

SECTION IX
FACILITY LOAD AND OTHER
DESIGN CRITERIA

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9-01 SITING

All proposed structures will be located above the 5-year flood pool with site selection based on soil types, erosion potential, and present shoreline erosion problems.

a. Buildings. Buildings are generally located in areas of tree cover providing the recreational user with isolation and screening from other activities and providing an aesthetically pleasing area. See PLATE 10.

b. Topography. The topography of the area will be utilized to the best possible advantage by placement of the buildings to provide the user with a scenic view.

c. Trails. The siting of trails was determined by the locations that would provide the best water and nature orientation. Trails are generally located below 462.5 flood pool elevation. In some cases, trails will be used by operational vehicles for service and maintenance of these areas.

d. Roads. Road sites where possible were limited to level areas located away from extensive tree cover.

9-02 CAMPING AREA ROADS - See PLATE 10.

9-03 BOAT LAUNCHING RAMPS - See PLATE 10.

9-04 PICNIC SHELTERS - See PLATE 10.

9-05 COMFORT STATIONS - See PLATE 10.

9-06 DAY USE SERVICE EQUIPMENT - See PLATE 10.

9-07 SIGNS

All new signs will be installed, as required, by project personnel and will conform to the OCE Sign Manual, and the Graphic Standards Manual, EP 310-106.

9-08 INTERPRETIVE DEVICES

Nature trails, markers, visual aids, and displays are provided by lake personnel, as required.

9-09 WASTE AND DISPOSAL

Trash and refuse collection and disposal services are contracted to private haulers.

9-10 WATER AND SEWER, DESIGN CRITERIA

a. Waste Collection and Treatment. The sewer system was designed to be in accordance with the requirements of the federal Environmental Protection Agency, Illinois Environmental Protection Agency and Corps of Engineers Memorandum EM 1110-1-400: Planning and Design Criteria, and other standards

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and conditions as required by the Corps of Engineers. Septic systems were not utilized.

Generally, sewers were located to obtain maximum use of gravity flow mains by following contours. Lift stations and force mains were provided as necessary to transfer flow from locations having low ground elevations relative to the ground elevation downstream. Where possible, gravity sewers from several buildings were grouped to intersect at a common lift station. Gravity sewers were 8-inch diameter PVC mains and 4-inch PVC service laterals.

Lift station sizing was based upon all sewage being pumped within an 18 hour day with a peak flow factor of 2.5 times and average of 30 gallons per day (GPD) per person for campers and 5 GPD per person for picnickers using waterborne toilets. Minimum size for force mains was 4-inch diameter. Minimum discharge from the lift stations was based on maintaining proper velocities within the force main and minimizing detention times.

Initially, sewage treatment was designed in accordance with the requirements of the Federal Environmental Protection Agency, Illinois Environmental Protection Agency and Corps of Engineers Memorandum EM 1110-1-400 "Planning and Design Criteria" and other standards and conditions as required by the Corps of Engineers. Facility loading was based upon all camping spaces fully occupied on a weekend day without any additional overflows permitted to occur during seasonal or holiday peaks. Peak population was based upon eight person per day for each campsite, and four persons per day for picnic tables. For planning purposes, facility sizing was based upon 20 pounds Biochemical Oxygen Demand (BOD) or less per 1000 cubic feet for an extended aeration package treatment plant. At campsites, the BOD per capita day was assumed at .08 pounds and at picnic areas the BOD per capita day was assumed at .02 pounds. For treatment plants of 40,000 GPD and above, dual aeration tanks were provided. Tertiary treatment was provided by use of gravity filters.

At the present time, the St. Louis District, to the maximum extent possible, is eliminating the package extended aeration treatment plants initially constructed. The alternative method of treatment is the land application of wastewater. Land application has been found to be more economical with regard to operation and maintenance than the package treatment plants. The land application of wastewater meets the Illinois EPA requirements and provides the same or better level of treatment as the package treatment facilities.

A 1995 wastewater feasibility study for the Boulder Recreation Area showed that the in-kind replacement of the extended aeration package sewage treatment plant (STP) would be more cost-effective. The design life of the STP would require the plant to be replaced four times during the design life of the alternative land treatment system.

b. Water System. The water system was designed to be in accordance with the requirements of the Corps of Engineers Memorandum EM 1110-1-400, "Planning and Design Criteria," and other standards and conditions as required by the Corps of Engineers.

The source of water supply for domestic purposes for each site was based upon 50 gallons per minute (GPM) at a pressure of 50 psi available at the connection to the main from the city of Carlyle system or the Clinton County Water District. The present water supply agreement with the water district does not provide adequate flows to meet fire protection demands.

Storage at each site was based upon a minimum supply of 50 GPM available from the water district. The total storage required was assumed as that necessary to provide for peak daily usage based upon 2.5 times the average daily consumption.

Domestic water demand was based upon 30 GPD average per person assuming that all water consumed in one day was used within 18 hours. The maximum hourly rate of demand was based upon a peak factor of 2.5 times average flow.

Main sizing was based upon peak domestic rate of flow. Looping of water lines has not been provided. Sizing of service lines to buildings was based upon fixture units flow requirements in accordance with the National Plumbing Code.

Water mains are considered to be adequately sized at peak flows to maintain required residual pressures for flush tanks.

9 - 11 POLICIES AND PROCEDURES PUBLICATIONS.

a. General policies and procedures for planning, design, operation, and maintenance of recreation facilities at USACE Civil Works projects are given in engineer manuals (EM), engineer regulations (ER), and engineer pamphlets (EP) referenced below:

EM 1110-1-400	Recreation Planning and Design Criteria.
ER 1110-2-400	Design of Recreation Sites, Areas, and Facilities.
ER 1110-2-102	Design Features to Make Building and Facilities Accessible to and Usable by the Physically Handicapped.
EP 1130-2-550	Chapter 3: Project Master Plans and Operational Management Plans
ER 1130-2-400	Recreation-Resource Management of Civil Works Water Resource Projects.
ER 1165-2-400	Recreational Planning, Development, and Management Policies.
EP 310-1-6	Graphic Standards Manual.
EP 310-1-6a and b	Sign Standards Manual.

b. These publications guide the development of recreational facilities to assure they are of the highest quality while serving the health, safety, and enjoyment of the visiting public.