Soil Mechanics Laboratories

National Design, Construction and Soil Mechanics Center

Natural Resources Conservation Service

Lincoln, NE
512 South 7th St.
Lincoln, NE 68508
402-437-5337

Fort Worth, TX
501 W. Felix St., Bldg. 23
Fort Worth, TX 76115
817-509-3322

http://www.ndcsmc.nrcs.usda.gov/contact/directory/soil.html

NDCSMC Co-Director: Stephen D. Reinsch, Lincoln, NE

Fort Worth Lab Supervisory CE: Lee Ann Moore, Fort Worth, TX

Purpose: The Center laboratories provide engineering soil testing services and soil mechanics related design recommendations to NRCS engineers in the 50 United States, Pacific Basin and Puerto Rico for projects in various NRCS programs for over 40 years.

The Center consists of two laboratories. The two labs were originally established to provide engineering soil testing, analyses, and reports for structures in the small watershed program, which were primarily dams. Today, the workload has expanded to include a large number of agricultural waste lagoon projects, EWP, and rehabilitation of watershed structures.

The labs perform a wide range of tests to determine various engineering (not agronomic) properties of soils. These tests provide site-specific information that is not available in published soil surveys. Testing includes determination of the following soil properties:

USCS soil classification (CL, CH, SC, GM, etc.)
- Permeability
- Compressibility
- Strength
- Dispersion
- Grain size distribution / Filter requirements
- Compaction properties
- Plasticity
- Others

Engineers associated with the laboratories provide detailed geotechnical engineering analysis on complex structures based on test results. Typical analyses performed are soil stability, seepage, and settlement analysis. Analysis is also performed on low permeable soil liners for animal waste systems.

The labs also provide technology transfer and soils engineering training to NRCS employees and maintain testing data records and testing correlation data.

GENERAL GUIDELINES FOR SUBMITTING SOIL SAMPLES TO THE SOIL MECHANICS LABS

Undisturbed samples are usually submitted in cores or tubes collected by an investigating geologist.

Also, small shelby hand samplers are used to collect undisturbed samples from constructed ag. waste liners. If you would like to borrow hand sampler to collect and send a sample for permeability testing, please contact either of the labs.

Small disturbed samples are submitted to the labs for determining index properties such as natural water content, dispersion, specific gravity of soil particles and Atterberg limits.

Large disturbed samples are submitted when more than just index tests are needed.

Large samples are needed for compaction tests, remolded permeability tests, and/or remolded shear tests.

For sample sizes needed, please see the following table.

SAMPLE SIZES

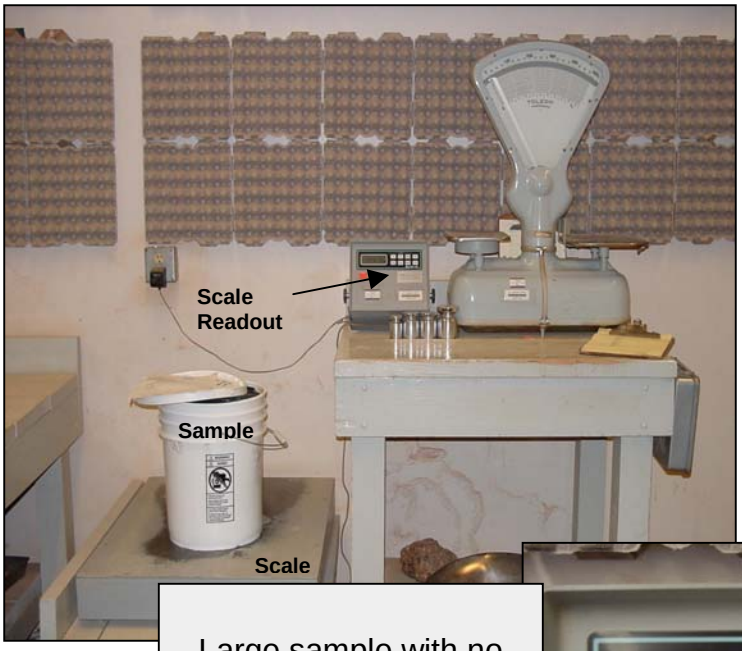
DESCRIPTION OF GRAVEL IN SAMPLE	LARGEST SIZE GRAVEL IN SAMPLE	TYPE OF SAMPLE	**MINIMUM** SAMPLE SIZE (lbs)
Sample has less than 10 % gravel	< 3/4 "	"S"	2
	3 "	"S"	10
	3 "	"L"	50
Sample has over 10% but less than 50 % gravel	3 "	"S"	20
		"L"	75
Sample has more than 50 % gravel	3 "	"S"	40
		"L"	100

The size of sample you need to submit depends mainly on two things:

(1) What tests you are requesting, and

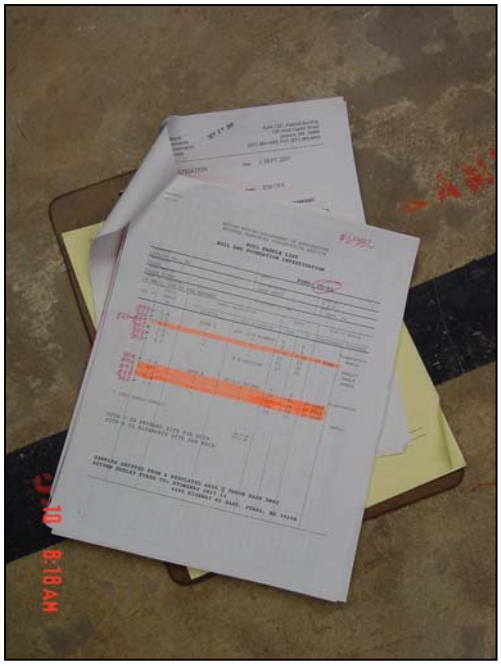
(2) The amount of gravel in the sample and the size of any gravel particles in the sample.

If you are submitting samples only for index tests, gradation and Atterberg limits, you need to send a sample size designated "S" in the previous table.



Large sample with no gravel for an ag. waste storage pond.

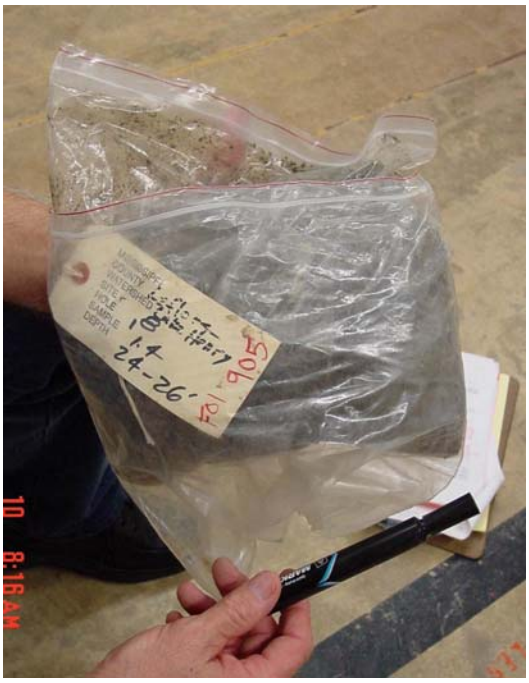
If you are requesting compaction tests and/or permeability tests, you should send a sample size designated "L" in the previous table. The Soil Mechanics Labs often receive samples that are too small for the requested tests to be performed. It is not desirable to reuse soil for multiple tests because the soil properties change with each cycle of wetting and drying.



You should submit a sample list with the sample shipment. A blank sample list is attached and can be copied and used to submit with sample shipments. This is needed so the lab staff can check that all samples listed are actually received and identified clearly.

The Soil Mechanics labs <u>each</u> receive about 1,000 samples per year, and accurate tracking of samples depends on good written documentation.

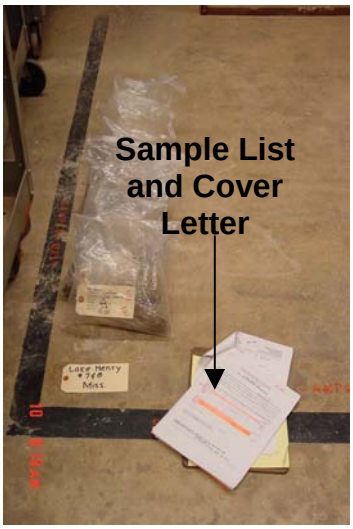
Methods for labeling and tagging samples for shipment to the Soil Mechanics Center are very important. Using indelible ink on paper tags and permanent ink on plastic bags are methods of labeling samples that help insure easy identification by the laboratories. Wax pencils and some markers (even permanent ones) will rub off during shipment - even if the bags are packed in boxes. It is always advisable to have redundant labeling, with a sample tag inside the bags with the soil as well as having the outside of the bag labeled.



Include a copy of a letter or form 356 detailing the tests requested, sample and site identification information including project name, type of program (WF-08, CO-01, EWP, etc). Also include a name and address to contact with any questions, and names and

addresses of those to receive a copy of the test report with the shipped samples.

Copies of this information may also need to be sent to your State Conservation Engineer or Resource Engineer.



SAMPLE LIST FOR SOIL MECHANICS LABORATORY

STATE:_____COUNTY: _____

SITE NAME: _____

PROJECT TYPE: _____ FUND / PROGRAM: _____
(repair, new dam, etc.) (WF-08, EWP, CO-01, etc.)

CONTACT PERSON: _____ PHONE: _____

_____ FAX: _____

Laboratory Sample Number	Field Sample Number	Description or Location	Depth, (feet)	Size of Sample

Testing Requested:

NRCS-356 (SML) 10-97
DISTRIBUTION:
ORIG. & 3 COPIES TO S.O.
STATE OFFICE APPROVES &
SENDS 2 COPIES TO S.M.L.

U.S DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

REQUEST FOR SOIL MECHANICS LABORATORY TEST

FOR USE OF ORIGINATING OFFICE	FOR USE OF ORIGINATING STATE OFFICE	FOR USE OF SOIL MECHANICS LAB.
FROM _____	ORDER NO. _____	LABORATORY WORK ORDER _____
ADDRESS _____	APPROPRIATION _____	
DATE _____	AMOUNT ENCUMBERED $ _____	
REPORT TO _____	TECHNICAL APPROVAL _____	DATE SAMPLES RECEIVED _____
_____	ADMINISTRATIVE APPROVAL _____	

TO BE FILLED IN BY ORIGINATING OFFICE

1. NUMBER OF SAMPLES: UNDISTURBED _____ DISTURBED _____

2. SITE OR PROJECT _____

3. WATERSHED OR LOCATION _____

4. PROGRAM CLASSIFICATION: CO-1 ( ), WP-1 ( ), WP-2-1 ( ), WP-2-2 ( ), FP-1 ( ), FP-2 ( ), FP-3 ( ), GP ( ), SB ( )

5. ESTIMATED TESTING COST $ _____

5. DESCRIPTION OF PROJECT (PLANS, PROFILES AND GEOLOGIC REPORTS SHOULD BE SUBMITTED IF AND WHEN AVAILABLE):

A. EARTH DAM CONSTRUCTION: DAMAGE CLASS *(Eng. Memo. 27)* _____ MAXIMUM HEIGHT OF DAM _____

ELEVATIONS: TOP OF DAM _____ PERMANENT POOL _____ EMERGENCY SPILLWAY _____

INVERT OF PRINCIPAL SPILLWAY OUTLET _____ UPSTREAM BERM _____ DOWNSTREAM BERM _____

WIDTH: UPSTREAM BERM _____ DOWNSTREAM BERM _____ FLOODWATER DETENTION TIME _____

PROPOSED SLOPES: UPSTREAM _____ DOWNSTREAM _____ CLASS OF FILL _____ *(Standard Specifications SCS)*

EQUIPMENT TO BE USED _____

FOUNDATION CONDITIONS IF NOT SAMPLED: _____

_____

OTHER IMPORTANT FACTORS OR PROBLEMS: _____

_____

B. RESERVOIR SEALING:
MAXIMUM WATER DEPTH _____ POND BOTTOM AREA _____

ESTIMATED SEEPAGE LOSSES _____ PREVIOUS TREATMENT _____

OTHER PERTINENT FACTORS (DEPTH TO GRAVEL, LIMESTONE SINKS, ETC.) _____

_____

C. OTHER PROJECTS (SPECIFY - SOIL CEMENT STABILIZATION, CANAL BANK STABILITY, LAND SLIDES OR OTHER)

_____

_____

7. REMARKS OR ANALYSIS DESIRED: _____

_____

_____

Plastic buckets (5 gal. or larger) with sealable lids are ideal for collecting and shipping samples. The sample may be either placed directly in the bucket or inside a plastic bag in the bucket. Used buckets (like from the food service industry or cleaned paint buckets are fine as long as they are cleaned and will seal.)

If buckets aren't available, sturdy plastic bags should be used for the samples. This prevents bag rupture and spillage during shipment. If thinner bags are used, double the bags. The samples in plastic bags may be shipped in sturdy corrugated paper boxes with reinforcement tape at the seams.

However, you should **not** use very thin bags and rely on the box to keep the sample intact.

Keep in mind that once the sample arrives in the lab, the bags or containers need to be sturdy enough to be moved without bursting.

Even small disturbed samples may need to be double-bagged to prevent drying out and to insure that the sample is intact upon arrival at the lab.

The natural water content can be a very important piece of information. When submitting large samples on projects where the water content of the sample represents the moisture conditions expected during construction, it is a good idea to submit an additional small sample designated for the water content measurement.

Note: If you have questions about locating suitable containers or plastic bags for shipping samples, please feel free to call Lee Ann Moore in the Fort Worth Soil Mechanics Lab at 817-509-3322.

Where to Ship Samples

Large samples may be shipped to the Soil Mechanics Centers by normal truck freight lines. To ship large samples by US mail, FedEx, or UPS, you can split large samples into several smaller samples for shipment. Address samples to:

Soil Mechanics Laboratory
Building 23
Fort Worth Federal Center
501 Felix Street
Fort Worth, TX 76115

or

Soil Mechanics Laboratory
512 South 7th Street
Lincoln, NE 68508