ALABAMA SUPPLEMENTS TO THE

NATIONAL ENGINEERING FIELD HANDBOOK

CHAPTER 4. Elementary Soil Engineering

Contents

	PAGE
Site Investigation	**AL-4-27(1)**
SCS-ENG-538 – Soil Investigation to Determine Suitability of Proposed Pond Site	**AL-4-27(3)**

SITE INVESTIGATION

GENERAL

Higher dams, particularly those over 25 ft., need increasingly-careful evaluation of foundation and embankment materials. Even dams with less height having known or suspected unusual foundation conditions, low density materials, or porous foundation strata should be carefully investigated and a determination made as to the field tests or laboratory tests needed.

A minimum amount of boring and soil classification will suffice for those sites where materials and conditions are similar to other sites in the area where completed structures have performed satisfactorily.

EXTENT OF SITE INVESTIGATION

The base area of the contemplated structure should be carefully examined. Exploration into the foundation should extend as far below a given section as necessary to reveal the conditions important to safe design and construction.

Borrow areas should be explored and samples investigated for each major change in material and for a computed amount of material that is enough to build the structure plus 25 to 50 percent.

EMBANKMENT MATERIAL

Drilling and sampling of the site should be intensive enough to accomplish the following:

1. Classification of materials by the Unified Soil Classification System.

2. Represent a major portion of the available embankment material.

3. Determination of compaction characteristics of the borrow materials by running appropriate tests or using experience data.

4. Evaluation of the in-place moisture conditions of the borrow. Construction may have to be postponed until a drier period if materials are too wet for proper compaction. Moisture will have to be added during construction operations if the soils are too dry.

FOUNDATION MATERIAL

Investigation of foundation materials may be made with power equipment, augers, or hand excavated trenches or test pits. Sampling should be in sufficient detail to:

1. Classify the materials using the Unified Soil Classification System (USCS). This may involve wet sieving through the No. 4 and No. 200 sieves for all coarse grained materials in order to determine the percentage of fine sands and gravels.

2. Represent all changes of materials as to depth and area that will affect the stability of proposed structures.

SPRINGS AND SEEPS

Where springs and seeps occur under the base of the embankment, their origin of flow must be located and uncovered. The quantity of flow should be measured and seasonal variation of flow noted.

PIPING POTENTIAL

Pipes are formed by underground erosion. Water moving through the soil carries the fine particles away and a series of eroded tubes or tunnels develop. These openings will grow progressively larger and can cause a dam failure. Piping occurs in the same materials that are highly susceptible to erosion on the surface such as fine sands and materials containing nonplastic or dispersed fines. The presence of easily erodible materials in the foundation may call for special treatment. Materials suspected of having high piping potential should be identified and sampled for laboratory analysis.

RECORD OF SITE INVESTIGATIONS

Site investigations are made for most engineering practices; including waste management systems, erosion control systems, water management systems (drainage and irrigation), ponds, and other structural measures. The data found and recommendations made are recorded on form SCE-ENG-538, Soil Investigation to Determine Suitability of Proposed Pond Sites, or on Form AL-ENG-17, Location Sketch, using USCS symbols. This information is filed in the case file with the practice being designed.

SAMPLING FOR LABORATORY TESTING

Sample sizes required for laboratory testing vary according to material characteristics and tests desired. Refer to National Engineering Handbook, Section 8, Engineering Geology, Chapter 3, for guidance on sample sizes. Agricultural waste pond soil liners require about 50 lbs. of material for each soil that requires permeability testing.

Shipment of soil from Alabama is regulated by the Animal and Plant Health Inspection Service (APHIS), USDA. Refer to NEM Part 531.13 for requirements in packaging and shipping of soil samples to soil mechanics testing laboratories.

SCS-ENG-538
Rev. 5-70

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL INVESTIGATION TO DETERMINE SUITABILITY OF PROPOSED POND SITE

FARMER'S NAME _____ DISTRICT _____
DATE _____ COUNTY _____
S. C. S. PHOTO SHEET NO. _____ WORK UNIT _____

WATERSHED AREA MEASUREMENTS
CROPLAND _____ ACRES PASTURE _____ ACRES
WOODLAND _____ ACRES TOTAL _____ACRES

POND CLASS

WORK UNIT CONSERVATIONIST

SKETCH OF PROPOSED POND SHOWING WHERE BORINGS WERE MADE (Approx. scale 1" _____ feet.
Locate reference point on center line of dam and identify on sketch.

SHOW DEPTH SCALE

BORING NUMBER AND PROFILE
Make and list dam site and spillway borings first - then ponded area and borrow pit borings separate with vertical red line. (Continued on back were necessary) Show water table elevations on dam site borings.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

BORINGS MADE BY _____ SIGNATURE & TITLE _____ DATE _____

AL-4-27(3)

(210-VI-NEH, Amend. AL2, March 2004)

TYPES OF MATERIAL ENCOUNTERED IN BORINGS
(Use one of systems below)

UNIFIED CLASSIFICATION	USDA CLASSIFICATION
GW - Well graded gravels; gravel, sand mix	g - gravel
GP - Poorly graded gravels	s - sand
GM - Silty gravels; gravel;-sand-silt mix	vfs - very fine sand
GC - Clayey gravels; gravel-sand-clay mix	sl - sandy loam
SW - Well graded sands; sand-gravel mix	fsl - fine sandy loam
SP - Poorly graded sands	l - loam
SM - Silty sand	gl - gravelly loam
SC - Clayey sands; sand-clay mixtures	si - silt
ML - Silts; silty, v. fine sands; sandy or clayey silt	sil - silt loam
CL - Clays of low to medium plasticity	cl - clay loam
CH - Inorganic clays of high plasticity	sicl - silty clay loam
MH - Elastic silts	scl - sandy clay loam
OL - Organic silts and silty clays, low plasticity	sic - silty clay
OH - Organic clays, medium to high plasticity	c - clay

1. Suitable material for embankment is available. Yes ☐ No ☐ *(Indicate where located on the sketch on reverse side)*

REMARKS:

2. Explain hazards requiring special attention in design. *(Seepage, spring, rock, etc.)*

GENERAL REMARKS:

24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49