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2 8 STORAGE RESERVOIR

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STORAGE RESERVOIR CRITERIA

1.0 INTRODUCTION

1.1 SCOPE

This report presents the design criteria and methods of analysis for the Rancho Seco storage reservoir. In addition to an earth fill dam, the project will include a high level spillway and low level outlet works. The investigation program outlined will establish the suitability of the site as well as provide the basic engineering data necessary to establish design parameters.

1.2 PURPOSE AND DESCRIPTION OF PROJECT

The storage reservoir will supply emergency cooling water for the plant. Normal makeup water for the plant will be obtained from the Folsom-South Canal.

The reservoir is located approximately 1 mile east of the plant. The embankment is located in a natural topographic canyon with the centerline trending north 30° west. The embankment will be a rolled earthfull structure with a crest approximately 1800 feet long and a maximum height of 60 feet above the existing streambed.

1.3 FLOOD HYDROLOGY

The reservoir is not located on a major water course and therefore is not subject to water level regulations from other sources. The tributary drainage is approximately two square miles and normal storm run-off will be discharged over the spillway. The spillway will be designed to pass the maximum flow based on a one hundred year storm.

2.0 GEOLOGY AND SEISMOLOGY

The basic geology of the site is covered in Appendix 2C. Additional investigation will be accomplished at the site as outlined in the Geologic and Soils Program for the reservoir attached to this criteria.

3.0 SEISMICITY

The seismicity of the site is covered in Appendix 2D Seismic Report and the values stated therein will be used for the design of the dam and appurtenances. Appendix 5A Structural Design Base provide the functional requirements.

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4.0 EMBANKMENT

The embankment is located as shown on Figure 2.2-2. The structure will be located between two prominent bluffs across a natural watercourse and will be a rolled earthfill structure with drain zones and an impervious core.

The crest of the embankment will be at elevation 245 and the crest of the embankment will be approximately 22 feet wide and the height a maximum of 60 feet above the existing watercourse streambed. It is anticipated that the embankment will be constructed of earth materials found in the streambed and on the adjacent terraces and uplands and dredger tailings, supplemented by useable materials from required excavations.

5.0 CONSTRUCTION MATERIALS

A comprehensive investigation and analysis of the construction materials will be performed during the detailed soil and foundation investigation program. The engineering properties and quantities of the various materials will be evaluated and the results of this evaluation will provide a portion of the basic technical data required to establish design parameters.

6.0 FOUNDATION SEEPAGE CONTROL AND INSTRUMENTATION

In addition to the field permeability and laboratory permeability testing, instrumentation will be installed during the construction of the embankment to monitor the development of seepage pressures. Piezometers may be installed and will be arranged in such a manner to establish hydraulic gradients parallel and transverse to the dam centerline. The results of the seepage analysis will provide a portion of the data necessary to design impervious blanket materials or cutoffs that may be required.

7.0 STABILITY CRITERIA AND ANALYSIS

A minimum factor of safety for the embankment of 1.5 has been established as design criterion for all normal operating conditions. For unusual or rare conditions, which are very remotely possible if possible at all, a lower minimum factor of safety can be tolerated. This lower minimum factor of safety is acceptable provided a factor of safety greater than 1.0 is maintained for any possible condition. For the unusual operating conditions such as rapid drawdown, or design earthquake, a minimum factor of safety of 1.2 has been established. For the maximum hypothetical earthquake, a minimum factor of safety of 1.0 has been adopted.

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The conditions to be analyzed are as follows:

STABILITY ANALYSIS - DESIGN CRITERIA

<u>Case</u>	<u>Scope</u>	<u>Condition</u>
1	Upstream	Gravity forces
2	Downstream	Gravity forces plus seepage
3	Upstream	Rapid drawdown
4	Upstream	Gravity forces plus seismic forces
5	Downstream	Gravity with seismic forces

The stability of the embankment sections will be analyzed by conventional methods. The "sliding circle" type of analysis using the method of differential slices as described in: State of California, Supervision of Dams Technical Memo: "Earth Dam Stability Analysis" by W. A. Brown, April 1952 will be used as well as infinite slope formulas based on methods presented in "Fundamentals of Soil Mechanics" by Donald W. Taylor. Stability calculations will be performed by computer as well as manually.

These methods of analysis provide for the earthquake to be applied as a horizontal vector equivalent to the seismic force.

The magnitude of this force and appropriate soil properties will be established by the method proposed by H. B. Seed.^{1 & 2}

Soil sampling and laboratory testing will be similar to that performed initially for the plant area and presented in Appendix 2E. In addition to tests conducted previously, an evaluation of the behavior of the soil under dynamic loading conditions will be obtained.

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REFERENCES

¹Seed, H. B. and Martin G. R., "The Seismic Coefficient in Earth Dam Design" Journal of Soil Mechanics and Foundation Division. ASCE May 1966.

²Seed, H. B. "A Method of Earthquake Resistant Design of Earth Dams," Journal Soil Mechanics and Foundation Division. ASCE January 1966.

GEOLOGIC AND SOILS INVESTIGATION PROGRAM
FOR
STORAGE RESERVOIR

1.0 PURPOSE

The purpose of the Rancho Seco Storage Reservoir Investigation Program is to provide the basic engineering and geologic data necessary to evaluate the foundation characteristics of the site and develop design criteria for the embankment. The data developed from the Investigation Program will also provide necessary information to satisfy the requirements of the Preliminary Safety Analysis Report (PSAR), as well as the requirements of the State of California, Department of Water Resources. During the investigation drilling, sampling, logging, and laboratory testing will be performed to provide the basis for design recommendations.

2.0 SCOPE

The Investigation Program will consist of the following:

- a. Geologic and soil drilling, sample and exploration trench excavations, and visual logging of materials.
- b. Laboratory testing and tabulation of test results.
- c. Field permeability testing by selected methods.
- d. Evaluation of laboratory testing and field investigations.

In addition to the investigation of the foundation, a comprehensive investigation of potential borrow areas to evaluate construction materials engineering properties will be performed.

3.0 EVALUATION

The evaluation will contain the following basic engineering data from which the suitability of the proposed site and the design of the reservoir embankment will be made:

- a. Plot plan showing location of all borings, trenches, and other field investigations.
- b. Geologic map of the area.
- c. Soil profile of the proposed site.
- d. Summary and location of proposed construction materials.
- e. Summary of foundation investigation and seepage analysis.