, parking at boat ramps, and fish cleaning stations.
- o Need better management and traffic control.
- o Year around access preferred.

Lone Star Ramp - 3 respondents

- o Add parking at boat ramps.

Oak Valley - 5 respondents

- o Improve RV camping.
- o Add hydrants to picnic areas.
- o Keep free parks cleaner.

Pops Landing/Perry's Cove/Willows Point - 2 respondents

- o Improve existing and add parking at boat ramp, camping, and picnic sites.
- o Add fish cleaning stations.

Shady Grove Park - 6 respondents

- o Improve restrooms
- o Add restrooms, covered areas, courtesy dock, trails/hiking, softball and playground areas.

General Comments

- o Water level is too low and stumps are not visibly marked.
- o Allow users to walk into parks during the winter for nature walks and bird watching.
- o Access to fishing is adequate overall.
- o Access to hunting is less than adequate.
- o Enforce drinking and boating laws.
- o Post signs explaining divers flag.
- o Need more natural areas, and fish and wildlife habitat.
- o Need more undisturbed areas.

This survey is not statistically significant, but can be used as an indicator for further study and planning.

4-08 LAND USE AND OWNERSHIP

Neighboring land use and ownership will influence development and management of project lands in a number of ways. In some cases, adjacent uses will have a positive influence. For example, private marina and resort facilities complement the Corps - managed day use and camping facilities. The private facilities provide concessions and services while the Corps facilities provides public access.

A number of single family subdivisions surround the narrow band of Corps owned lands at Lake O' the Pines. Refer to Plate 3-2 for location of residential areas surrounding the lake. Nearby residents use public lands for fishing, walking, hunting, and bird watching. Since much of the fee land is not fenced it is difficult for users to distinguish the boundary between Corps land and private land is about 400 residences presently border perimeter lands. About 320 of these residents hold 5 year renewable permits to cut underbrush and mow grass down to the lakeshore. About 150 residents hold 5 year renewable permits for private floating docks. Due to high waters in recent years only about 120 docks are presently floating.

The project has held a series of public meetings during the process of developing the Lakeshore Management Plan. As a result of this process specific lakeshore areas were designated as protected lakeshore areas, precluding private use facilities and privileges. Protected lakeshore areas surround about two-thirds of the shoreline at Lake O' the Pines. Twenty-one shoreline areas have been designated as limited development areas. These areas also are adjacent to private land holdings which have been developed for private recreational cottages and homes.

4-09 EXISTING RECREATION ACTIVITIES

The project is currently used for a variety of activities. These activities have been considered in planning for land uses which are responsive to regional needs. The land use plan takes these existing activities into account and where compatible with other project uses, makes accommodations for them. In some cases, existing uses may not be compatible with the most appropriate use for a given site. The project plan then takes into account possible means to restrict those uses or minimize conflicts.

a. Pleasure Boating, Waterskiing, and Fishing. Lake O' the Pines receives use by motor boats, sail boats, row boats, canoes, skiers, and wind surfers. An estimated 184,000 pleasure boats, fishing boats, and water skiing boats used Lake O' the Pines from November 1986 through October 1987. The total number of water surface acres needed to meet current needs is 6,040 water acres. Projections for water surface acres needed for pleasure boating, skiing, and fishing by 2005 is 7,059 acres. The water area

surface area at Lake O' the Pines is 18,780 acres at water supply pool and 19,780 at recreation pool level. Input received from questionnaires and the workshop indicated a high desire for courtesy docks at all boat ramps. Courtesy docks should be installed at all boat ramps to improve convenience and boating safety.

b. Swimming. Lake O' the Pines receives substantial use by swimmers. A total of 274,000 swimmers were estimated during November 86 through October 87. Most of the users are families with children and most swimming is concentrated in 6 designated swimming areas. Three of these are located within camping areas and three within day use areas. An undetermined number of people use Lake O' the Pines for scuba diving. Most diving occurs in the vicinity of Hurricane Creek, Johnson Creek, and Alley Creek.

c. Fishing. Water resources available for fishing at Lake O' the Pines are substantial. A total of 272,000 boat fisherman and 107,360 shoreline fisherman were estimated during the period November 86 through October 87. Approximately 3,986 acres of trees within the reservoir which were inundated at the time of impoundment provide good fish habitat. TPWD has stocked the lake with game fish and it has become a popular fishing resource for local and distant users. Its popularity for fishing is expected to continue. Input received from questionnaires and the workshop indicates a high desire for raising the pool level during fall, winter, and spring seasons so more water covers uncleared trees. Under present operation trees which have broken off near 228.5 pool elevation pose hazards to those fishing the area. Users recommend that shoreline trails and fishing piers or docks be developed to improve ease of access, especially for handicapped and elderly users.

d. Off Road Vehicles. Some off-road vehicle use is presently occurring on project lands even though it is prohibited. A total of 11,000 ORV riders were estimated around parks and access areas during the period of November 86 through October 87. This estimated use was based on surveys near park areas. Use occurring in the remote areas where unimproved access roads or trails lead to the fee boundary has not been determined. Some of these unimproved roads and trails have become rutted and muddy from overuse. In addition, soil and vegetation has been destroyed where ORVs have left the roadways. This use has a negative impact on project resource aesthetics, and wildlife habitat, and it is a source of irritation to surrounding private landowners. Because of the unavailability of suitable Corps lands on which to use ORVs all riders will be excluded from entering and using public lands for this purpose.

e. **Hunting.** The number of hunters who presently use or are projected to use Lake O' the Pines lands has not been determined. The field survey did not address this use. The areas available to hunters are limited by two primary factors. First, much of the perimeter lands are too narrow to provide good hunting opportunities. Hunting is not permitted within 200 yards of all parks, residences, areas restricted as management areas, public use areas, and safety zones. Second, access is limited into the larger more desirable hunting areas. A hunting brochure designating hunting areas and outlining hunting restrictions is distributed to those inquiring about hunting at the project office. Hunting is permitted northwest and southeast of Highway 59, at the upper end of Alley Creek, at the upper end of Johnson Creek, and below the dam.

Each year the project examines the current hunting policy, identifies potential conflicts and if necessary adopts a new policy. For example, as residential areas are built adjacent to project lands additional lands may be closed to hunting. Duckblind permits are issued for \$10.00 administrative fee and a \$40.00 deposit. These duckblind permits allow anchoring of a floating blind at least 200 yards away from other permitted blinds and 200 yards away from any public use facility during duck hunting season. Lake O' the Pines offers hunting for deer, squirrel, quail, dove and duck. All state game laws must be followed while hunting project lands. No special permits are required to hunt on project land unless a duckblind is to be constructed. To help orient hunters, the government boundary is marked with yellow paint on trees.

f. **Camping.** A substantial amount of camping takes place at Lake O' the Pines. A total of 128,000 persons consisting of 52,000 camping units with an average of 2.4 persons per group or unit were estimated to have camped at Lake O' the Pines during the period of November 86 through October 87. The average length of stay for a camping party is 3.2 nights. The number of tent camping to RV camping at Lake O' the Pines as determined by the number of receipts at the fee use areas is as follows:

Park	Total Camping Units	RV Camping Units	Tent Camping Units
Alley Creek Park	8,132	5,692	2,439
Johnson Creek Park	15,170	15,170	798
Brushy Creek Park	9,864	8,187	1,677
Buckhorn Creek Park	4,142	2,775	1,367

Low participation in tent camping at the project may be due to the low quality and quantity of tent camp sites in fee use and free access areas. Tent sites have been placed primarily in

steeper areas of the park with few leveled and defined areas for vehicle parking, picnic tables, grills or tent pads. Most of the tenting areas are eroded and void of protective ground cover. Some of the tent sites are positioned on slopes too steep for practical use. Relocation of some sites, major improvements to others, and the addition of new tenting areas is needed.

One of the most popular activities at Lake O' the Pines is RV camping. Almost all of the multi-use campsites used by RV campers include a paved parking pullout, picnic table and grill. Many of the multi-use camping areas become very congested because of the number of vehicles campers bring and the shortage of space in which to park them. When vehicles are parked on dirt areas soil compaction and erosion results. Thinning of sites and provision of additional parking areas are needed in some of the loops. Many RV clubs like to come to Lake O' the Pines and camp together in groups. Additional group camping areas with pavilion, restrooms, and showers would be desirable so more loops could be reserved and conveniently used by groups.

Free camping is allowed at Hurricane Creek Park, Oak Valley Park, and Cedar Springs Park. These areas are used by families, fishing groups, senior citizens on fixed income and motorcycle groups. Drinking water and restrooms without showers are provided in each of these areas.

g. Picnicking. A substantial amount of picnicking occurs at the project. Approximately 83 percent of the estimated 144,000 people (46,000 parties) use project picnic facilities. Those parks providing the majority of the picnic facilities include Lakeside, Johnson, Alley, Shady Grove, and Hurricane Parks. Most of the picnic tables are located near shade trees. A few of the sites have upright grills but none of the sites have level impact resistant areas.

Three group pavilions, one in Lakeside, one at Shady Grove Park, and one at Johnson, provide picnic opportunities for groups. A cooker and drinking water are available at each of these sites.

e. Canoeing. Canoeing on Cypress Creek, from The Lake O' the Pines to Jefferson, and on Lake O' the Pines has become more and more popular in recent years. Cypress Canoe Rental from Jefferson reported 1000 people canoeing the upper or lower reach of Pines to Jefferson. The Sierra Club, Dallas Down River Club and other groups and organizations canoe the creek for leisure while some individuals float the creek and fish for bass.

The desirability of using Cypress Creek for canoeing depends on the release rates from Lake O' the Pines. When the releases downstream are less than 600 cfs canoeing is not recommended on Cypress Creek, especially on the upper half of the reach. At

this flow rate it can take 2 days of dragging a canoe over log and brush jams to reach the half way point. The lower portion of Pines to Jefferson can be canoed during lower flows but access is required over private land. When releases are 1000 cfs to 3000 cfs, canoeing is excellent from Pines to Jefferson. At 1000 cfs Cypress Creek stays within its banks. At 3000 cfs Cypress Creek extends out into the flood plain. At this 3000 cfs rate one should proceed with caution while canoeing due to the water flow rate. The trip from Pines to Jefferson takes approximately 6 hours. At 1000-3000 cfs the lower half (7 miles) of Pines to Jefferson takes 3-4 hours. Cypress Creek flows at approximately 2-3 mph when releases are 1000-3000 cfs.

Signage is needed at the outlet, warning canoeists of hazards encountered during low releases or explaining how release information may be acquired. This type of signage will need to conform to the Corps Sign and Standard Manual.

4-10 FUNDING SOURCES FOR EXPANSION OF FACILITIES

At this time funds for rehabilitation and new construction within non-fee areas is limited except for replacement of existing facilities such as restrooms, roads, etc. Even though additional day-use facilities are needed, funding policies presented do not allow further development. Limited Corps Special Recreation Use Fees (SRUF) funding is available for addition of recreational facilities for which the Corps can collect a fee. Typical facilities constructed with SRUF funds include RV campsites, tent sites, restrooms, group pavilions within fee areas and group picnic pavilions within non-fee areas. Current policy also specifies that no additional recreation areas can be opened and developed unless a non-Federal public body will agree to cost-share 50 percent of the cost of development and bear all subsequent costs of operation, maintenance and replacement. Privately funded, constructed, and managed recreational facilities may be another way to provide future needed recreational development at the lake.

4-11 NATURAL AND CULTURAL RESOURCE MANAGEMENT

The ultimate responsibility for managing Lake O' the Pines natural and cultural resources rests with the Corps of Engineers. Natural resource management is to be integrated with other project activities under a multiple use concept. A number of general authorizing laws and regulations set out the Corps' responsibilities for initiating progressive resource management programs. ER 1130-2-400 directs that proper management techniques should be applied wherever the opportunity exists to improve vegetative conditions for wildlife, recreation, scenic value, timber, cultural resources, wildfire prevention, pest control, watershed protection and other project uses. Specific management objectives are to be based upon land use designations

presented in this MPRU and subsequently refined in the Operational Management Plan. However, there are limits to the extent of resource management activities that the Corps can undertake without the support of a local, state or federal sponsoring agency.

4-12 FISH AND WILDLIFE ENHANCEMENT

Direct management of fish and wildlife resources by the Corps is limited to a stewardship role or to mitigation responsibilities as directed by Congress and/or approved by the Assistant Secretary of the Army. The Corps has a stewardship role at Lake O' the Pines which requires the management of wildlife habitat to insure maintenance and protection of self sustaining populations of species identified in this MPRU, Chapter 5-05. Specific management measures will be described in detail in the Operation Management Plan.

Fish and wildlife enhancement, as it related to the Federal Water Project Recreation Act of 1965 (P.L. 89-72), is generally defined as management initiatives which concentrate or increase an animal population for the recreational purposes of hunting and fishing. Such enhancement measures may be implemented only through a cost share agreement approved by the Assistant Secretary of the Army.

4-13 RECREATION CARRYING CAPACITY

Once recreation facilities needs through the year 2005 were determined (see Appendix B) investigations into carrying capacities to accommodate these additional facilities was initially investigated in the field. The goal is to achieve a well-balanced level of use which maximize the ability of the available resources without exceeding the carrying capacity of a particular area. Land resources and user preferences were studied to determine if the existing use levels should be continued, restricted, or expanded. The results of these efforts is reflected in the plates found in chapter 6.

4-14 MAXIMUM PRACTICAL USE OF PROJECT RESOURCES

Following in depth site investigations into existing and potential recreational areas, various design alternatives were explored by the study team and the best options were selected for this plan. As a result of this process, all recreational needs identified in Appendix B except for 14 boat lanes were accommodated within or near existing recreational areas. The study team determined additional recreational areas would need to be opened in order to accommodate these additional 14 boat lanes. Rather than open new areas, the team explored ways to improve vehicular circulation near boat ramps and associated parking areas to increase efficient use of existing boat ramps. The designs in Chapter 6 reflect these improvements.

project land and water use zoning and resource use objectives
Chapter 5



CHAPTER 5

PROJECT LAND AND WATER USE ZONING AND RESOURCE USE OBJECTIVES

5-01 INTRODUCTION

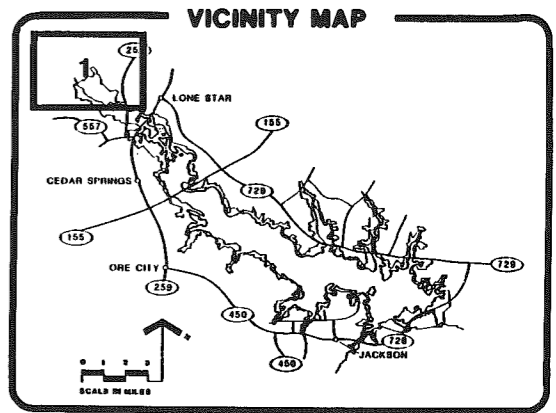
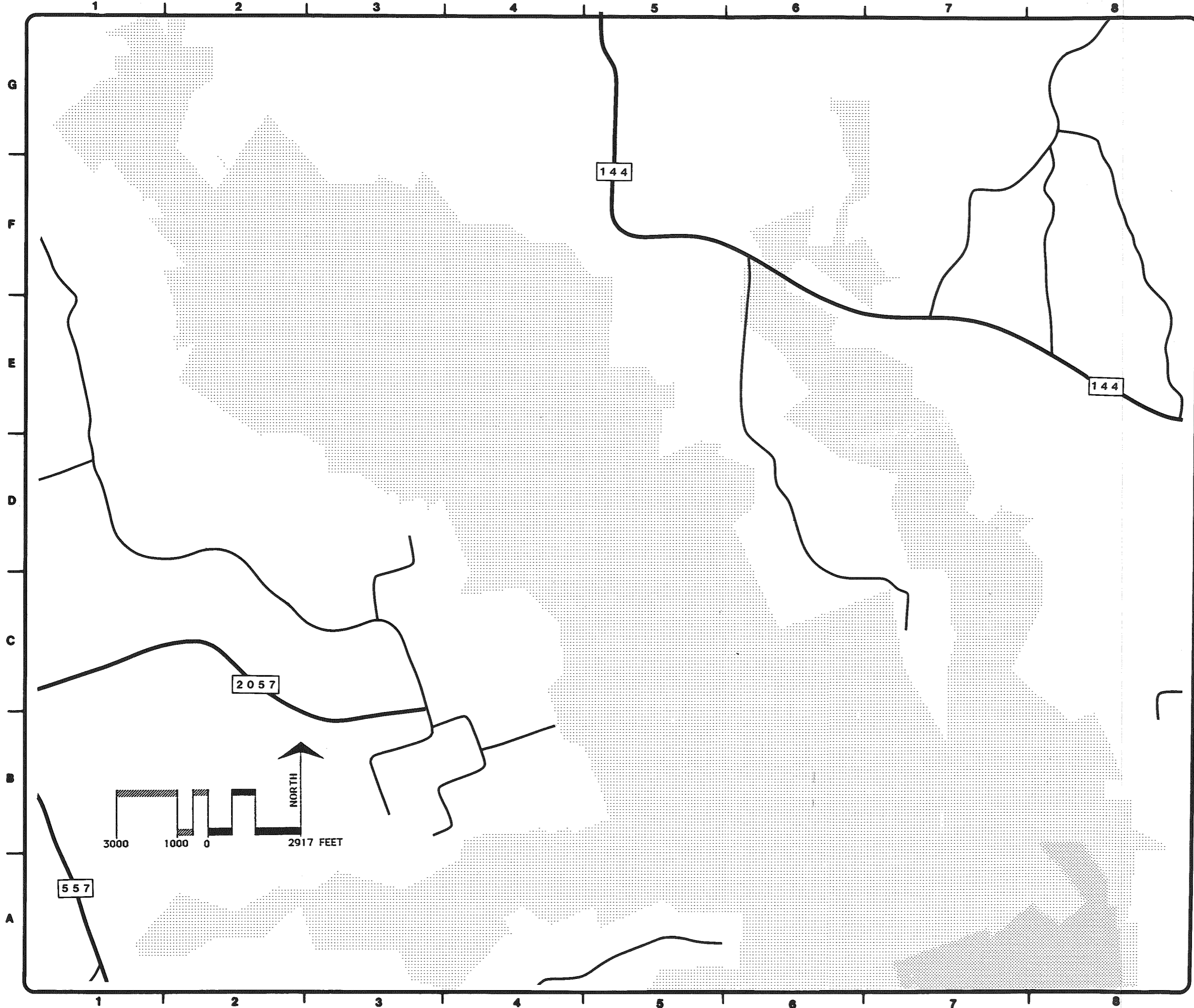
The purpose of this chapter is: (1) to describe land allocation based on authorized purposes, (2) to further classify and delineate zones to utilize project lands and waters consistent with authorized project purposes and resource capabilities and (3) to define and prescribe a series of resource use objectives for the project. Together these three elements are the heart of this MPRU, and form the basis for the detailed guide to use, management, development, and public use of project lands and water.

5-02 LAND ALLOCATION

All lands purchased for specific purposes at Lake O' the Pines fall under the land allocation category of Operations or Recreation. No lands were purchased for fish and wildlife or mitigation. Refer to Plate Sequence 5-1 for location of those lands purchased specifically for Operation or Recreation purposes.

a. Operation. These lands are acquired in accordance with the authorizing documents for operation of the project, i.e. flood control and water supply. Acquisition of fee title land included those lands lying below the 5-year flood frequency (elevation 236 feet) and the acquisition of flowage easements between elevations 236 and 254.5 feet.

b. Recreation. These areas were separable lands acquired in accordance with authorizing documents for public recreation. Specific tracts and area acquired for specific recreation purposes are presumed missing before, or lost during, the transfer of information from New Orleans District to Fort Worth District. For the purposes of this study those land areas in the vicinity of recreation areas and other large tracts above the flood control pool (elevation 249.5) were estimated. Through this process acquisition of fee title land for recreation appears to include 11 areas, totalling approximately 1660 acres. These lands are located in the following areas: Lone Star Park, Cedar Springs Park, Pine Hill Park, Oak Valley, Alley Creek, Copeland Creek Park, Brushy Creek Park, Overlook Park, Hurricane Creek Park, Buckhorn Creek Park, Johnson Creek Park, Shady Grove, Alley Creek Park, 155 East area and Barnes Point.



LEGEND

PROJECT USES

OPERATIONS

- FEE LANDS ABOVE CONSERVATION POOL (ELEV. 228.5)
- FEE LANDS BELOW CONSERVATION POOL (ELEV. 228.5)

RECREATION

- LANDS PURCHASED FOR RECREATION PURPOSES

FLOWAGE EASEMENT

PERMIT TO FLOOD

ROADS

U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: _____

DRAWN BY: _____

REVIEWED BY: _____

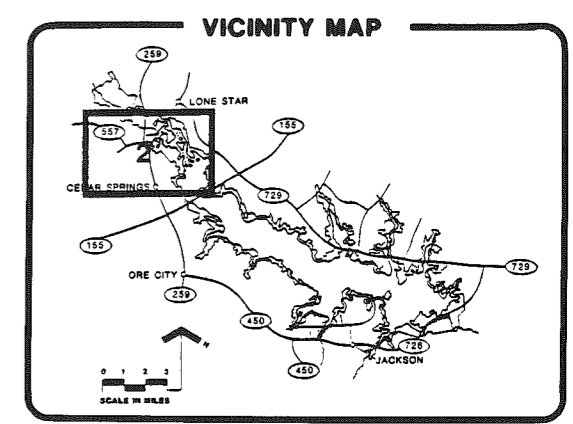
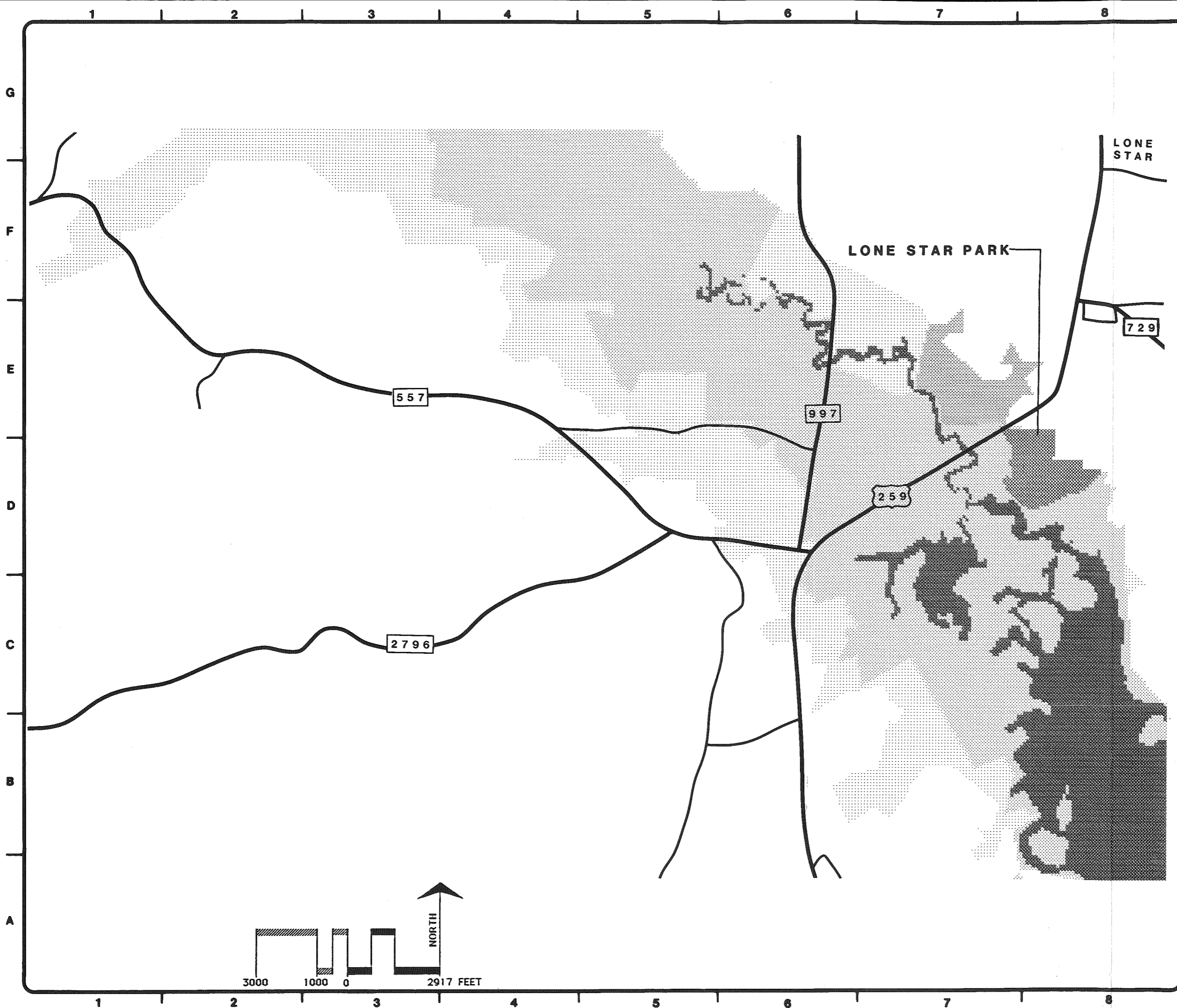
**LAKE O' THE PINES
CYPRESS RIVER, TEXAS**

LAND ALLOCATION

INVITATION NO. _____ DATE: _____

CONTRACT NO. _____ SHEET NO. 1 of 7 SEQUENCE NO. 5-1

DRAWING NUMBER _____



LEGEND

PROJECT USES

OPERATIONS

- FEE LANDS ABOVE CONSERVATION POOL (ELEV. 228.5)
- FEE LANDS BELOW CONSERVATION POOL (ELEV. 228.5)

RECREATION

- LANDS PURCHASED FOR RECREATION PURPOSES

FLOWAGE EASEMENT

PERMIT TO FLOOD

ROADS

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FORT WORTH, TEXAS

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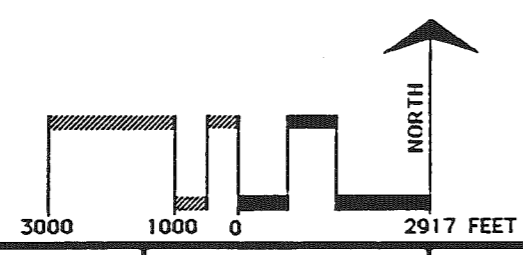
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CYPRESS RIVER, TEXAS

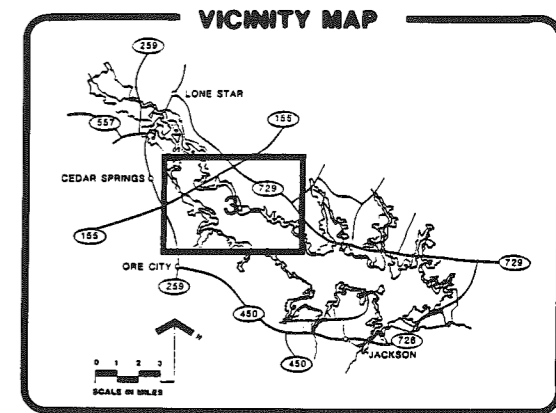
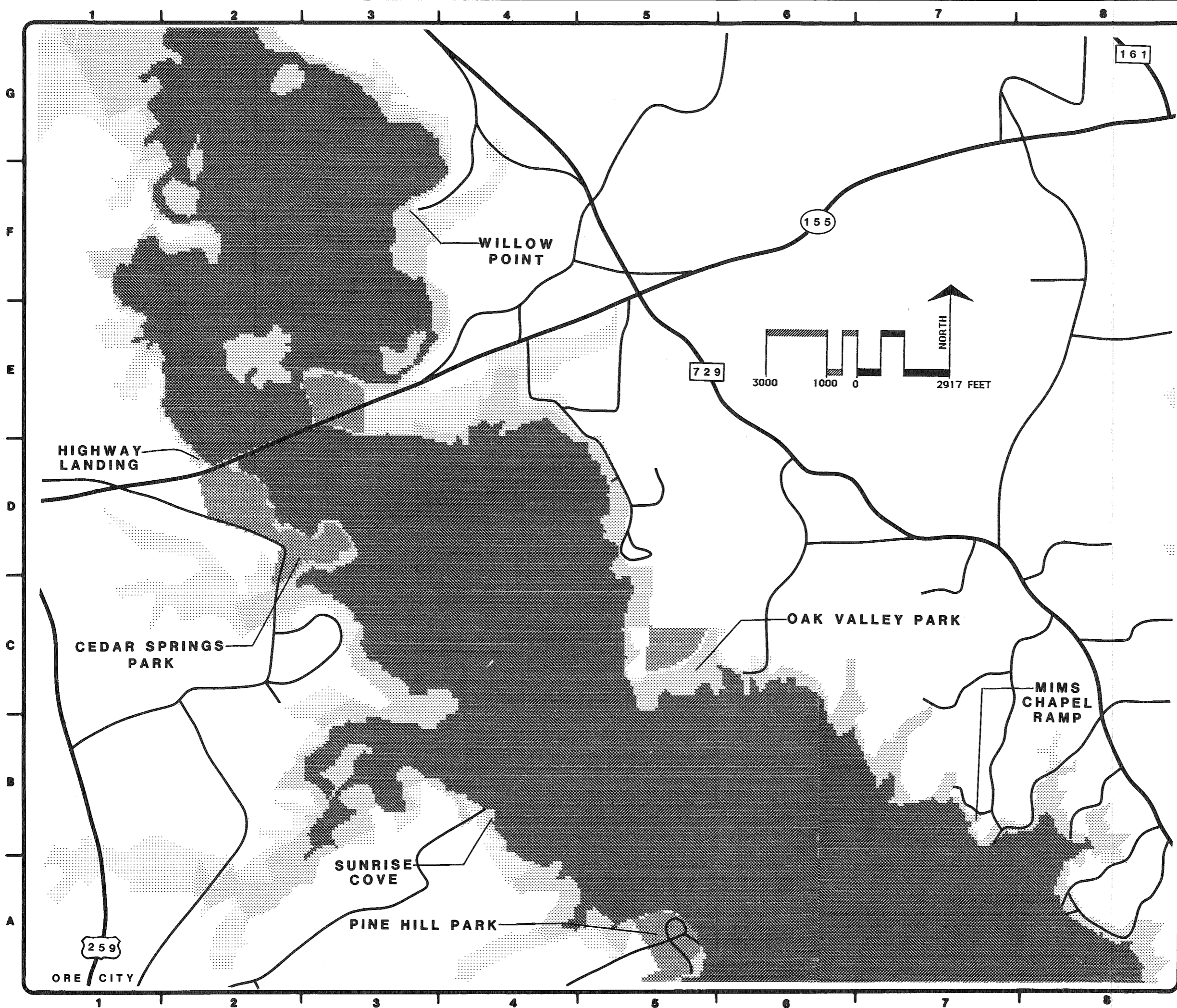
LAND ALLOCATION

INVITATION NO. _____ DATE: _____

CONTRACT NO. _____ SHEET NO. _____

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LEGEND

PROJECT USES

OPERATIONS

- FEE LANDS ABOVE CONSERVATION POOL (ELEV. 228.5)
- FEE LANDS BELOW CONSERVATION POOL (ELEV. 228.5)

RECREATION

- LANDS PURCHASED FOR RECREATION PURPOSES

FLOWAGE EASEMENT

PERMIT TO FLOOD

ROADS

U. S. ARMY ENGINEER DISTRICT, FORT WORTH
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FORT WORTH, TEXAS

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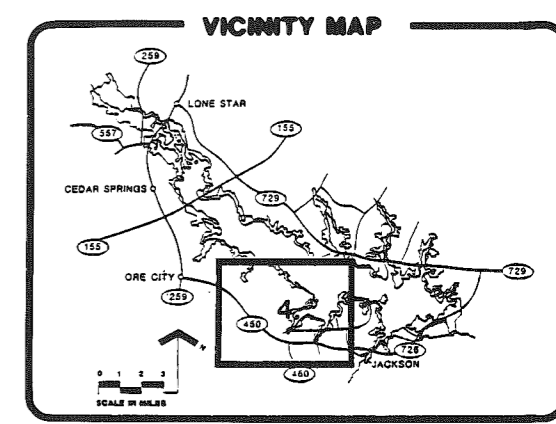
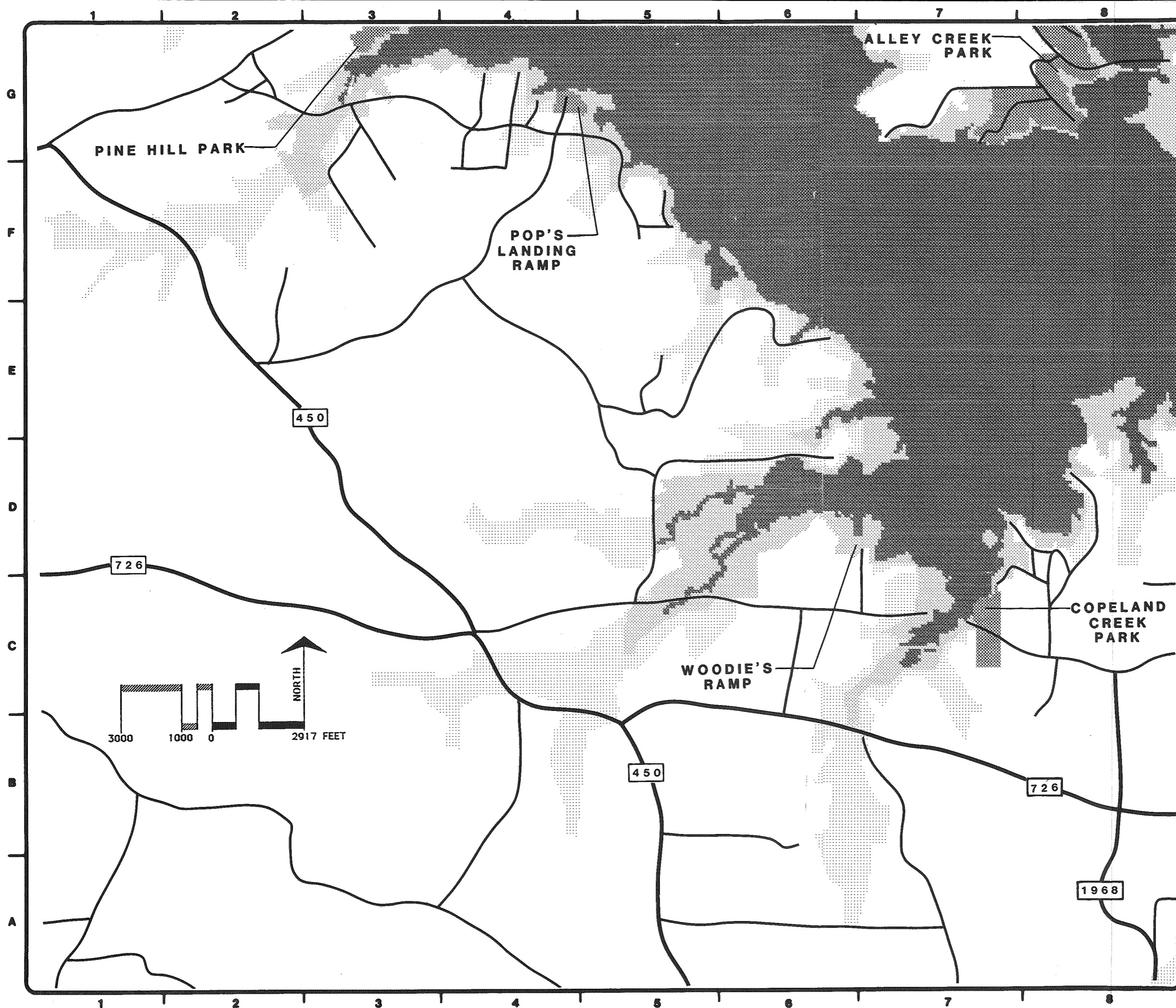
LAKE O' THE PINES
CYPRESS RIVER, TEXAS

LAND ALLOCATION

INVITATION NO. _____ DATE: _____

CONTRACT NO. _____ SHEET NO. 3 OF 7

DRAWING NUMBER _____ SEQUENCE NO. 5-1



LEGEND

PROJECT USES

OPERATIONS

- FEE LANDS ABOVE CONSERVATION POOL (ELEV. 228.5)
- FEE LANDS BELOW CONSERVATION POOL (ELEV. 228.5)

RECREATION

- LANDS PURCHASED FOR RECREATION PURPOSES

FLOWAGE EASEMENT

PERMIT TO FLOOD

ROADS

U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

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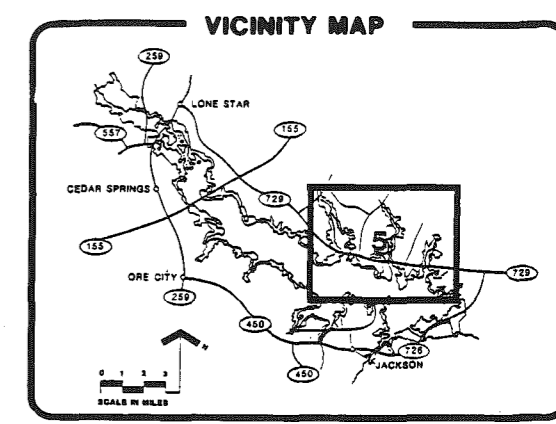
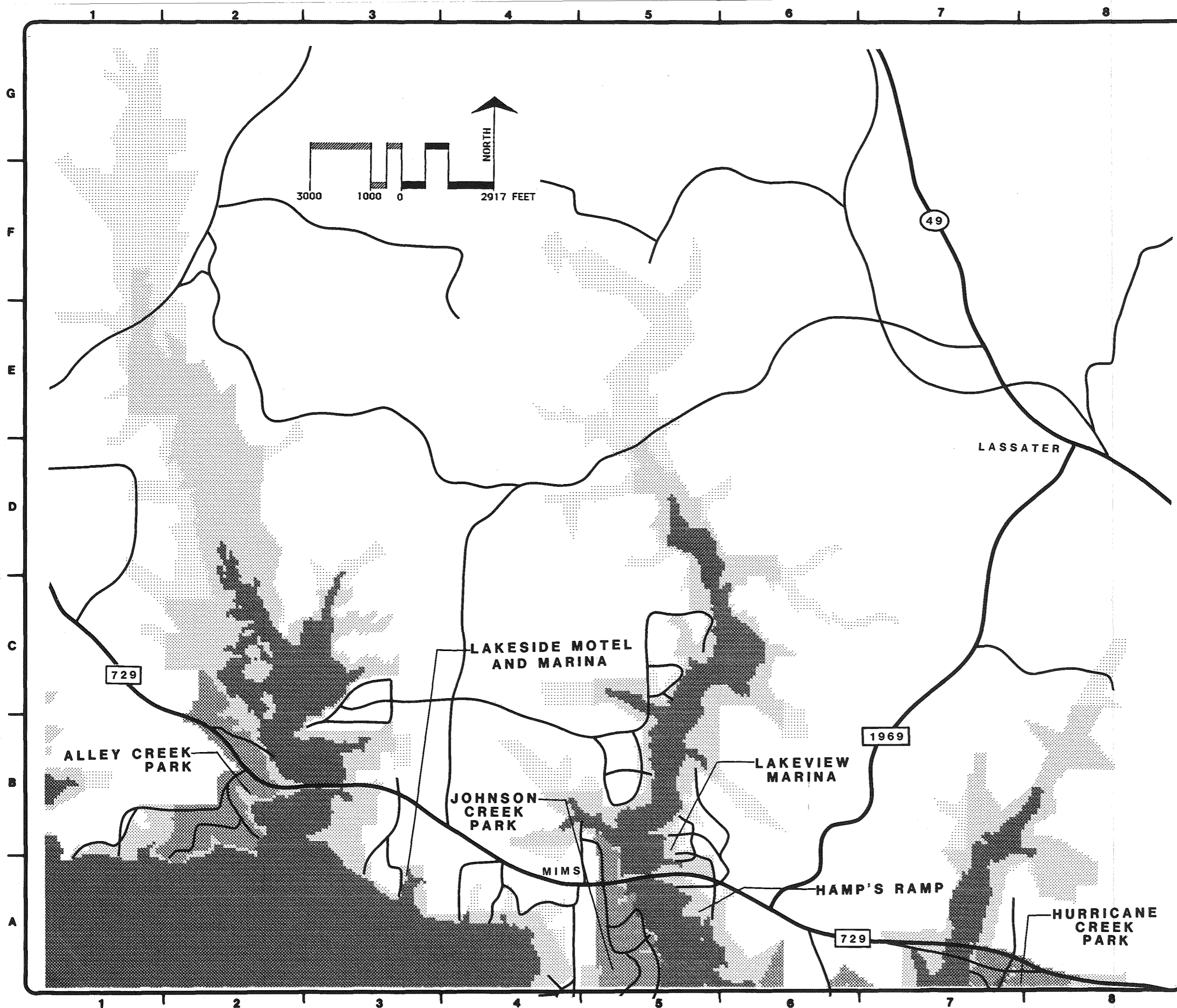
LAKE O' THE PINES
CYPRESS RIVER, TEXAS

LAND ALLOCATION

INVITATION NO. _____ DATE: _____

CONTRACT NO. _____ SHEET NO. 4 of 7

DRAWING NUMBER _____ NO. 5-1



LEGEND

PROJECT USES

OPERATIONS

- FEE LANDS ABOVE CONSERVATION POOL (ELEV. 228.5)
- FEE LANDS BELOW CONSERVATION POOL (ELEV. 228.5)

RECREATION

- LANDS PURCHASED FOR RECREATION PURPOSES

FLOWAGE EASEMENT

PERMIT TO FLOOD

ROADS

U. S. ARMY ENGINEER DISTRICT, FORT WORTH
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FORT WORTH, TEXAS

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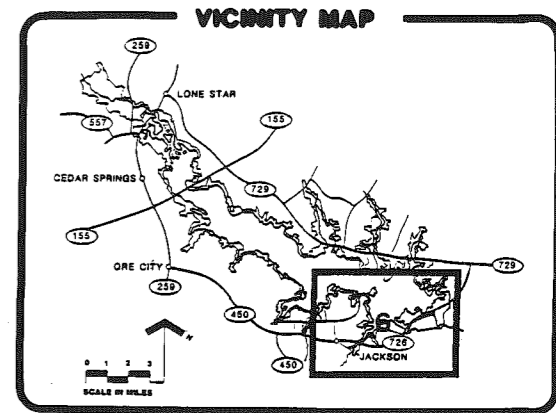
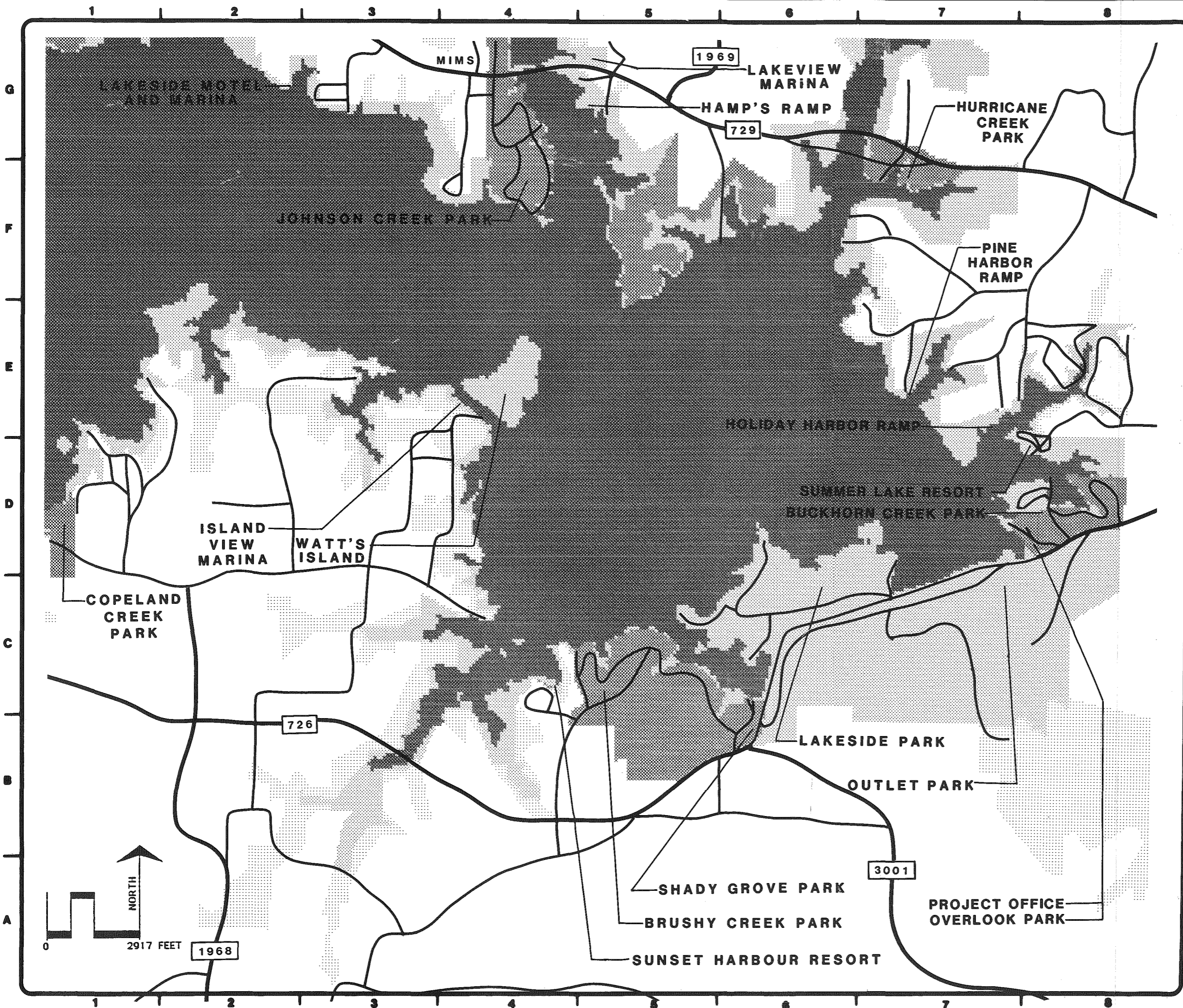
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LAKE O' THE PINES
CYPRESS RIVER, TEXAS

LAND ALLOCATION

INVITATION NO.	DATE:
CONTRACT NO.	SHEET NO. 5 of 7
DRAWING NUMBER	NO. 1



LEGEND

PROJECT USES

OPERATIONS

- FEE LANDS ABOVE CONSERVATION POOL (ELEV. 228.5)
- FEE LANDS BELOW CONSERVATION POOL (ELEV. 228.5)

RECREATION

- LANDS PURCHASED FOR RECREATION PURPOSES

FLOWAGE EASEMENT

PERMIT TO FLOOD

ROADS

U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

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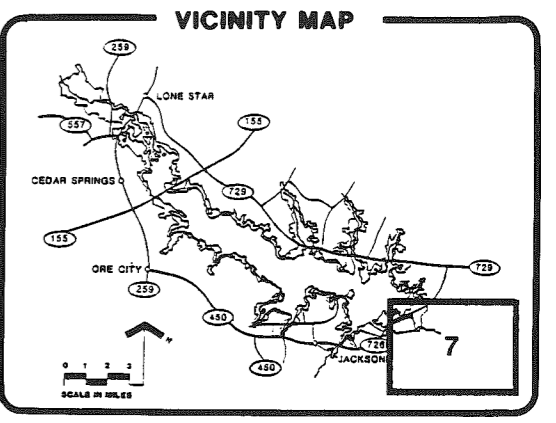
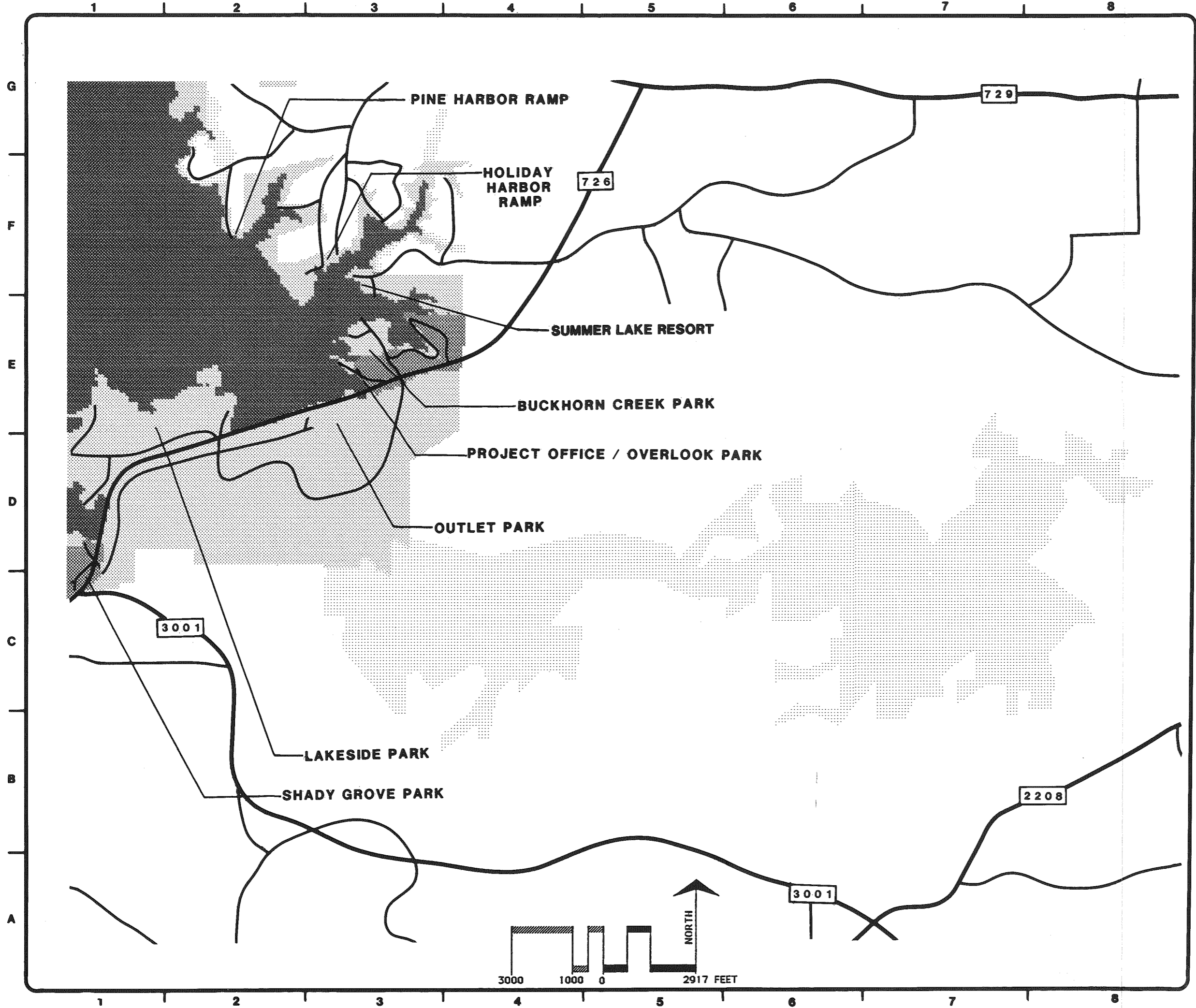
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LAKE O' THE PINES
CYPRUS RIVER, TEXAS

LAND ALLOCATION

DATE: _____

CONTRACT NO. _____ SHEET NO. 6 OF 7 DRAWING NUMBER 5-1



LEGEND

PROJECT USES

OPERATIONS

- FEE LANDS ABOVE CONSERVATION POOL (ELEV. 228.5)
- FEE LANDS BELOW CONSERVATION POOL (ELEV. 228.5)

RECREATION

- LANDS PURCHASED FOR RECREATION PURPOSES

FLOWAGE EASEMENT

PERMIT TO FLOOD

ROADS

U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: _____
DRAWN BY: _____
REVIEWED BY: _____

LAKE O' THE PINES
CYPRESS RIVER, TEXAS

LAND ALLOCATION

INVITATION NO.	DATE:
CONTRACT NO.	SHEET NO. 7 of 7
DRAWING NUMBER	SEQUENCE NO. 5-1

5-03 LAND USE CLASSIFICATION

All lands have been acquired for authorized project purposes and allocated for these uses. The classification process is a further distribution of project lands by management categories which, based upon resources available and public needs, provide for full utilization while protecting project resources. Land use classification categories identified in ER 1130-2-435 allow five major categories of use at Lake O' the Pines: (1) project operations, (2) recreation, (3) environmentally sensitive areas, (4) multiple resource management and (5) easement lands. Those lands designated as multiple resource management lands are reserved and used for one or more of the following: (a) recreation - low density, (b) wildlife management general, (c) vegetative management, or (d) inactive and/or future recreation area. Refer to Plate Sequence 5-2 for location of those lands classified for specific uses at Lake O' the Pines.

a. Project Operations. These lands are designated to provide for safe, efficient operation of the project. This includes those lands required for the embankment structure, operations center, office, maintenance compound, material storage area, intake structures, outlet works, and spillway corridor.

b. Recreation. This includes land developed for intensive recreational activities by the visiting public, including developed recreation areas and areas for concession, resort, and quasi-public development. Future recreation areas will be classified as multiple resource management until initiation of proposed development. On Plate Sequence 5-2, recreation lands are further identified as those lands managed by the (1) Corps, (2) counties, or (3) concessionaires.

c. Environmentally Sensitive Areas. This includes areas where cultural or aesthetic features have been identified. Each of these areas are identified on Plate Sequence 5-2, and are supported by narrative explaining the rationale for the classification. Some of these areas fall within one of the other classification categories. It is critical that management protect these sensitive areas from adverse impacts. No agricultural or grazing leases are permitted on this land.

1. Cultural Resources. Though the majority of known sites at Lake O' the Pines are inundated, a number of sites still lie above conservation pool elevation 228.5. Many of these sites have been vandalized and no longer exist. Areas marked on Plate Sequence 5-2 designate Federal property on which any of a range of cultural properties, prehistoric to historic, may exist. These areas may require future work in identification or protection of these cultural resources. Measures to preserve and protect cultural resources are clearly outlined in ER 1130-2-438.

2. Aesthetically Sensitive Shoreline. Nearly all of the shoreline surrounding the lake has been designated as an environmentally sensitive area. Most of the shoreline is forested, which provides good erosion control and visual screening of adjacent developments. It is important to preserve this forested shoreline where possible. In those areas where the forest screen is light or lacking, efforts should be made to develop a screen to reduce the visual impacts of residential homes, subdivisions and other developments.

d. Multiple Resource Management. These lands are managed for one or more of the following uses and can occur on lands classified for other uses.

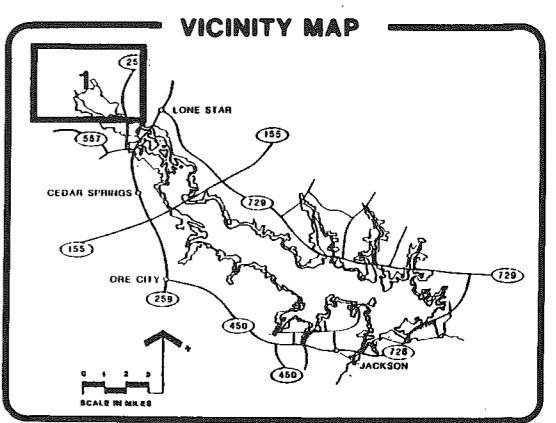
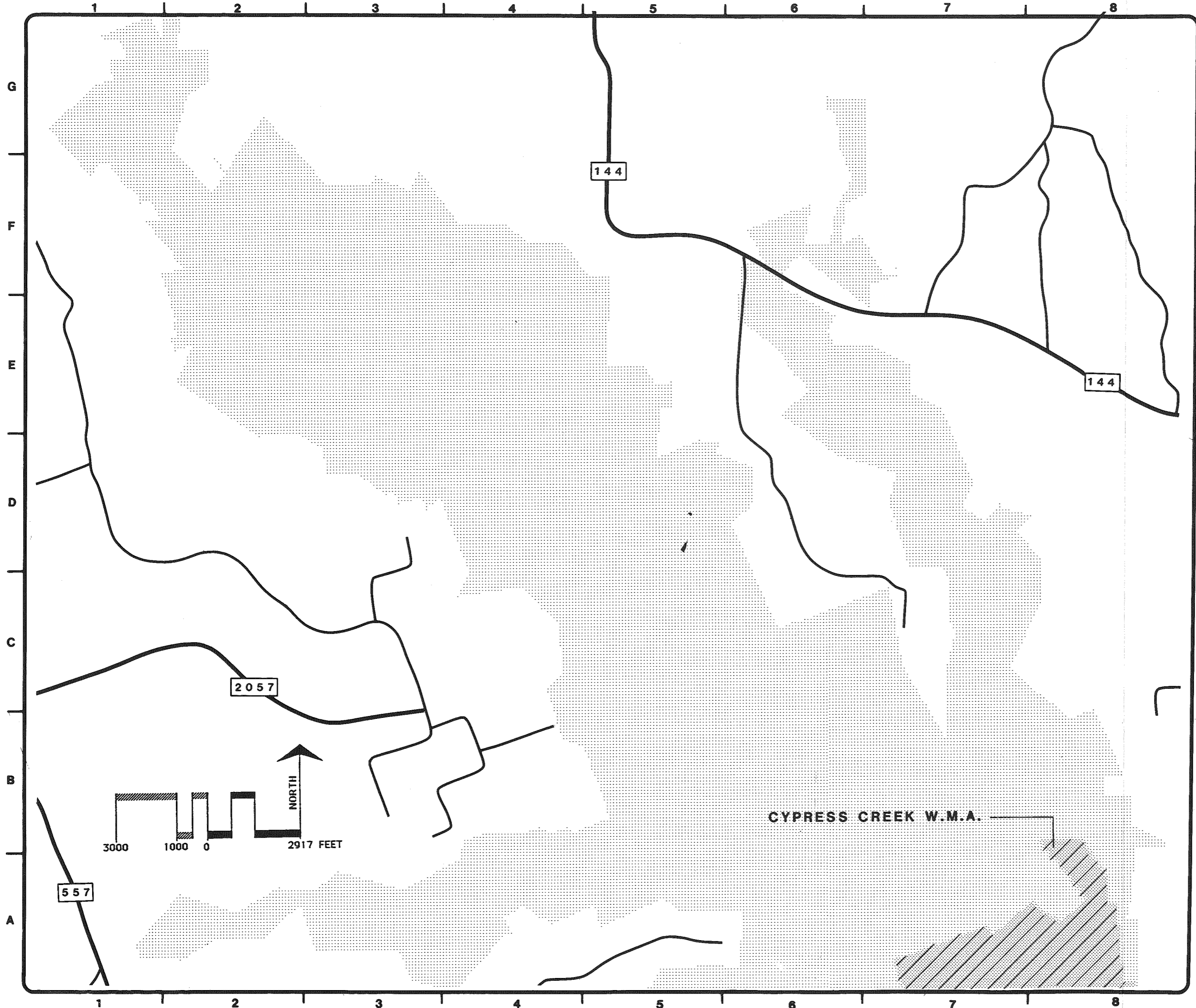
1. Recreation - Low Density. Activities which will occur in these areas include hiking, primitive camping, wildlife observation, hunting, or similar low density recreational activities.

2. Wildlife Management. Activities which will occur in these areas include fish and wildlife management activities. Lands in this sub-category will be evaluated for consideration for lease or license to the Department of the Interior or the state.

3. Vegetative Management. Activities which will occur in these areas include development or control of forest or other vegetative cover.

4. Inactive and/or Future Recreation Areas. Activities which will occur in these areas include recreation areas planned for the future and those which have been temporarily closed. These lands will be classified as multiple resource management as an interim use.

e. Easement Lands. This includes all lands for which the Corps holds an easement interest but not fee title. Planned use and management of easement lands will be in strict accordance with the terms and conditions of the easement estate acquired for the project.



LEGEND

LAND USE ZONES

- ▬ PROJECT OPERATIONS
- ▨ RECREATION
- * CORPS OF ENGINEERS
- COUNTY
- CONCESSIONAIRE

MULTIPLE RESOURCE MGT.

- ▨ RECREATION LOW DENSITY
- ▨ WILDLIFE MGT. AREA
- ▨ VEGETATIVE MGT. AREA
- ▨ INACTIVE AND/OR FUTURE RECREATION AREA

ENVIRONMENTALLY SENSITIVE AREAS

- CULTURAL RESOURCES
- AESTHETICALLY SENSITIVE SHORELINE

EASEMENT LANDS

- ▨ CONSERVATION POOL 228.5
- ▨ PERMIT TO FLOOD
- ROADS

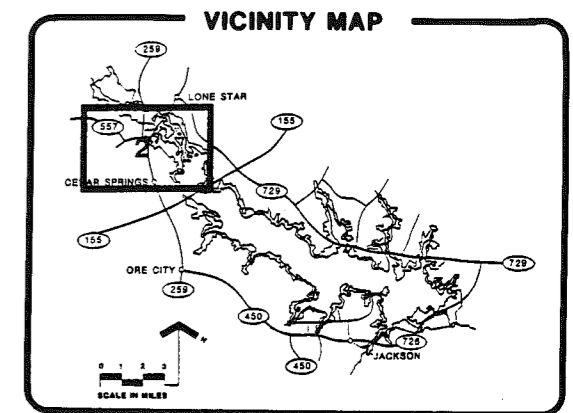
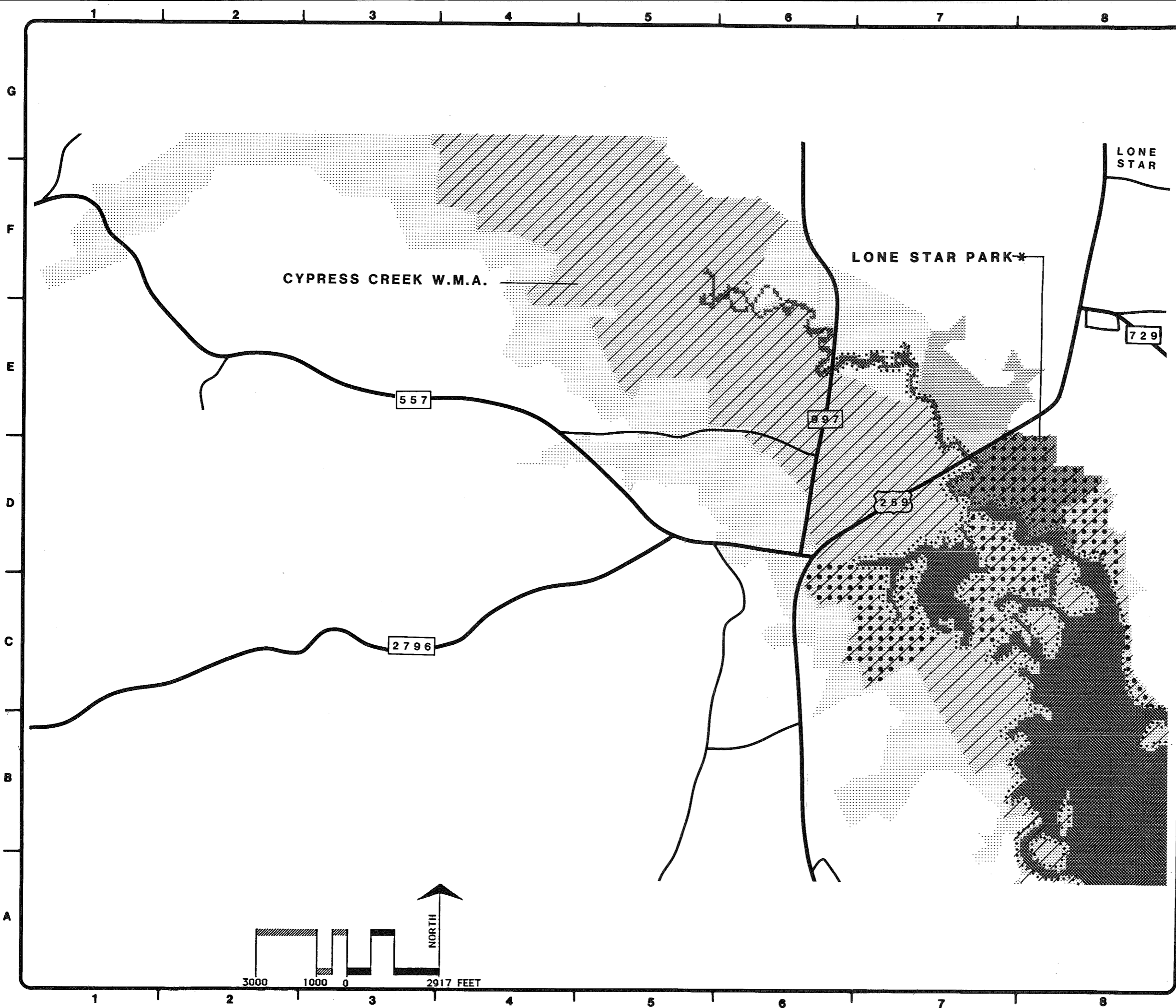
U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

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REVIEWED BY: _____

LAKE O' THE PINES
CYPRESS RIVER, TEXAS

LAND CLASSIFICATION

INVITATION NO. _____ DATE: _____
CONTRACT NO. _____ SHEET NO. _____ SEQUENCE NO. _____
DRAWING NUMBER _____ 1 of 7 5-2



LEGEND

LAND USE ZONES

- PROJECT OPERATIONS
- RECREATION
- CORPS OF ENGINEERS
- COUNTY
- CONCESSIONAIRE
- MULTIPLE RESOURCE MGT.**
- RECREATION LOW DENSITY
- WILDLIFE MGT. AREA
- VEGETATIVE MGT. AREA
- INACTIVE AND/OR FUTURE RECREATION AREA
- ENVIRONMENTALLY SENSITIVE AREAS**
- CULTURAL RESOURCES
- AESTHETICALLY SENSITIVE SHORELINE
- EASEMENT LANDS**
- CONSERVATION POOL 228.5
- PERMIT TO FLOOD
- ROADS

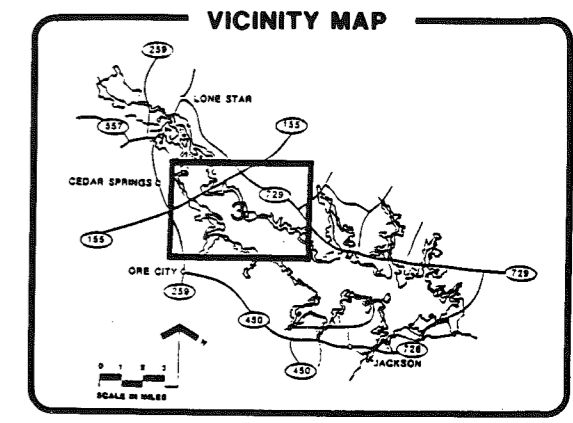
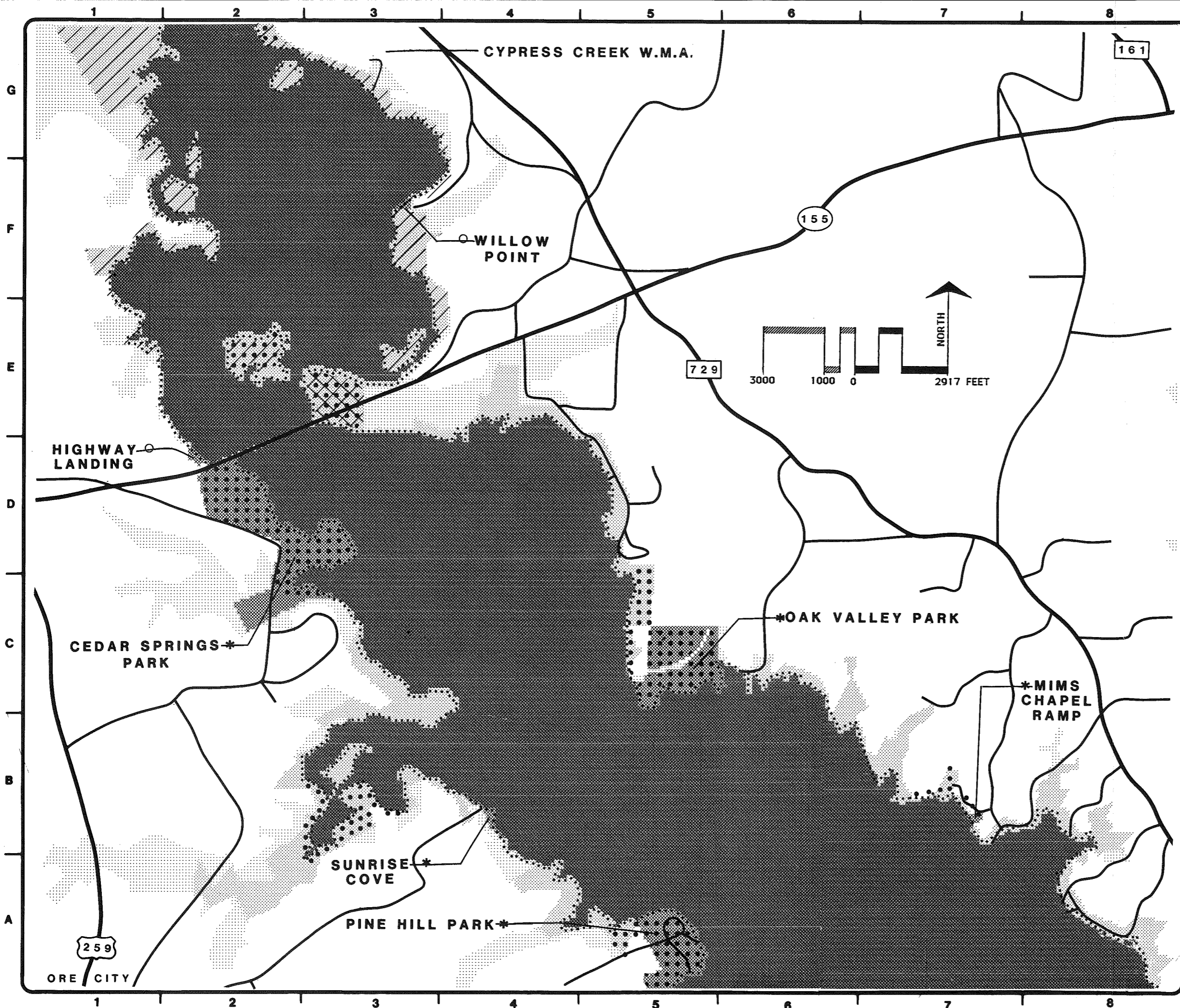
U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: _____
DRAWN BY: _____
REVIEWED BY: _____

LAKE O' THE PINES
CYPRESS RIVER, TEXAS

LAND CLASSIFICATION

INVITATION NO.	DATE:
CONTRACT NO.	SHEET NO. SEQUENCE
DRAWING NUMBER	2 of 7 5-2



LEGEND

LAND USE ZONES

- PROJECT OPERATIONS
- RECREATION
 - * CORPS OF ENGINEERS
 - COUNTY
 - CONCESSIONAIRE
- MULTIPLE RESOURCE MGT.**
 - RECREATION LOW DENSITY
 - WILDLIFE MGT. AREA
 - VEGETATIVE MGT. AREA
 - INACTIVE AND/OR FUTURE RECREATION AREA
- ENVIRONMENTALLY SENSITIVE AREAS**
 - CULTURAL RESOURCES
 - AESTHETICALLY SENSITIVE SHORELINE
- EASEMENT LANDS**
 - CONSERVATION POOL 228.5
 - PERMIT TO FLOOD
- ROADS

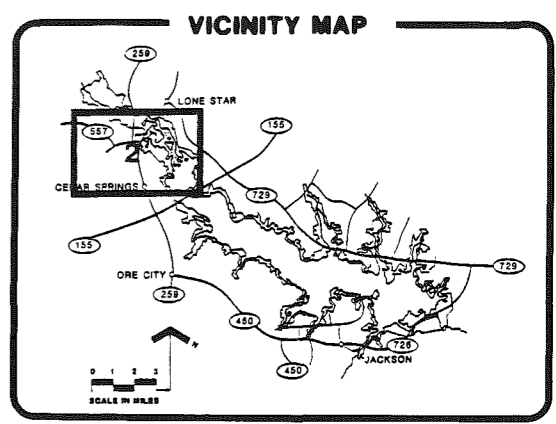
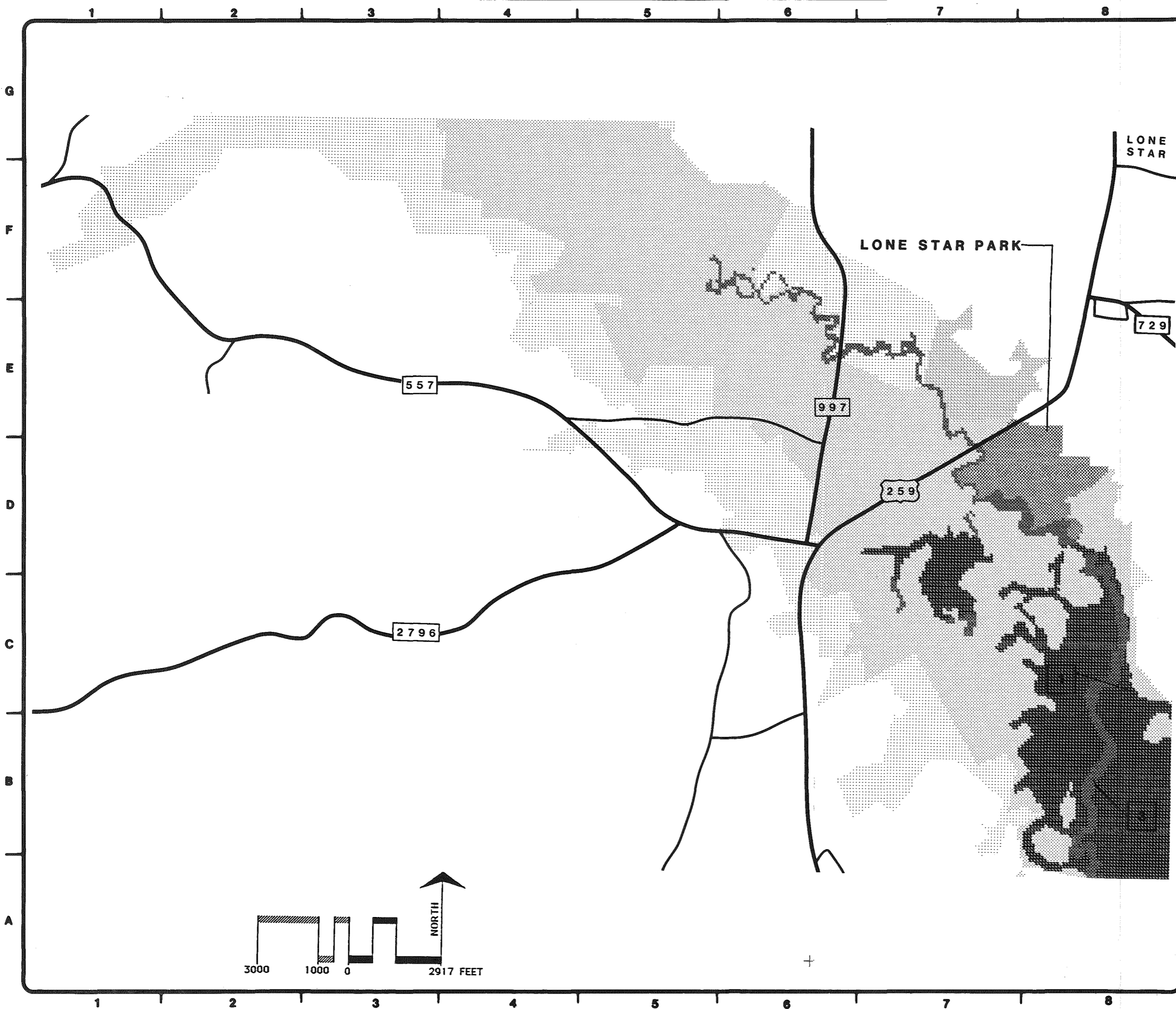
U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: _____
DRAWN BY: _____
REVIEWED BY: _____

LAKE O' THE PINES
CYPRESS RIVER, TEXAS

LAND CLASSIFICATION

INVITATION NO.	DATE:
CONTRACT NO.	SHEET NO. SEQUENCE
DRAWING NUMBER	3 OF 7 5-2



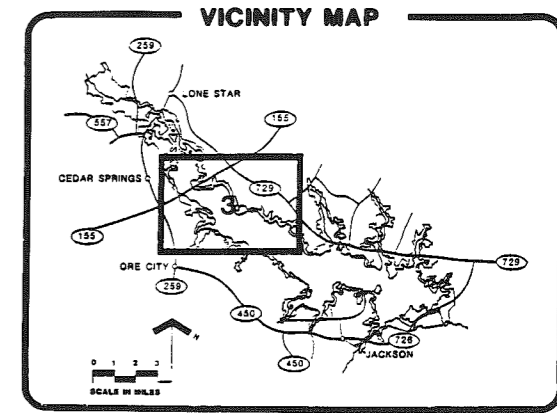
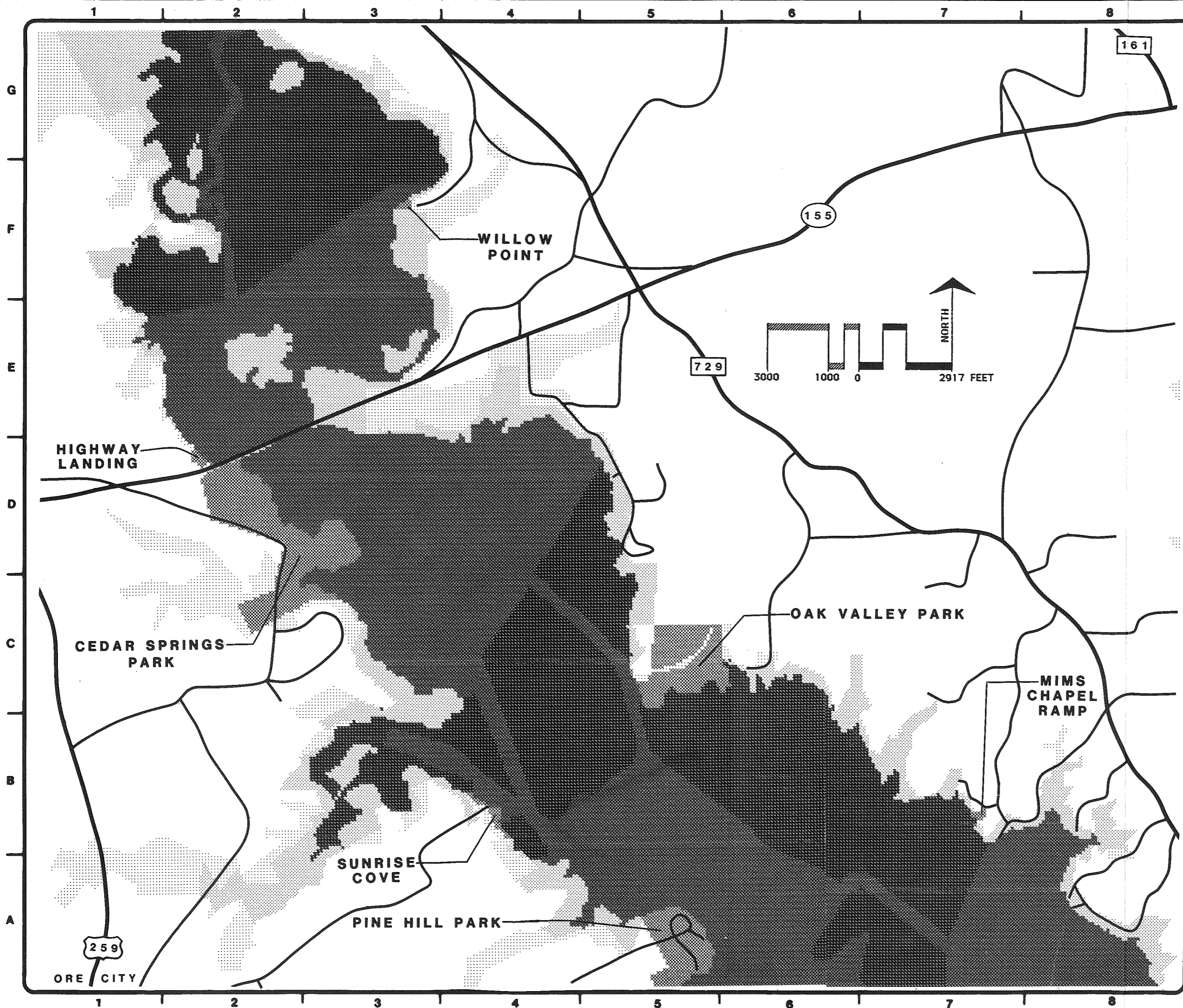
LEGEND

WATER USE RESTRICTIONS

- UNCLEARED TIMBER
- 1** RESTRICTED AREAS
- 2** LOW SPEED BOATING AREA
- 3** BOAT CHANNEL
- 4** SWIMMING AREA
- RECREATION AREAS
- FEE LANDS
- FLOWAGE EASEMENT
- PERMIT TO FLOOD
- CONSERVATION POOL ELEV. 228.5
- ROADS

U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY:	LAKE O' THE PINES CYPRESS RIVER, TEXAS
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REVIEWED BY:	
WATER USE PLAN	
INVITATION NO.	DATE:
CONTRACT NO.	SHEET NO. SEQUENCE NO.
DRAWING NUMBER	2 of 7 5-3



LEGEND

WATER USE RESTRICTIONS

- UNCLEARED TIMBER
- 1** RESTRICTED AREAS
- 2** LOW SPEED BOATING AREA
- 3** BOAT CHANNEL
- 4** SWIMMING AREA
- RECREATION AREAS
- FEE LANDS
- FLOWAGE EASEMENT
- PERMIT TO FLOOD
- CONSERVATION POOL ELEV. 228.5
- ROADS

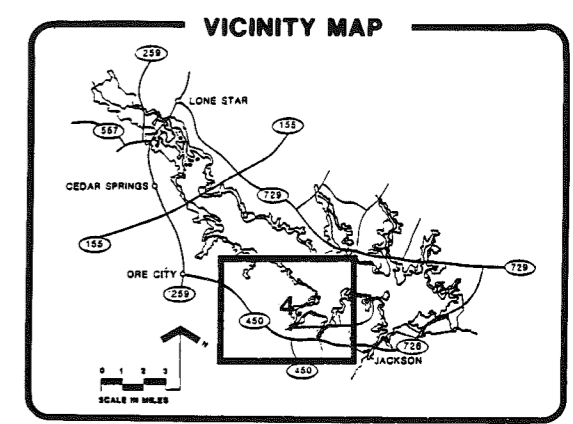
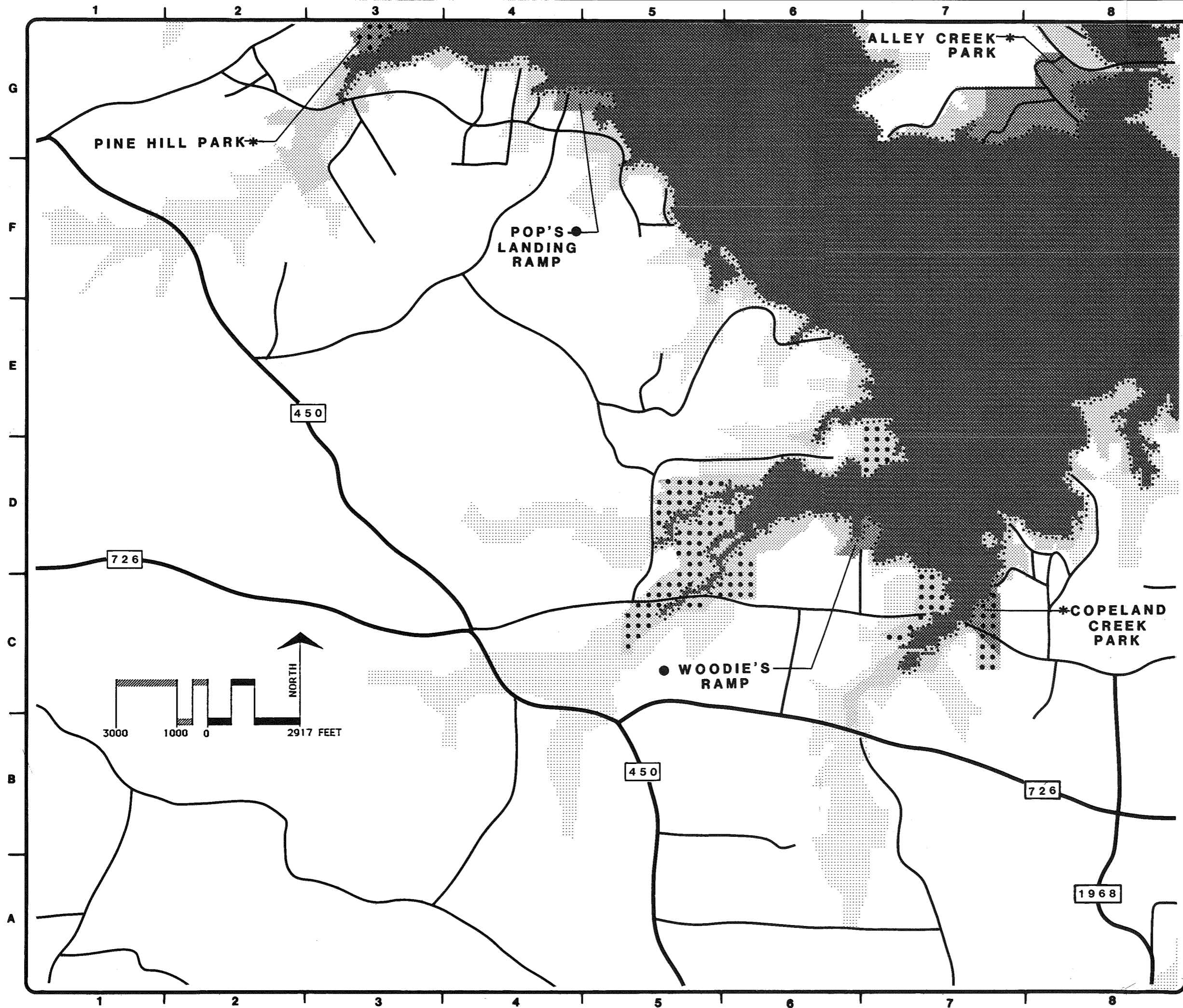
U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

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LAKE O' THE PINES
CYPRESS RIVER, TEXAS

WATER USE PLAN

INVITATION NO. _____ DATE: _____
CONTRACT NO. _____ SHEET NO. 3 of 7
DRAWING NUMBER _____ SEQUENCE NO. 5-3



LEGEND

LAND USE ZONES

- PROJECT OPERATIONS
- RECREATION
- * CORPS OF ENGINEERS
- COUNTY
- CONCESSIONAIRE

MULTIPLE RESOURCE MGT.

- RECREATION LOW DENSITY
- WILDLIFE MGT. AREA
- VEGETATIVE MGT. AREA
- INACTIVE AND/OR FUTURE RECREATION AREA

ENVIRONMENTALLY SENSITIVE AREAS

- CULTURAL RESOURCES
- AESTHETICALLY SENSITIVE SHORELINE

EASEMENT LANDS

- CONSERVATION POOL 228.5
- PERMIT TO FLOOD
- ROADS

U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

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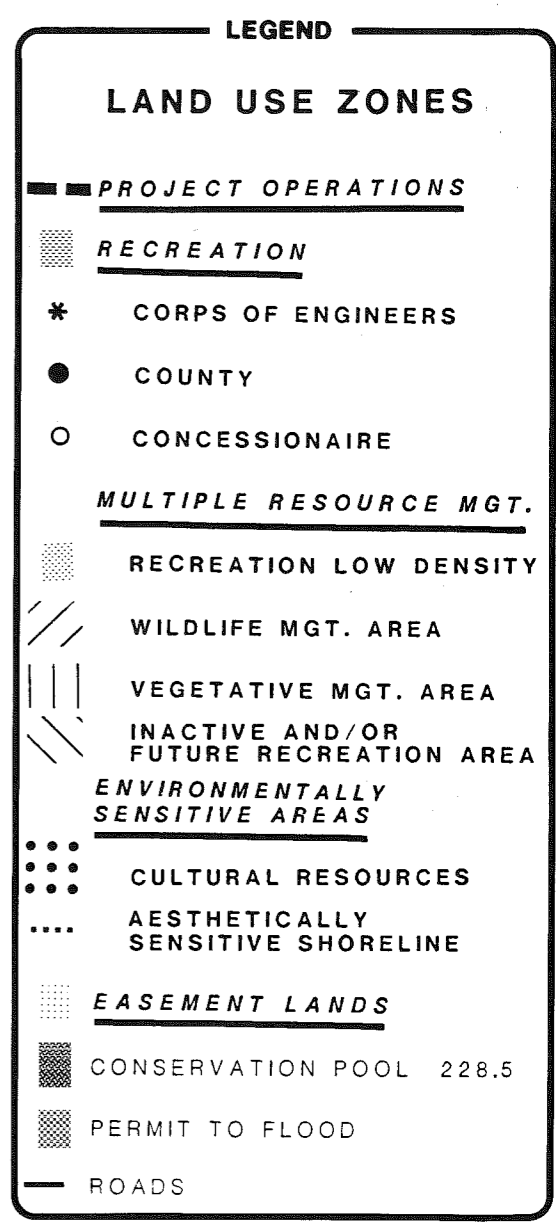
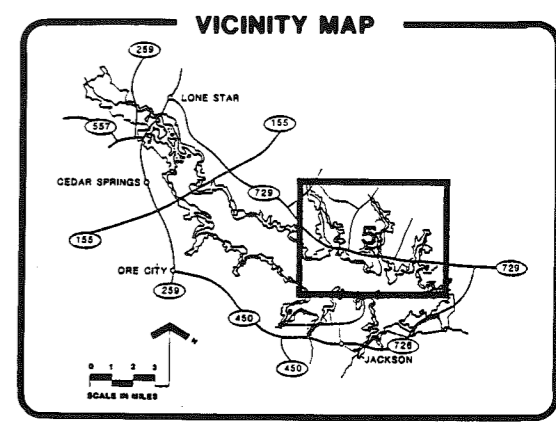
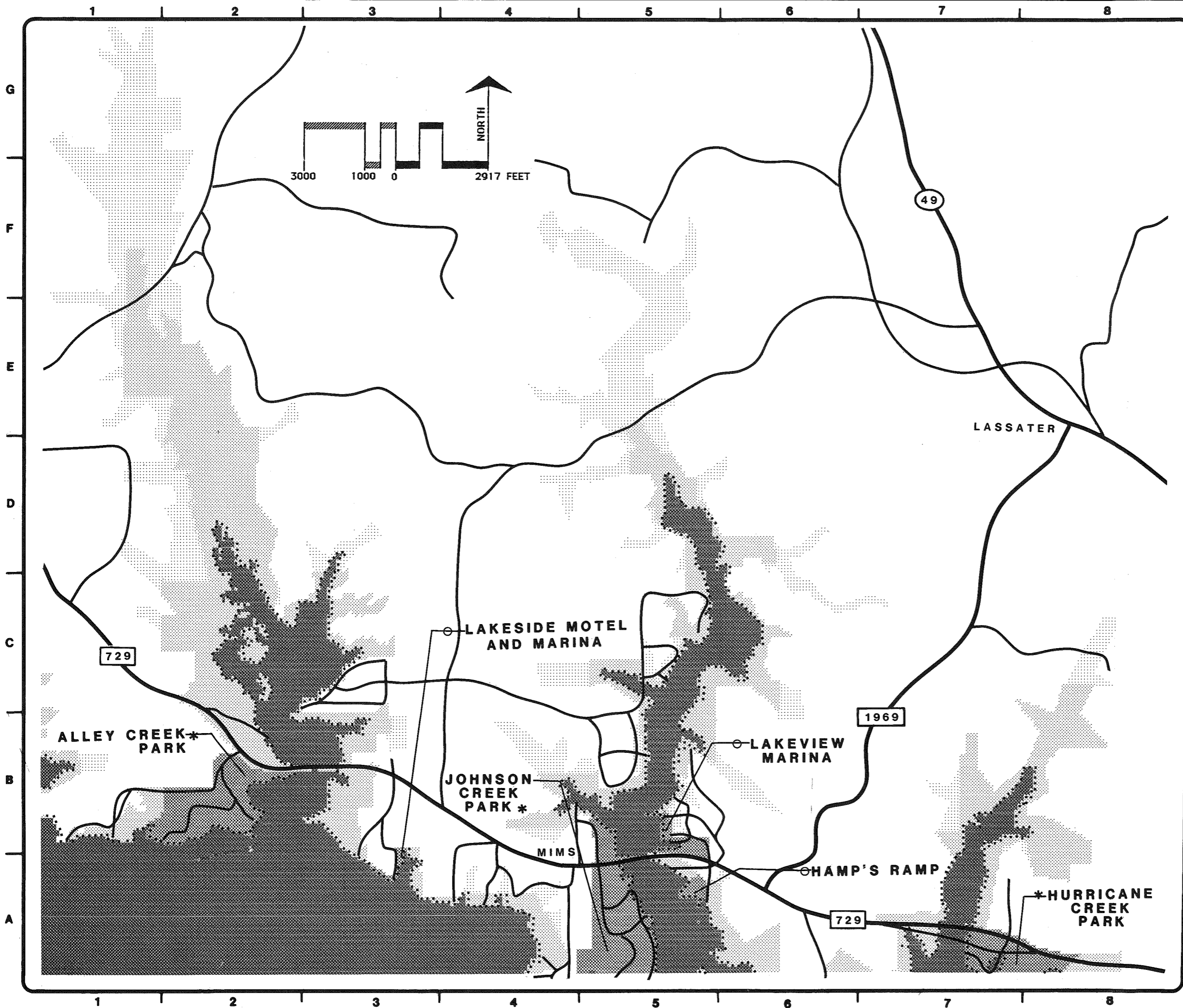
LAKE O' THE PINES
CYPRESS RIVER, TEXAS

LAND CLASSIFICATION

INVITATION NO. _____ DATE: _____

CONTRACT NO. _____ SHEET NO. 4 OF 7 SEQUENCE NO. 5-2

DRAWING NUMBER _____



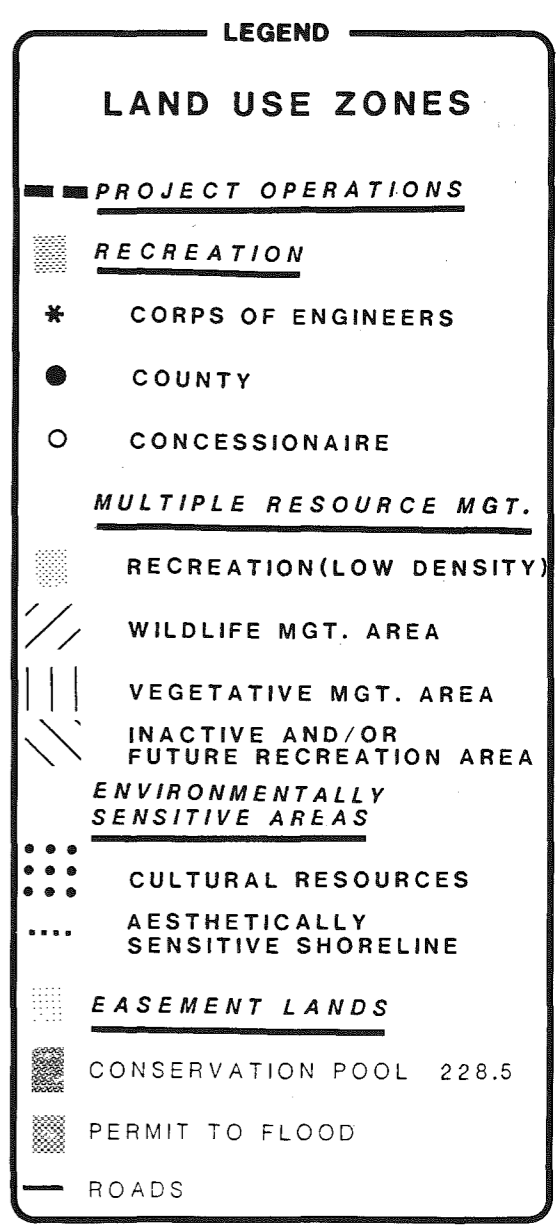
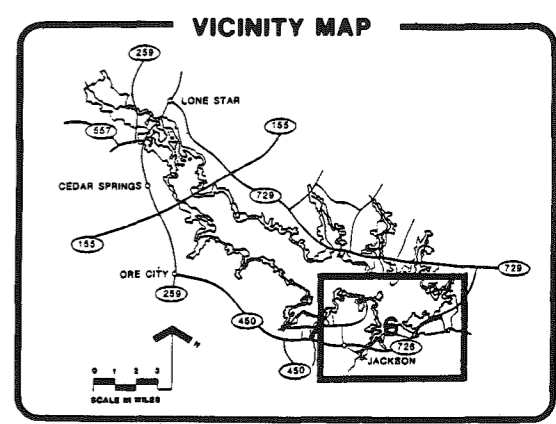
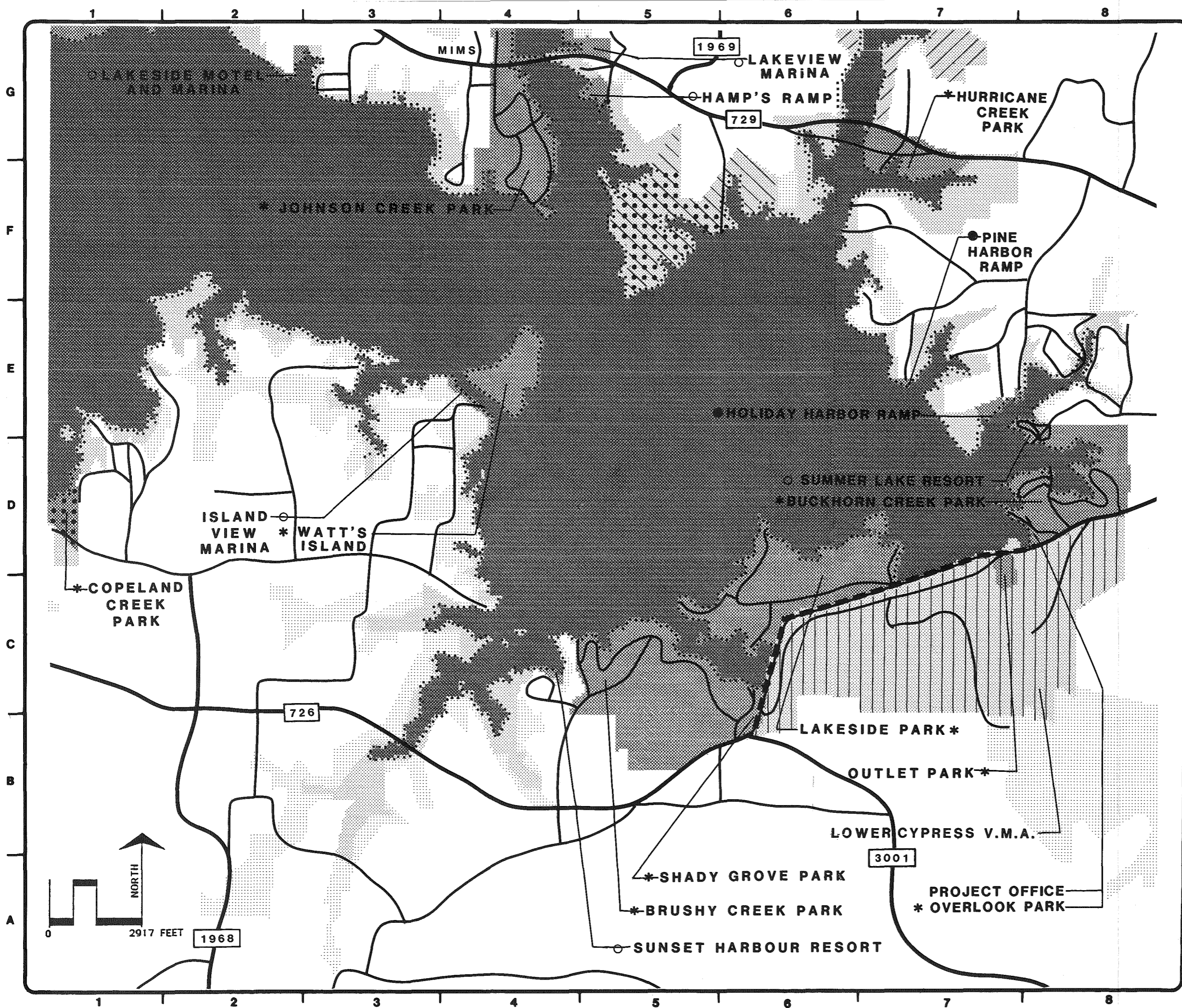
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LAND CLASSIFICATION

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 CONTRACT NO. _____ SHEET NO. SEQUENCE NO. _____
 DRAWING NUMBER 5 of 7 5-2



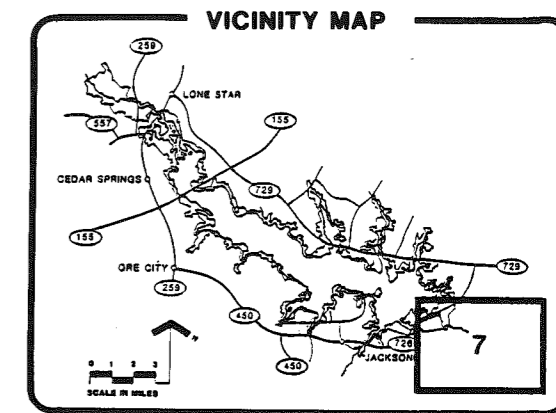
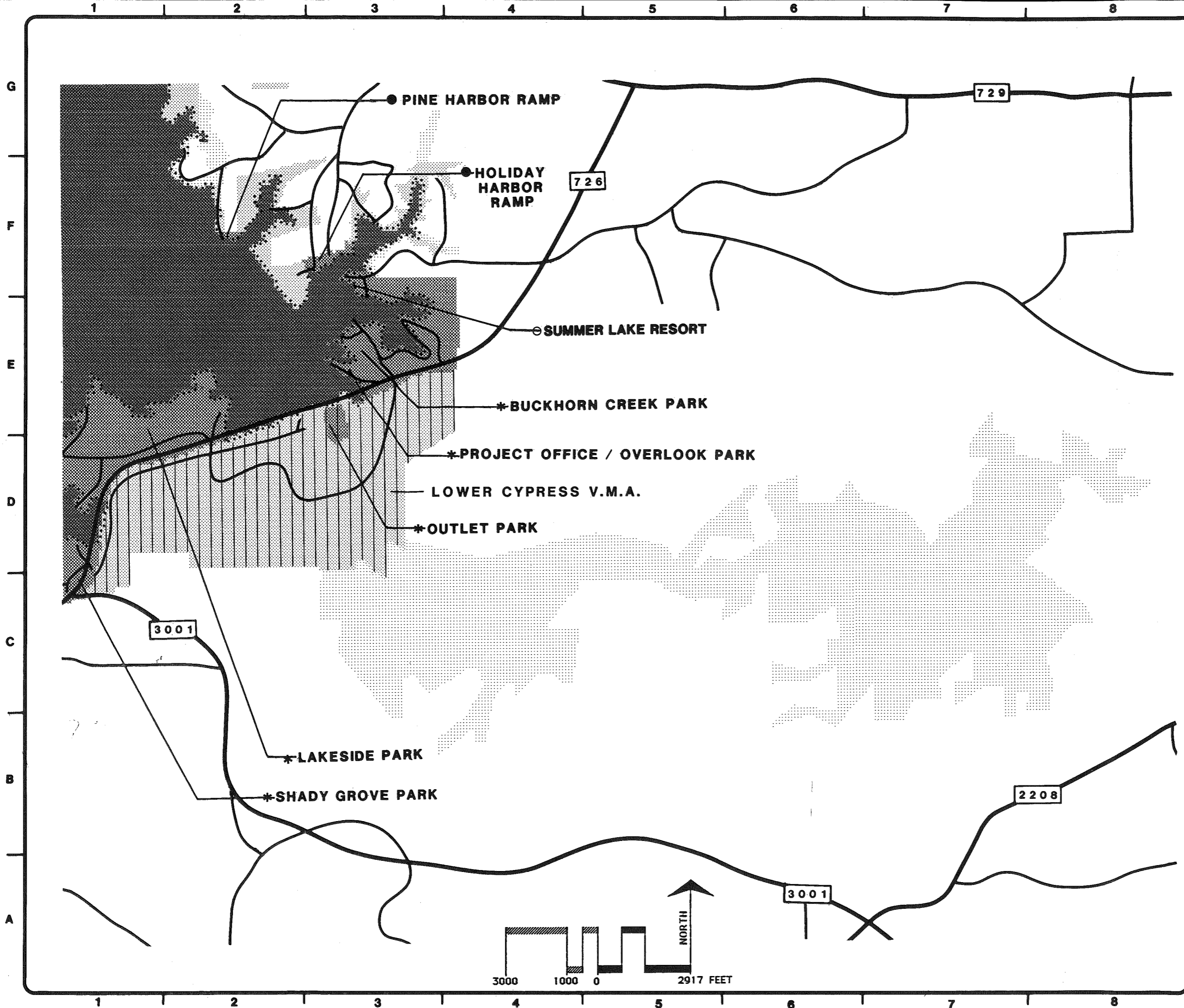
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DRAWING NUMBER 6 of 7 5-2



LEGEND

LAND USE ZONES

- PROJECT OPERATIONS
- RECREATION
- CORPS OF ENGINEERS
- COUNTY
- CONCESSIONAIRE
- MULTIPLE RESOURCE MGT.**
- RECREATION LOW DENSITY
- WILDLIFE MGT. AREA
- VEGETATIVE MGT. AREA
- INACTIVE AND/OR FUTURE RECREATION AREA
- ENVIRONMENTALLY SENSITIVE AREAS**
- CULTURAL RESOURCES
- AESTHETICALLY SENSITIVE SHORELINE
- EASEMENT LANDS
- CONSERVATION POOL 228.5
- PERMIT TO FLOOD
- ROADS

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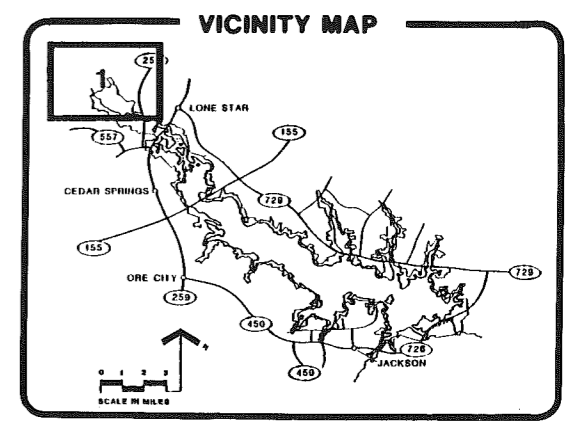
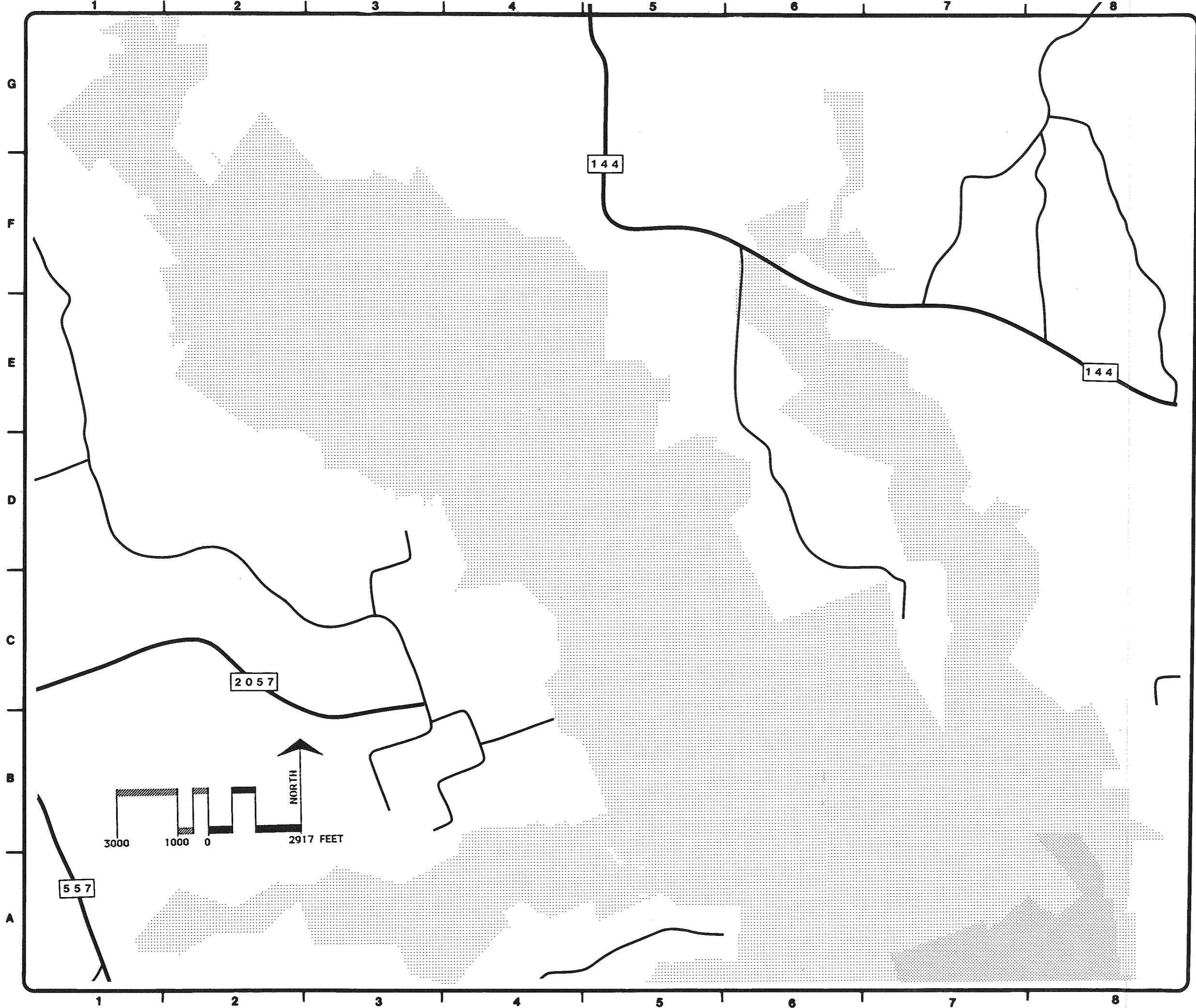
**LAND
CLASSIFICATION**

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DRAWING NUMBER _____

5-04 WATER USE CLASSIFICATIONS

Water use areas are designated to minimize safety hazards while allowing maximum utilization of all the water areas available. Due to occasional drawdowns, the water areas will be marked with buoys according to corresponding uses, restrictions and rules (see Plate Sequence 5-3). A description of these areas is presented below.

- a. Swimming Areas.** All authorized swimming areas will be identified by project signs and buoys. Only swimming and related activities will be allowed in these areas. Areas of high boating activity such as boat ramps and marinas will be located far enough from swimming areas so as to reduce the effects of boating wakes and oil and gas pollution.
- b. Restricted Areas.** Water areas within 300 feet of the outlet spillway, and other water intake structures are restricted from public use and will be so marked.
- c. Low Speed Boating Areas.** Congested areas, such as boat ramps, marina moorings, and beaches, where high speed boating and the associated wakes create a potential for accidents or property damage will be designated as low speed boating areas.
- d. Uncleared Areas.** Uncleared (timbered) areas exist where surface and subsurface debris create a hazard to any type of boating activity.
- e. Boat Channel.** Boats and vessels will not be allowed to anchor in the travel portion of any channel so as to prevent, impede, or interfere with the safe passage of other boats.
- f. Low Pool Hazards.** Low pool hazards are subsurface structures such as old bridges, embankments, etc. which become hazardous to boaters at elevations lower than normal pool. No low pool hazards have been identified at Lake O' the Pines.



LEGEND

WATER USE RESTRICTIONS

- UNCLEARED TIMBER
- 1** RESTRICTED AREAS
- 2** LOW SPEED BOATING AREA
- 3** BOAT CHANNEL
- 4** SWIMMING AREA
- RECREATION AREAS
- FEE LANDS
- FLOWAGE EASEMENT
- PERMIT TO FLOOD
- CONSERVATION POOL ELEV. 228.5
- ROADS

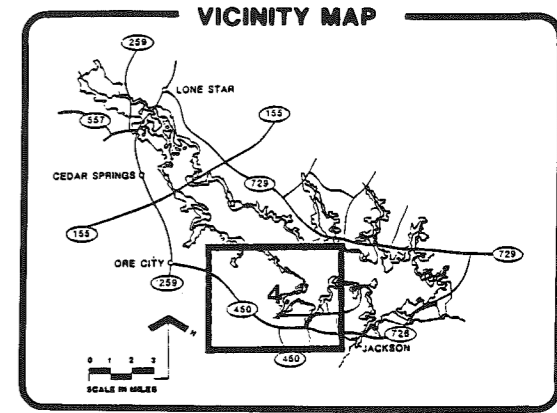
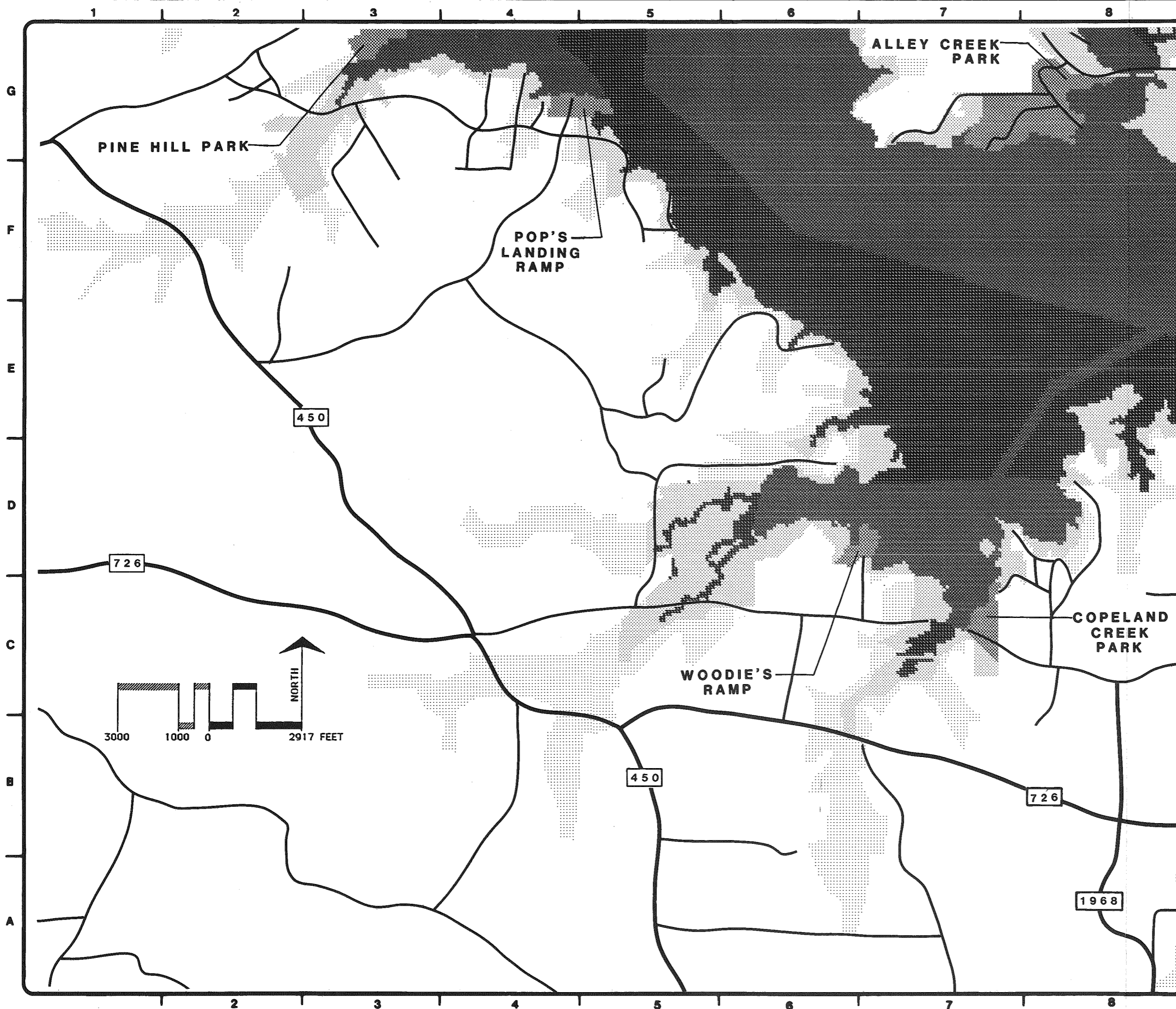
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WATER USE PLAN

INVITATION NO.	DATE:
CONTRACT NO.	SHEET NO. SEQUENCE NO.
DRAWING NUMBER	1 of 7 5-3



LEGEND

WATER USE RESTRICTIONS

- UNCLEARED TIMBER
- 1** RESTRICTED AREAS
- 2** LOW SPEED BOATING AREA
- 3** BOAT CHANNEL
- 4** SWIMMING AREA
- RECREATION AREAS
- FEE LANDS
- FLOWAGE EASEMENT
- PERMIT TO FLOOD
- CONSERVATION POOL ELEV. 228.5
- ROADS

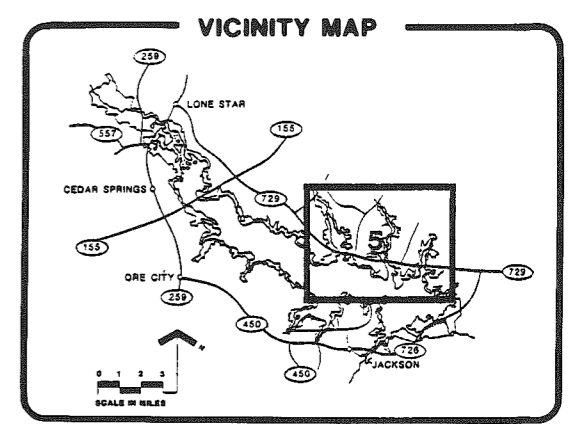
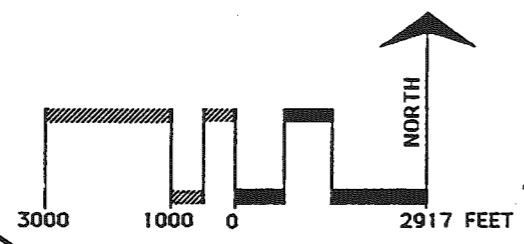
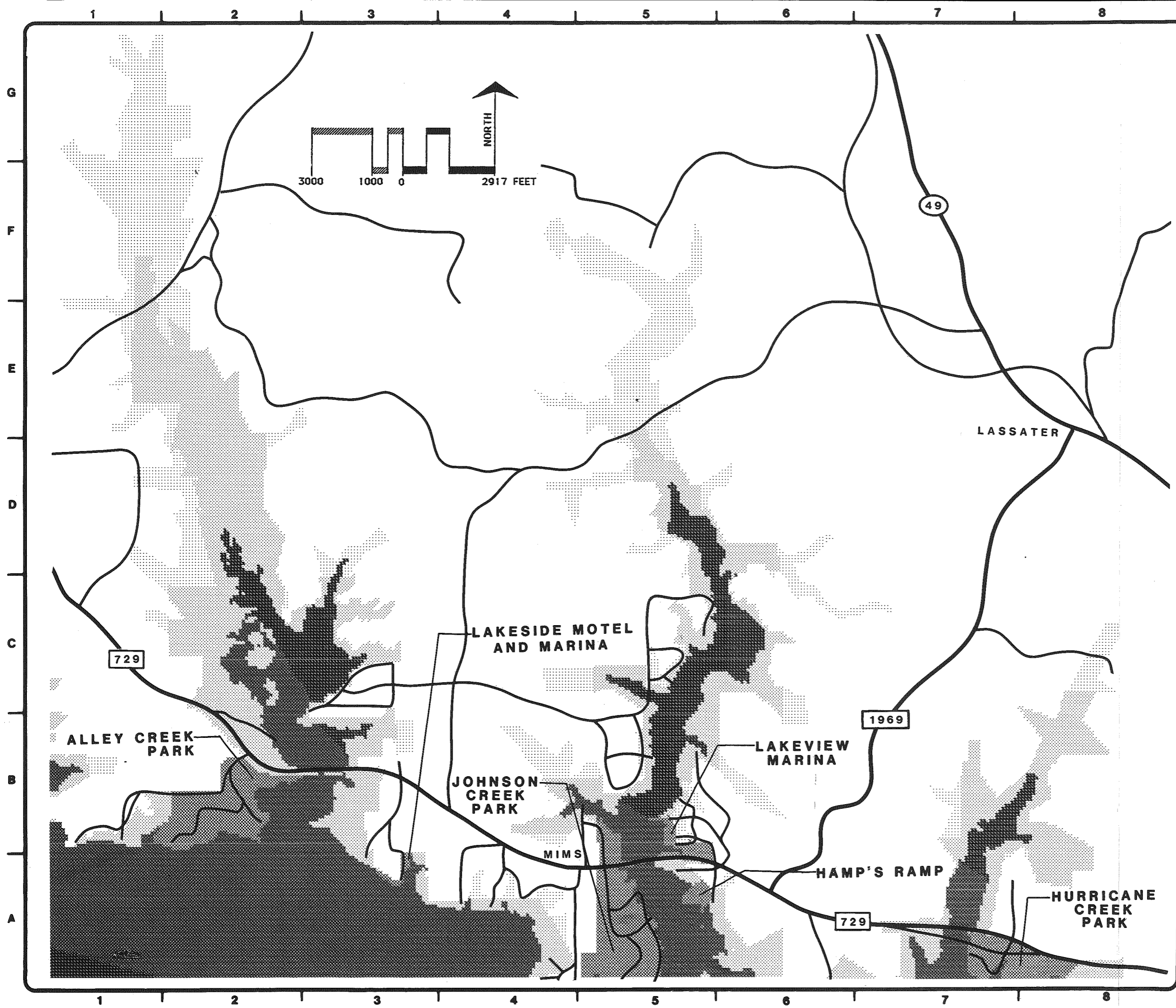
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WATER USE PLAN

INVITATION NO. _____ DATE: _____
CONTRACT NO. _____ SHEET NO. SEQUENCE
DRAWING NUMBER 4 of 7 5-3



LEGEND

WATER USE RESTRICTIONS

- UNCLEARED TIMBER
- 1** RESTRICTED AREAS
- 2** LOW SPEED BOATING AREA
- 3** BOAT CHANNEL
- 4** SWIMMING AREA
- RECREATION AREAS
- FEE LANDS
- FLOWAGE EASEMENT
- PERMIT TO FLOOD
- CONSERVATION POOL ELEV. 228.5
- ROADS

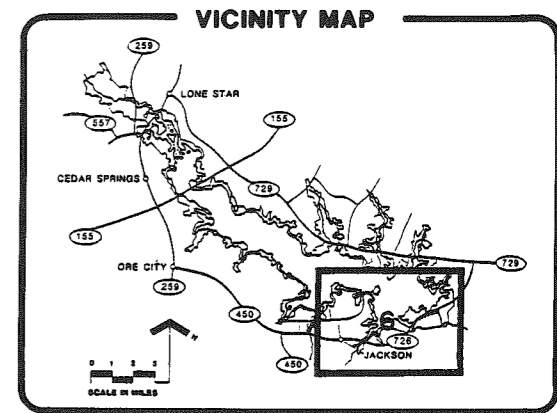
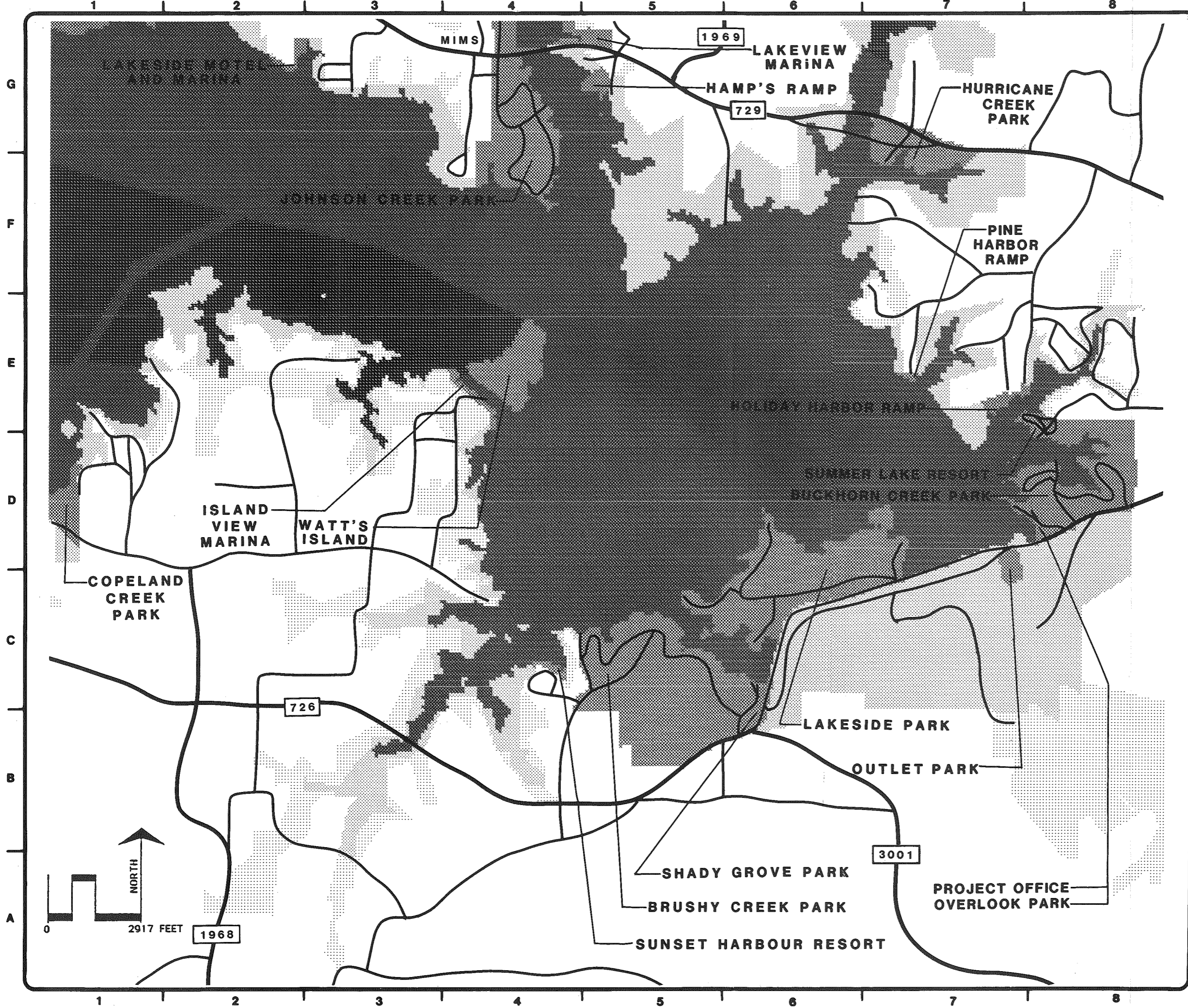
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WATER USE PLAN

INVITATION NO.	DATE:
CONTRACT NO.	SHEET NO. SEQUENCE
DRAWING NUMBER	5 of 7 5-3



LEGEND

WATER USE RESTRICTIONS

- UNCLEARED TIMBER
- 1** RESTRICTED AREAS
- 2** LOW SPEED BOATING AREA
- 3** BOAT CHANNEL
- 4** SWIMMING AREA
- RECREATION AREAS
- FEE LANDS
- FLOWAGE EASEMENT
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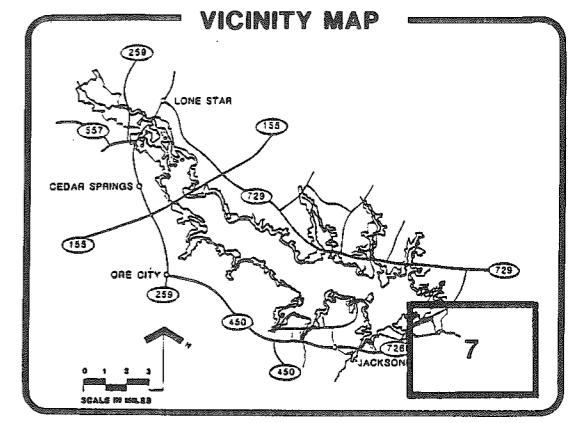
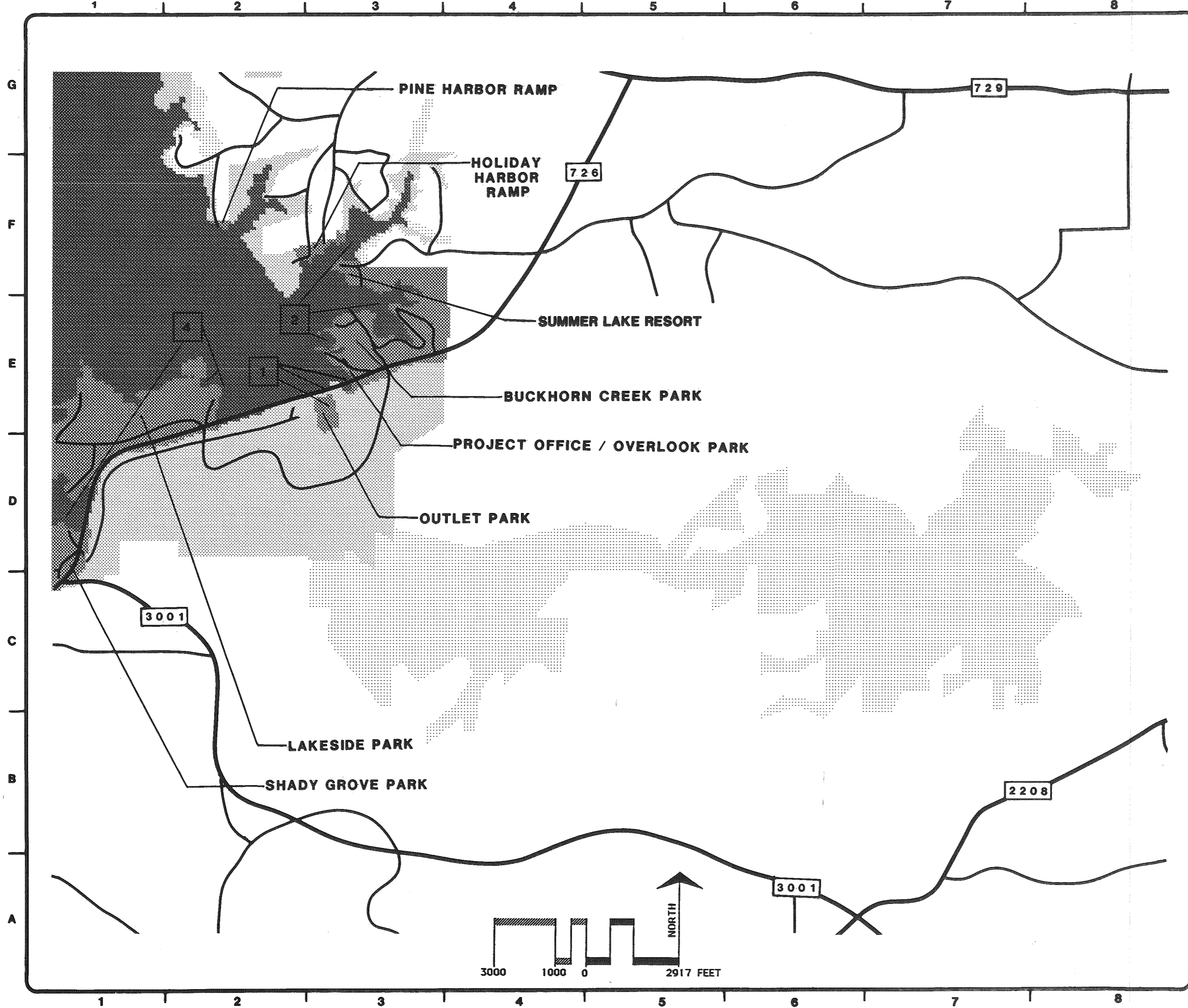
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FORT WORTH, TEXAS

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CYPRESS RIVER, TEXAS

WATER USE PLAN

INVITATION NO.	DATE:
CONTRACT NO.	SHEET NO. SEQUENCE
DRAWING NUMBER	6 of 7 5-3



LEGEND

WATER USE RESTRICTIONS

- UNCLEARED TIMBER
- 1** RESTRICTED AREAS
- 2** LOW SPEED BOATING AREA
- 3** BOAT CHANNEL
- 4** SWIMMING AREA
- RECREATION AREAS
- FEE LANDS
- FLOWAGE EASEMENT
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- CONSERVATION POOL ELEV. 228.5
- ROADS

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CYPRESS RIVER, TEXAS

WATER USE PLAN

INVITATION NO. _____	DATE: _____
CONTRACT NO. _____	SHEET NO. 7 OF 7
DRAWING NUMBER _____	SEQUENCE NO. 5-3

5-05 PROJECT WIDE RESOURCE USE OBJECTIVES

This section presents project-wide Resource Use Objectives (RUOs) identified for Lake O' the Pines. Project-wide RUOs direct how the project's resources can or should be developed, managed and used to help satisfy identified regional goals and the expressed desires of the public and other agencies. Site-specific RUO's for each of the park areas are outlined in Chapter 6.

a. General

(1) **Control Shoreline Erosion.** Throughout the course of the master plan update process, observations were made of shoreline areas experiencing significant erosion problems. Although it is not economically feasible to implement an extensive shoreline erosion control program, efforts will be made to identify particular problem areas for protection where significant public facilities are at risk.

(2) **Improve Control of Project Lands From Off-Road Vehicle Access.** There is an ever increasing need at Lake O' the Pines to protect project lands from off-road vehicle access. Various types of fencing are needed in many areas to control vehicular access to project lands. Efforts will be made to determine areas used for illegal vehicle access and implement preventative measures. Public education programs will be initiated to promote cooperation from local communities.

b. Recreation

(1) **Plan for Fewer but Larger Recreational Areas.** Wherever possible, continued efforts will be made to consolidate park operations to create larger and more functional sites to minimize road and utility costs, operation and maintenance expenses, ease of user fee collection, and prevention of vandalism.

(2) **Update Recreation Design Standards for the Development of New Facilities and the Rehabilitation and Replacement of Existing Facilities.** Efforts will be made to improve the quality and functionality of recreation areas. In many cases this can best be accomplished by redesigning park road circulation patterns, constructing delineated site impact areas for camping and picnic sites, and replacing or rehabilitating existing wood and cinder block restrooms where practical. All rehabilitation efforts should conform to the project architectural theme.

(3) **Eliminate Conflicts Between Day Use and Overnight Use Activities.** All of the park areas at Lake O' the Pines currently have separation between day-use and overnight use areas. Steps should be taken to provide adequate separation between these uses in areas proposed for future development.

(4) Improve Corps Emphasis on the Design, Rehabilitation and Future Development of Recreation Facilities in Leased Park Areas. There are several parks leased to local governments. In most cases these areas are in need of redesign and rehabilitation work. Generally, such work has not been accomplished by the lessees and in some instances conditions are rapidly deteriorating. Project and district staff should place emphasis on encouraging rehabilitation of leased lands.

(5) Improve Boater Safety on the Lake. It is estimated that approximately 27 percent of the overall recreation participation at Lake O' the Pines is boater related. Efforts to improve boat launching areas, buoy restricted areas, mark boat lanes and eliminate hazardous utility lines should be given high priority.

(6) Broaden the Range of Camping Opportunities. Some of the best camping facilities at Lake O' the Pines have been provided for RV camping. Efforts should be made to expand the range of facilities to include more tent camping sites and construct additional tent pads at selected multi-use campsites.

(7) Provide Additional Trail Use Opportunities. The popularity of walking for pleasure has increased dramatically in recent years. There is also an increasing demand for equestrian trails. At present there are very limited opportunities for trail use at Lake O' the Pines, however the potential for the development of additional trail systems (hiking and horseback riding) is good. Project and District personnel should explore the possibilities of new trail construction to be accomplished through the use of volunteers or local governmental sponsor.

(8) Improve Boat Launching Facilities. There is a need for 24 additional boat lanes initially and 37 boat lanes by the year 2005. The ability to launch at some boat ramps is limited by inadequate parking and poorly designed turnarounds and access roads. Efforts to upgrade all launch areas are critical. Additional boat lanes should be added where possible.

(9) Establish Control Stations at all Major Overnight and Day-Use Areas. The establishment of control stations with gate attendants at day-use parks has resulted in a dramatic reduction in the level of vandalism and crime common to those parks. This type of control measure will be considered for use at all camping areas and at day-use at other Corps lakes areas where there is a high incidence of unlawful behavior. Incorporation of control stations at all major day-use and overnight use areas is an important first step in regaining control of park areas.

(10) Improve Project Aesthetics. In addition to implementing rehabilitation efforts to improve the manageability and function of various park areas at Lake O' the Pines, efforts should be taken to improve general aesthetics which will aid in creating a family atmosphere. Once measures are taken to gain control of park areas, attention should be focused on aesthetic measures. Recommended actions include landscaping, increased grounds maintenance, facility replacement with more architecturally attractive features, and a consistent architectural theme. Road and parking delineation should be used to restrict vehicles to designated areas and plant screening should be used to provide privacy between closely spaced sites.

(11) Identify Highly Impacted Areas. At present, there are no public use areas which do not show signs of excessive resource deterioration due to pedestrian or vehicular traffic. In many cases, this is a result of undesirable circulation patterns which allow users to repeatedly drive or walk on unprotected soils. Good picnic and campsite design will alleviate much of this impact (see Chapter 7); however, a special effort should be made to identify all highly impacted areas and take measures to stabilize them or reroute traffic to areas that have already been stabilized. Some areas may have soils that simply will not support recreation use. Facilities such as campsites, restrooms and parking lots should eventually be removed from these areas allowing them to revegetate.

(12) Handicapped Areas. The physically and mentally impaired should be given access to a wide range of outdoor recreation activities through careful and appropriate planning and design.

c. Natural Resources

(1) Forest Management. The land base at Lake O' the Pines is relatively small but sustained yield forest management will be initiated in concert with other resource objectives. Sustained yield management will place equal emphasis on timber, wildlife and scenic values and in most cases will seek to establish forested areas having a diversity of age and species composition.

(2) Protection of Environmentally Sensitive Areas. Areas having significant ecological, cultural or aesthetic value will be protected from degradation. Limited public use will be allowed in these areas and may be prohibited if conditions warrant. Land management activities including forest management, wildlife management, park renovation or development and other project operations will be carried out with due regard to the protection of environmentally sensitive areas.

(3) Stewardship of Wildlife Habitat. Project lands currently provide suitable habitat for many wildlife species which utilize shoreline areas, bottomland hardwoods and mixed pine-hardwood uplands. Through implementation of the Operational Management Plan (OMP), species for which there exists a missing or limiting habitat component will be identified. Management efforts will be initiated to protect and sustain these species by overcoming limiting habitat components. Species which depend heavily on edge habitat such as whitetail deer, great horned owls and eastern turkey, will likely be identified in the OMP due to a lack of open grassland habitat at Lake O' the Pines.

The majority of project lands lying above Highway 155 present management opportunities for waterfowl and grey squirrel habitat improvement. Significant habitat work in this area would require cost sharing or outgranting the area to the Texas Parks and Wildlife Department. Efforts to outgrant this area to the State for waterfowl and grey squirrel habitat improvement should be initiated.

(4) Aquatic Weed Control. Preliminary surveys by personnel from the Waterways Experiment Station has identified several locations on Lake O' the Pines where Hydrilla is established but is not yet a threat. Elodea is well established in large areas of the lake and currently causes inconveniences at some boat ramps and marinas. Surveillance and appropriate control measures should be scheduled in the OMP.

(5) Improve Fish Habitat and Recreational Fishing Opportunities. Through the assistance of volunteers the Corps of Engineers should facilitate the placement of brush shelters and other fish attractors at strategic locations. Construction of fishing platforms or docks in fee area should be accomplished by direct expenditures of user fee revenues.

(6) Control Off-Road Vehicles. The popularity of off-road vehicles including dirt bikes, 3- and 4-wheel drives, etc., is having an adverse impact in natural resources at Lake O' the Pines. The popularity of these vehicles is expected to steadily increase making it paramount that controls be initiated. Given the small land base and many miles of boundary line, the effective control of off-road vehicles will require fencing, signing, patrolling, and education. To dedicate areas for off-road vehicle use would not be compatible with good land management practices, particularly where watershed protection and quality multiple recreational use is an important objective.

recreation development plan
Chapter 6



CHAPTER 6

FACILITY DEVELOPMENT PLAN

6-01 INTRODUCTION

The information presented in this chapter represents the culmination of the data inventory and analysis, and resource use objectives developed in Chapters 1-5 of this Master Plan. This chapter includes a general description, site analysis, and future development objectives for each recreational area at the project. The development and management recommendations within this plan are intended to improve the quality of the recreational facilities and to increase the potential for visitors to have a quality recreation experience.

6-02 RECREATION AREA ANALYSIS AND PROPOSED FACILITIES

A. **GENERAL:** This section presents a brief description of each existing and proposed recreation area. Refer to Plate 6-0 for the location of each recreation area at Lake O' the Pines and page reference of each area within Chapter 6. Descriptions for each recreation area were prepared in an outline format to provide a clear and concise statement of pertinent factors such as the size of the area, location and access, physical characteristics, analysis of natural and manmade features (in terms of recreational development) and future development/resource use objectives.

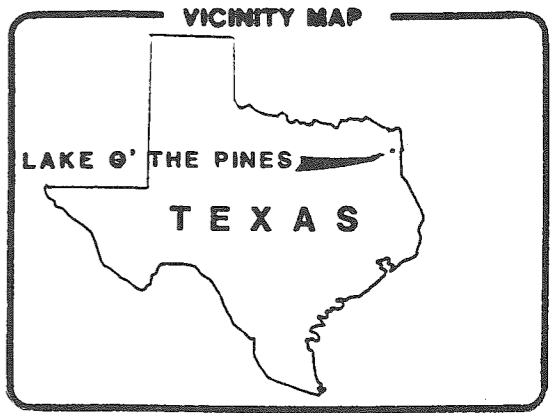
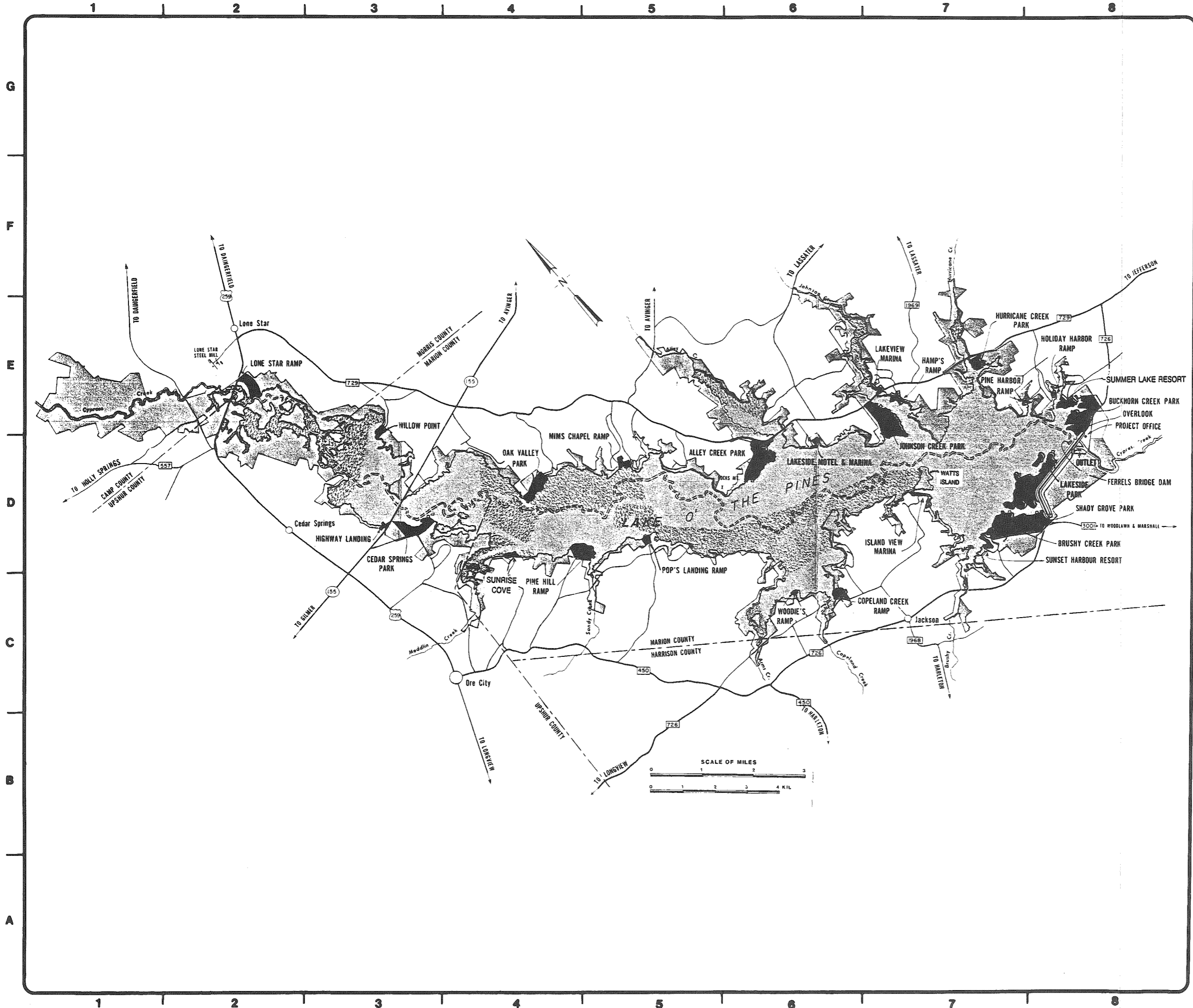
B. **SITE PLANS:** Each site description is accompanied by a conceptual site plan included as Plates 6-01 through 6-21. These site plans are prepared over photographs from a 1980 aerial fly-over of the Lake O' the Pines project. The aerial photographs show existing land features and developments with future development plans schematically depicted on each plate. Since these plans are conceptual all facilities need to be sited on the ground in consideration of vegetation, slope, soil conditions and drainage.

C. **GENERAL DEVELOPMENT GUIDELINES:** Developmental guidelines have been compiled for Lake O' the Pines to provide guidance for future, long term development actions. The purpose These guidelines are designed to allow flexibility in the pattern of development while assuring that long term recreational needs are met.

D. SUMMARY OF PROPOSED FACILITIES: The recreation needs analysis in Chapter 2 identified the number of facilities needed at Lake O' the Pines by the year 2005. The planning team located sites in existing parks, outgrant areas and concession areas where additional facilities could best be accommodated (see Plate 6-0). The results of this design process are noted in the text of Chapter 6 and represented in the graphics of Plates 6-01 through 6-21. Nearly all of the identified recreation needs were met except for 14 boat ramp lanes. Existing and proposed boat ramps which are designed with ample turn around space, wide ramp lanes, ample parking and good circulation should make up for this minor shortage. Refer to Table 6-1 for a summary of identified recreation facilities needs and existing and proposed facilities.

Table 6-1
2005 NEEDS, EXISTING AND PROPOSED FACILITIES

<u>Facility</u>	<u>2005 Needs</u>	<u>Existing</u>	<u>Proposed</u>	<u>Total</u>
Picnic Tables	587	191	431	587
Camp Sites	885	459	426	885
(RV Sites)				(601)
(Tent Sites)				(284)
Boat Lanes	100	62	14	86
Parking Spaces	2,393	1,944	902	2,821
(Car Spaces)				(1960)
(Car/Trailer Spaces)				(861)



LEGEND

MANAGING ENTITY	PAGE
MANAGED BY CORPS	
OUTLET PARK	126
OVERLOOK PARK	128
BUCKHORN CREEK PARK	131
HURRICANE CREEK PARK	142
JOHNSON CREEK PARK	151
ALLEY CREEK PARK	159
MIMS CHAPEL PARK	164
OAK VALLEY PARK	167
LONE STAR PARK	174
CEDAR SPRINGS PARK	179
PINE HILL PARK	186
COPELAND CREEK PARK	196
WATT'S ISLAND	201
BRUSHY CREEK PARK	206
SHADY GROVE PARK	211
LAKESIDE PARK	215
LEASE TO MARION COUNTY	
HOLIDAY HARBOR RAMP	136
PINE HARBOR RAMP	139
POP'S LANDING RAMP	190
WOODIES RAMP	193
LEASE TO CONCESSIONAIRE	
SUMMER LAKE RESORT	134
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LAKEVIEW MARINA	148
LAKESIDE MOTEL & MARINA	156
WILLOW POINT	171
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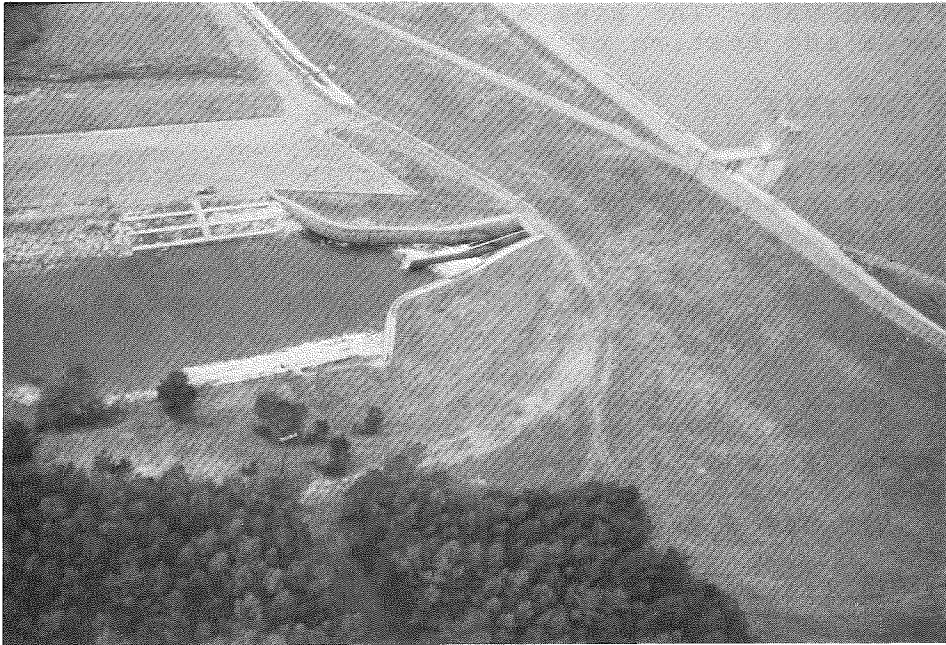
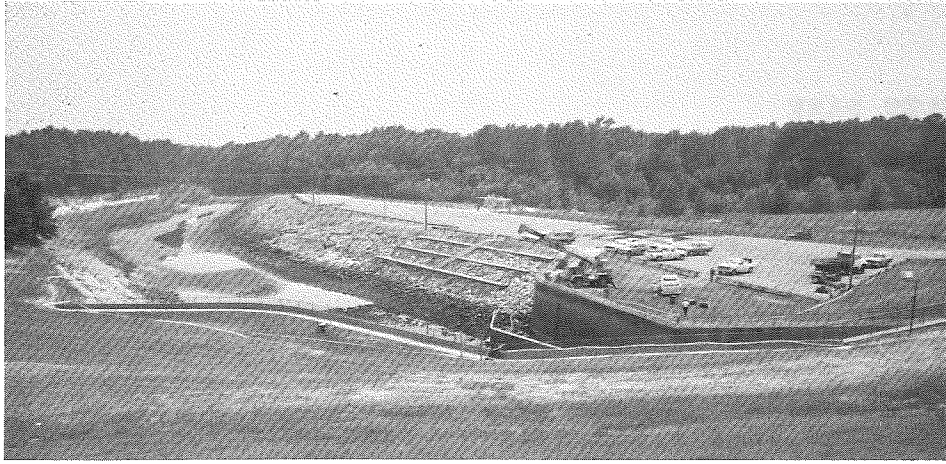
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RECREATION AREAS

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OUTLET PARK

6-03 OUTLET PARK

I. GENERAL DESCRIPTION

A. **SIZE:** 2 acres.

B. **LOCATION/ ACCESS:** Outlet Park is located on the southeast edge of the dam, on Highway 726.

C. **OPERATION:** The Corps currently operates the area as a free access area to the dam spillway and boat launch.

D. **PARK USE:** The area allows access for fishing the spillway area and boating or canoeing on Cypress Creek.

II. SITE ANALYSIS

A. **TERRAIN:** The public use area is a flat bench below the earthwork embankment of the dam. The sides of the stilling basin are steep, but are benched successively down to the water to allow access at various water levels. The slope beyond the stilling basin area gradually broadens down-stream to a gentle slope at the boat launch area.

B. **VEGETATION:** The area is currently a hard surfaced parking area with no vegetation except where the parking area abuts an open space grass area.

C. **SITE USE / IMPACT CONCERNS:**

1. The large asphalt parking area for approximately 95 cars currently has no delineation of parking spaces.

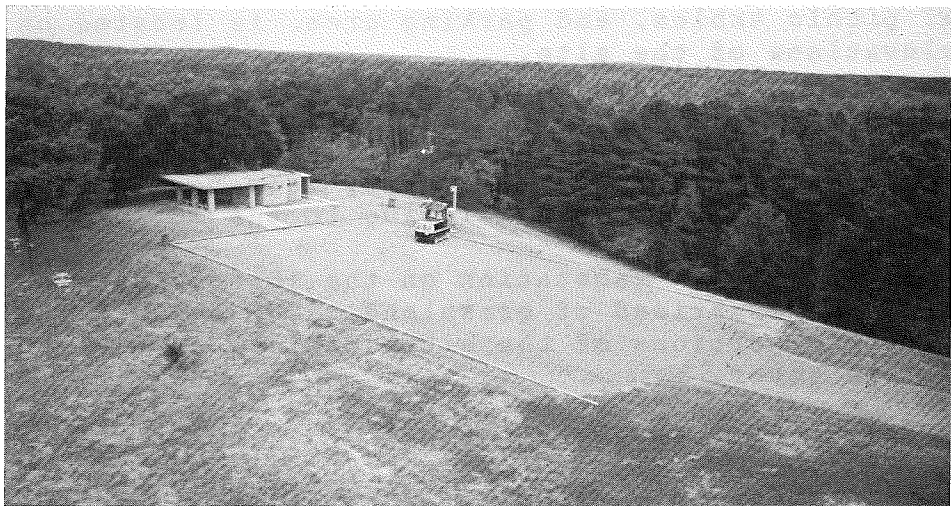
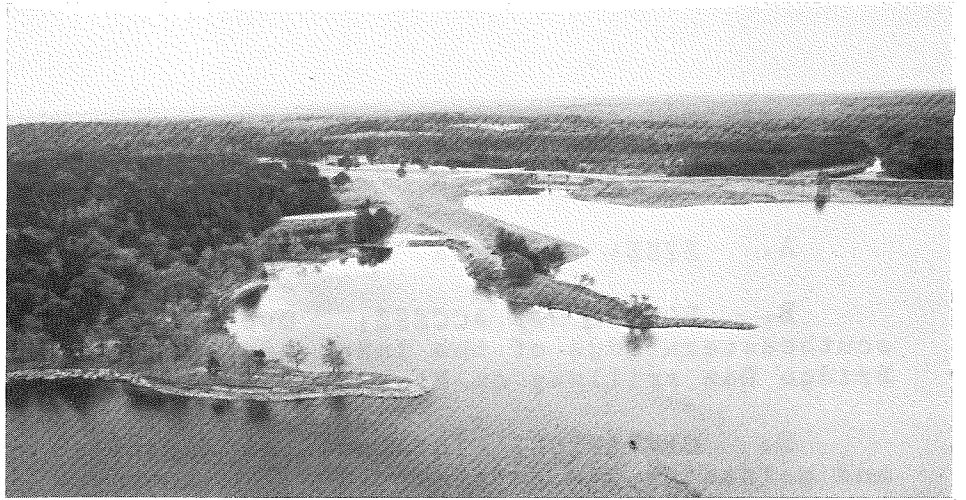
2. Other than a vault restroom, there are currently no human comfort features available on the site, such as shelters, picnic units, etc.

III. FUTURE DEVELOPMENT / RESOURCE USE OBJECTIVES

The following information will provide guidelines about action required to enhance the current site features and meet the estimated user needs in the year 2005. A description of these features follows:

A. **PARKING AREA:** Delineate parking spaces for both automobiles and boat trailers. Add 6 sheltered picnic units.

B. **BOAT LAUNCH AREA:** Provide turn-around for adequate vehicle maneuverability. Improve shoreline for canoe staging area.



PROJECT OFFICE / OVERLOOK PARK

6-04 PROJECT OFFICE/OVERLOOK PARK

I. GENERAL DESCRIPTION:

A. SIZE: 7 acres.

B. LOCATION / ACCESS: Overlook Park is located on the southeastern edge of the lake, adjacent to the north of Ferrells Bridge Dam spillway on Highway 726.

C. OPERATION: The Corps of Engineers currently operates and maintains the area.

D. PARK USE: The area currently is used for boat launching and fishing. An observation area, which includes a restroom, picnic tables, and parking area, is located on the higher elevations of the site.

II. SITE ANALYSIS

A. TERRAIN: The site is steeply rolling with the higher ground adjacent to Highway 726 sloping to the shoreline.

B. VEGETATION: Vegetation on the lower, western portion of the site, is comprised of grassland. The eastern and northern higher elevated portions of the site consists of Pine and Hardwood tree cover.

C. SITE USE / IMPACT CONCERNS:

1. The existing roadway alignment allows straight line vehicle access to the ramp with signs and speedbumps to warn vehicles approaching the lake. The existing restroom is in need of replacement.

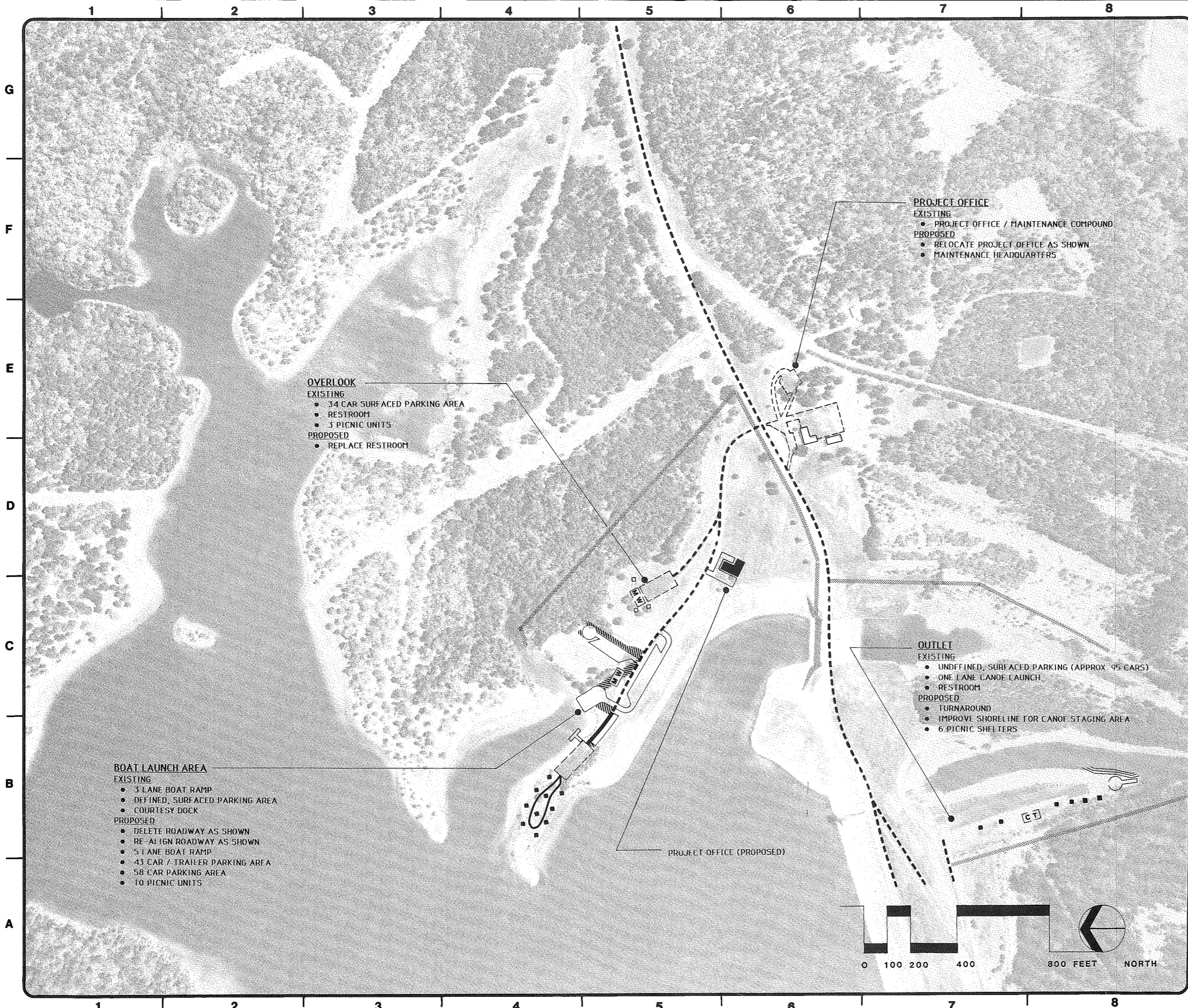
III. FUTURE DEVELOPMENT / RESOURCE USE OBJECTIVES

The following information will provide a guidelines about the action required to enhance the current site features to meet the estimated user needs in the year 2005. A description of these features are as follows:

A. OBSERVATION AREA: Replace existing restroom.

B. BOAT LAUNCH AREA: Re-align roadway to prevent straight line access into the lake. Upgrade the boat lane capacity from 3 lanes to 5 lanes to meet projected demand. Increase car/trailer parking to 43 spaces and provide vehicle overflow parking. Establish a picnic area on the peninsula and provide 10 picnic units.

C. PROJECT OFFICE: Relocate Project Office from present location to new location as shown on plan. Convert the existing Project Office site to a maintenance headquarters.



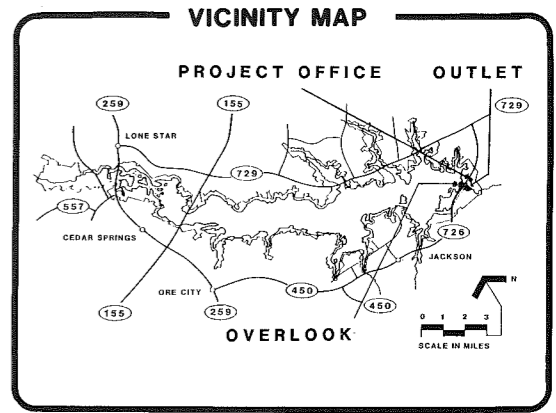
- BOAT LAUNCH AREA**
- EXISTING**
- 3 LANE BOAT RAMP
 - DEFINED, SURFACED PARKING AREA
 - COURTESY DOCK
- PROPOSED**
- DELETE ROADWAY AS SHOWN
 - RE-ALIGN ROADWAY AS SHOWN
 - 5 LANE BOAT RAMP
 - 43 CAR / TRAILER PARKING AREA
 - 58 CAR PARKING AREA
 - 10 PICNIC UNITS

- OVERLOOK**
- EXISTING**
- 34 CAR SURFACED PARKING AREA
 - RESTROOM
 - 3 PICNIC UNITS
- PROPOSED**
- REPLACE RESTROOM

- PROJECT OFFICE**
- EXISTING**
- PROJECT OFFICE / MAINTENANCE COMPOUND
- PROPOSED**
- RELOCATE PROJECT OFFICE AS SHOWN
 - MAINTENANCE HEADQUARTERS

- OUTLET**
- EXISTING**
- UNDEFINED, SURFACED PARKING (APPROX. 95 CARS)
 - ONE LANE CANOE LAUNCH
 - RESTROOM
- PROPOSED**
- TURNAROUND
 - IMPROVE SHORELINE FOR CANOE STAGING AREA
 - 6 PICNIC SHELTERS

PROJECT OFFICE (PROPOSED)



LEGEND

SYMBOLS

ROADS

- EXISTING SURFACED ROADS
- - - EXISTING UNSURFACED ROAD
- PROPOSED SURFACED ROAD
- ▨ PROPOSED UNSURFACED ROAD
- EXISTING PARKING
- ▭ PROPOSED PARKING
- ▨▨▨▨ ROAD DELETION

BUILDINGS

- CT COMPOSTING TOILET
- FV FRAME VAULT TOILET
- FW FRAME WATERBORNE TOILET
- MV MASONRY VAULT TOILET
- MW MASONRY WATERBORNE TOILET
- MS MASONRY WATERBORNE WITH SHOWERS
- FS FEE CONTROL STATION
- EXISTING BUILDING
- ▭ PROPOSED BUILDING

MISCELLANEOUS

- E ■ P PICNIC UNIT(E-EXISTING), (P-PROPOSED)
- △ E ▲ P TENT CAMPSITE(E-EXISTING),(P-PROPOSED)
- ⬡ E ⬢ P GROUP SHELTER(E-EXISTING),(P-PROPOSED)
- ⊙ AMPHITHEATER
- ⊙ PLAYGROUND
- ⊙ FISHING PIER
- ⊙ COURTESY DOCK
- TRAIL-(A) ACCESS,(H) HIKING,(W) WALKING
- (E) EQUESTRIAN,(I) INTERPRETIVE
- ⊙ SANITARY DUMP STATION(E-EXISTING)
- (P-PROPOSED)
- ⊙ FISH CLEANING STATION

--- PROJECT BOUNDARY

▨▨▨▨ RECREATION SITE BOUNDARY

U. S. ARMY ENGINEER DISTRICT, FORT WORTH
CORPS OF ENGINEERS
FORT WORTH, TEXAS

DESIGNED BY: _____

DRAWN BY: _____

REVIEWED BY: _____

LAKE O' THE PINES
CYPRESS RIVER, TEXAS
PROJECT OFFICE
OVERLOOK OUTLET

INVITATION NO.	DATE:
CONTRACT NO.	SHEET NO.
DRAWING NUMBER	SEQUENCE NO.

1 OF 1 6-01