SOIL MECHANICS -- LEVEL I

MODULE 1

UNIFIED SOIL CLASSIFICATION SYSTEM

PART C

USCS AND FIELD PROCEDURES

STUDY GUIDE

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

CONTENTS

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 1 - OBJECTIVES

At the completion of Part C, you will be able to:

1. Identify the flow chart and describe how it is used to classify soils in the Unified Soil Classification System (USCS) using field procedures.
2. Describe from a list each of the important field tests used in classifying soils in the USCS.
3. Correctly classify all 14 field classes in the USCS using manual field tests and the flow chart.

START THE PLAYER WHEN YOU HAVE FINISHED

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 2 - FLOW CHART

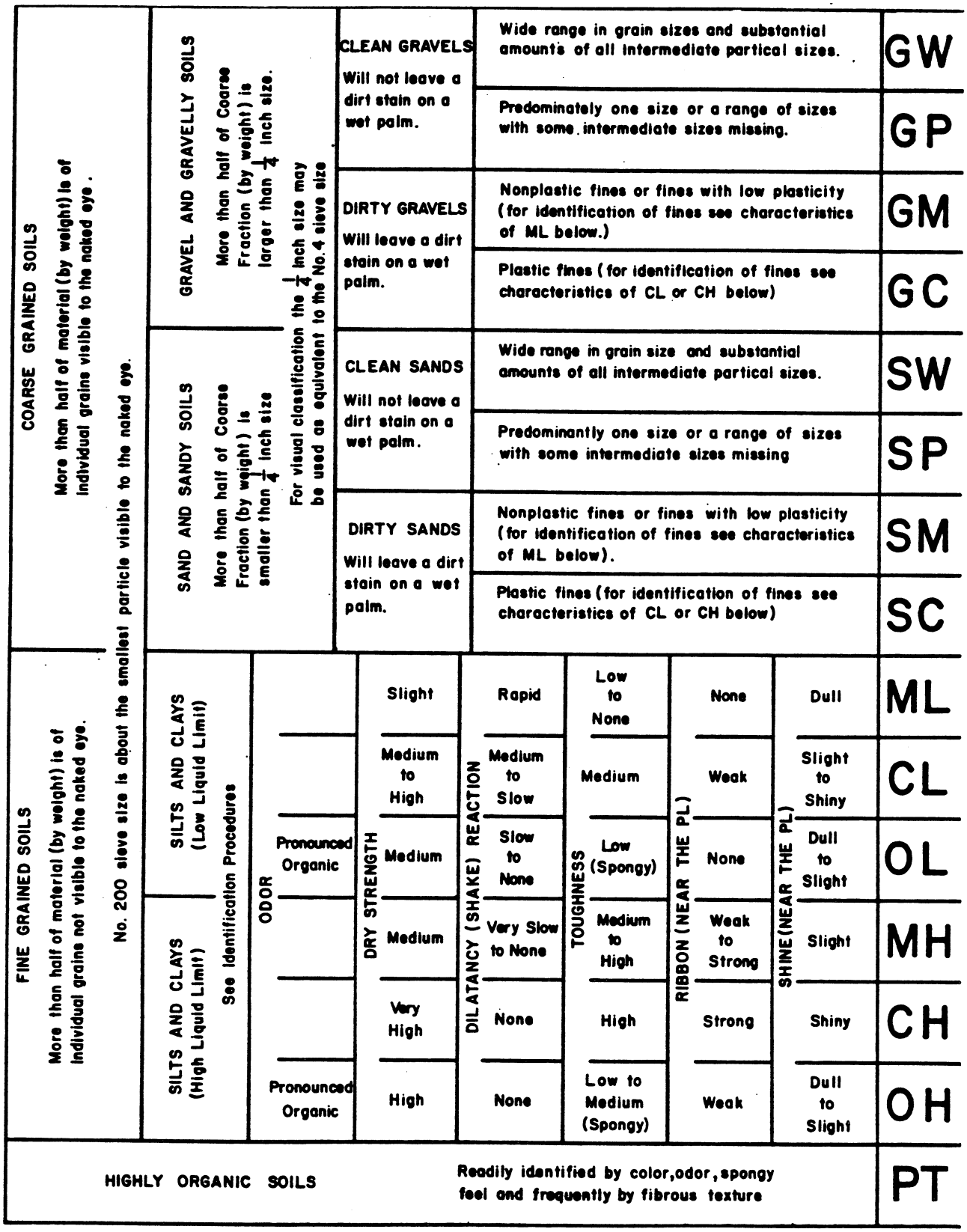
An important reference used to classify soils by field classification is the flow chart on the next page. To use the flow chart, begin on the left edge and branch as decisions are made as shown.

The classification process for the fine-grained soils portion of the chart is not a flow chart process. For those soils, the field tests listed must be evaluated before classifying a fine-grained soil. However, each test result does not branch to the next test. The classification of a fine-grained soil is based on an overall evaluation of all the field tests listed.

You should familiarize yourself with the flow chart on the next page before proceeding.

START THE PLAYER WHEN YOU HAVE FINISHED

FLOW CHART
UNIFIED SOIL CLASSIFICATION
FIELD IDENTIFICATION
FIELD IDENTIFICATION PROCEDURES



PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 3 - GRAIN SIZE AND GRADATION

The first step in field classification is to determine whether the soil is coarse-grained or fine-grained. Depending on the nature of the soil, this may be a purely visual determination, or it may include a manual evaluation of the texture of the sample.

To estimate gradation visually, spread the soil on a flat surface. Then, estimate the percentage of the soil that is larger than the No. 200 sieve, on a dry weight basis. Remember that a single gravel-sized particle will weigh as much as a considerable volume of fine-grained soil particles. No. 200 sized particles (0.074 mm in diameter) are about the smallest individual grain size that can be distinguished with the unaided human eye.

If a soil is not easily classified as fine-grained or coarse-grained solely on the basis of visual examination, you will need to manually evaluate the texture. This commonly is the case with sandy clays, clayey sands, very silty sands, and other similar soils. To evaluate the texture of these soils, place a representative sample in the palm of one hand and thoroughly wet it. Rub the wetted sample between your thumb and index finger. If you can discern grittiness, this usually indicates the soil has more than 50 percent coarser than the No. 200 sieve. Fine-grained soil has a silky texture. You can gain expertise in texture evaluation by comparing samples of known gradation. In the field exercise portion of this module, you will have this opportunity.

You must have sufficient sample to be representative of the soil being classified. The following guidelines are recommended for the size of sample to use for field classification:

Maximum particle size in soil sample	Size of sample for field classification
No. 4 sieve	100 grams (1/4 pound)
3/8 inch	200 grams (1/2 pound)
3/4 inch	1,000 grams (2.2 pounds)
1-1/2 inch	8,000 grams (18 pounds)
3 inch	60,000 grams (132 pounds)

START THE PLAYER WHEN YOU HAVE FINISHED

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 4 - LIQUID LIMIT EVALUATION

The first step in the field classification of a fine-grained soil is to determine whether the sample has a high or a low liquid limit value, greater than 50 percent or less than 50 percent.

This evaluation is made by selecting a representative sample of soil and manually removing as much as possible of the sample larger than the No. 40 sieve. A No. 40 sieve is helpful, if available. You should use about a tablespoon of soil that has been air-dried.

The sample is placed in the palm of one hand, and water is slowly added. After adding a little water, observe the speed of penetration of the water into the sample. This may be done by carefully lifting the wetted surface of the sample. Typically, soils with high liquid limits will not be penetrated by the added water as quickly as low liquid limit soils. This is due to the greater affinity to water of the higher liquid limit soils.

You should continue to slowly add water to the sample in your palm until the soil mass attains a soft putty-like state. Closely monitor the amount of water you have added to attain this state. While adding water, knead the sample occasionally to mix the soil and water thoroughly.

The amount of water added to reach a soft putty-like consistency is the measure of the liquid limit of the soil. You can gain experience in liquid limit evaluation by performing the test on samples with known liquid limit values.

Another procedure to determine the liquid limit is the cube test. Again mix water with a tablespoon of soil in the hand. Knead the soil thoroughly. Add sufficient water to bring the soil to the plastic state. No dry particles or lumps should be visible. Mold the soil pat into a cube. Flood the surface of the cube with water and immediately break open the cube. If water has penetrated into the inside of the cube this indicates that the soil has a low liquid limit. A high liquid limit is indicated if no water has penetrated the cube. Don't mistake water that flows into the inside during breaking for water that has actually penetrated the cube.

Estimating the liquid limit is the most difficult field evaluation for fine-grained soils. Fortunately, the other tests provide valuable supplemental information that aid in classifying and separating high liquid limit and low liquid limit soil.

START THE PLAYER WHEN YOU HAVE FINISHED

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 5 - DILATENCY TEST

This evaluation is performed on the soft, putty-like consistency soil pat that you will have after the liquid limit evaluation.

Mold the pat into a mass in the palm of one hand. Then, sharply strike the side of this palm against the other palm several times. Dilatent soils will develop a sheen on the surface of the pat. The pat will have a "livery" appearance. Then, when the pat is squeezed slightly, the pat's surface will quickly dull.

Observe the time that it takes for the water to disappear after squeezing. Low plasticity soils will usually react after 2-4 strikes. High plasticity soils usually show no reaction after 10 strikes.

Soils that are not dilatent will not develop a livery appearance and little change is apparent even after repeated strikes.

Dilatency may be rated as follows:

Rapid - Water appears quickly on the surface of the specimen during shaking and disappears quickly upon squeezing.

Slow - Water appears slowing on the surface of the specimen during shaking and does not disappear or disappears slowly upon squeezing.

None - No visible change in specimen.

Rapid dilatency reactions are typical of soils with low plasticity, particularly the ML classification. Soils with high plasticity such as the CH classification will have no dilatency reaction.

Several precautions are noteworthy for this evaluation. If you are using the test to evaluate the plasticity of the fines in a coarse-grained sample, the presence of substantial amounts of sand grains may accelerate this reaction and make it seem greater than it should. You should also be cautious not to start the test with a soil pat that has free water in it. Also, do not mistake the shiny appearance of some soils containing mica flakes for dilatency. Remember the livery appearance should disappear rapidly when squeezed to completely reflect a dilatent reaction.

See the flow chart for detailed typical reactions to this test for each classification of fine-grained soil.

START THE PLAYER WHEN YOU HAVE FINISHED

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 6 - TOUGHNESS TEST AND PLASTICITY EVALUATION

Begin this test with the pat of soil that you will have after performing the dilatent evaluation. You should dry the pat of soil by repeatedly kneading the soil and slowly adding dry soil that passed through the No.40 sieve until you reach the plastic state of consistency. As you dry the sample, occasionally roll out on a flat surface a thread of soil about 1/8 inch in diameter. If you can readily roll out a thread without the thread crumbling or cracking, the soil is at water contents above the plastic limit. You should continue drying the soil by kneading and rolling until the 1/8-inch thread just begins to crack or crumble. At this point you will have reached the plastic limit water content of the soil and should evaluate toughness at that point. Also evaluate the formation of a lump from the thread you have.

Plasticity characteristics of the soil are evaluated on the basis of the soil's behavior as you dry the sample from the liquid limit to the plastic limit water content, according to the following criteria:

High - Rolling and kneading to reach the plastic limit takes considerable time. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

Medium - The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.

Low - The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.

Nonplastic - A 1/8-inch thread cannot be rolled at any water content.

Toughness is described according to the following criteria:

High - Considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump have very high stiffness.

Medium - Medium pressure is required to roll the thread to near the plastic limit. The thread and the lump have medium stiffness.

Low - Only slight pressure is required to roll the thread near the plastic limit. The thread and the lump are weak and soft.

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 6 - Continued

Your flow chart has typical toughness and plasticity evaluations for all of the fine-grained classifications. You should review these before proceeding. You can gain experience in the use of this test by performing it on samples of known plasticity during the field exercise portion of this module.

You should remember that significant amounts of sand included in the sample will affect this evaluation drastically.

START THE PLAYER WHEN YOU HAVE FINISHED

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 7 - RIBBON TEST

A pat of soil with particles larger than the No. 40 sieve removed should be prepared at a water content slightly above the plastic limit by kneading soil with water to a medium putty-like consistency. A ribbon of soil is formed by extruding the pat of soil with the pressure of your thumb forced over the outside of your index finger. You should create a ribbon of soil perhaps 1/2 inch wide and as long as possible. Evaluate the strength of the ribbon by holding one end and gently shaking the ribbon until it breaks under its own weight.

Typical reactions to this evaluation for each classification of fine-grained soil are shown in your flow chart. High ribbon strength is typical of soils with high plasticity such as the CH classification.

Ribbon strength may be rated as follows:

strong

weak to strong

weak

none (no ribbon can be formed)

START THE PLAYER WHEN YOU HAVE FINISHED

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 8 - SHINE TEST

A pat of soil used in the toughness test may be used for this evaluation. The pat should be cut with a knife blade, or a smooth object such as your fingernail may be used to stroke the pat and create a smooth surface. The surface created on the pat is observed closely under direct light. Soils with high plasticity typically have a shiny appearance, and soils with low plasticity have a dull appearance.

You should not mistake the shininess of soils that contain mica for the shininess created by the colloidal content of clays. Performing the test at water contents near the plastic limit is important to avoid the appearance of free water on the sample pat for shininess.

Shininess may be rated as follows:

shiny

slight to shiny

dull to slight

dull

none

Typical shininess evaluations for each of the fine-grained classifications are shown in your flow chart. You should review these before you continue.

START THE PLAYER WHEN YOU HAVE FINISHED

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 9 - DRY STRENGTH TEST

Prepare a representative sample of soil by removing as much of the soil larger than the No.40 sieve as possible. Add sufficient water to the soil to mold into about a 1/2-inch ball or cube. Allow the cube to dry completely either by setting in the sun for several hours or air-drying overnight.

Dry strength of the dried soil cube is then evaluated by breaking it with finger/thumb pressure. High dry strength is typical of soils with high plasticity such as the CL and CH classifications. Low dry strength is typical of low plasticity soils such as the ML classification.

Substantial amounts of sand in the sample tested will affect the results significantly.

Dry strength may be rated as follows:

Very high - The dry cube cannot be broken between the thumb and a hard surface.

High - The dry cube cannot be broken with finger pressure. Specimen will break into pieces between thumb and hard surface.

Medium - The dry cube breaks into pieces or crumbles with considerable finger pressure.

Low - The dry cube crumbles into powder with some finger pressure.

None - The dry cube crumbles into powder with mere pressure of handling.

You will gain experience by testing samples that have known plasticity characteristics. Use these samples from the field exercise portion of this module.

Note: If the soil being classified is dry, the dry strength of natural clods may be evaluated rather than forming a ball and drying it. Natural clods, however, will have lower strengths than molded lumps.

Calcium carbonate or other cementing agents may cause some soils to exhibit dry strengths higher than expected. The results of the dry strength test may not correlate with the plasticity evaluated by the other field tests because of the presence of these cementing agents.

Study the typical reactions to the dry strength test for each USCS fine-grained classification on the flow chart before you continue.

START THE PLAYER WHEN YOU HAVE FINISHED

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 10 - ODOR TEST

Organic soils are detectible by an organic odor when moist and warm. Usually, organic matter is visually discernible in these soils as well. Classification of organic soils is also based on evaluation of their liquid limits and plasticity characteristics, as shown on the flow chart, Activity 2.

Peat soils contain few mineral soil particles. They will have a pronounced organic odor, usually dark brown to black, a spongy consistency, and a fibrous texture.

START THE PLAYER WHEN YOU HAVE FINISHED

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 11 - EVALUATION OF CLEAN AND DIRTY SANDS AND GRAVELS

DETERMINATION OF CLEAN OR DIRTY

For coarse-grained soil that is clean, you will need to determine whether it is well-graded or poorly graded. You will also have to determine whether sand or gravel is the predominant constituent in the soil.

Spread a representative sample on a flat surface. Visually estimate the percent of the sample larger than a No. 4 sieve and smaller than a No. 4 sieve. If you have a No. 4 sieve, it would be quite helpful in this estimate for separating the sample and evaluating the respective weights of the plus and minus No. 4 size particles, gravels and sands.

Coarse-grained soil is then evaluated as to whether it is clean or dirty. Two procedures may be helpful. One evaluation is made by placing a sample of the soil in your palm and wetting with clean water. Dirty coarse-grained soils will leave an obvious stain on your palm after brushing off the coarse-grained part. After letting your palm dry, the stain can be observed more closely. Fines in a dirty soil will create a powdery residue after drying. Another method of evaluating whether a coarse-grained soil is dirty or clean is to drop a representative sample in a beaker of clean water. Observe the formation of a cloud in the water. Silt and clay size particles will remain in suspension longer than 30 seconds, and an appreciable cloud after that time indicates dirty coarse-grained soils.

CLEAN SAND AND GRAVEL

For clean sands and gravels, you should determine whether the soil is well-graded or poorly graded. In the field, this is necessarily a visual determination. You should recall that a well-graded coarse-grained soil has a wide range of particle sizes, and that it has about equal amounts of each size particle represented. A poorly graded soil is predominately one size of particle, or it has a range of particle sizes missing from its gradation.

An example of a poorly graded sand is one that you might find on a beach. The sand would be entirely one size of grain. An example of a well-graded gravel would be one that you might find in a gravel pit located in a large river flood plain.

DIRTY SAND AND GRAVEL

For dirty sands and gravels, you should manually separate the particles larger than the No. 40 sieve. Next, evaluate the plasticity characteristics. Use the same field procedures that was described for the fine-grained soils. Evaluating the liquid limits in not necessary. Classification of dirty coarse-grained soil depends only on whether the minus No. 40 fraction plots above or below the "A"-line.

START THE PLAYER WHEN YOU HAVE FINISHED

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 12 - FIELD DESCRIPTION OF FINE-GRAINED SOILS

In addition to classification of a soil with its proper USCS symbol, you should also describe in detail the characteristics of the soil as shown below:

Group name: Include the group name of the soil, as covered in part B of this module. The entire group name is based on your estimate of the percent of sand or gravel, or both, in the soil.

Organic content: Describe any organic odor and typical dark-brown or black color as well as the presence of partially decayed leaves, twigs, roots, and other organic matter.

Structural characteristics of individual classification symbols:

Stratified - soil consists of alternating layers of varying soils or color. If layers are less than about 1/4-inch thick, describe as laminated, or varved if layers are fine-grained.

Fissured - soil breaks along definite planes of fracture with little resistance to fracturing. If the fractures appear polished or glossy, they should be described as slickensided.

Blocky - soil can be easily broken into small angular lumps which resist further breakdown.

Homogeneous - soils have none of the above discernible structural characteristics.

Water content condition: Describe as dry, moist, wet, or saturated.

Consistency: The consistency of wet or saturated fine-grained soil may be be evaluated and described as follows:

Soft - In-place soil easily penetrated several inches by thumb.

Medium (or firm) - penetrated several inches by thumb with moderate effort.

Stiff - readily indented by thumb, but penetrated only with great effort.

Very stiff - readily indented by thumbnail.

Hard - indented with difficulty by thumbnail.

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 12 - Continued

Local or geologic name: Describe origin if known, such as loess, weathered shale, alluvium, colluvium, or lasustrine

An example description of a fine-grained soil, which satisfies most of the above guidelines, follows:

Silt. About 10 percent fine sand. Slightly plastic. Yellowish brown. Saturated.

Soft in place. Non-stratified, but with numerous vertical root holes.

Loess. ML (Silt)

START THE PLAYER WHEN YOU HAVE FINSIHED

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 13 - FIELD DESCRIPTION OF COARSE-GRAINED SOILS

In addition to classifying a soil with its proper USCS symbol, describe additional characteristics of the soil as follows:

Particle size description

Estimate the percent of the total soil that is cobble or boulder sized particles. Estimate the percent gravel, percent sand, and percent fines in the soil finer than 3 inch.

Describe the grain shape of the sand and gravel in the soil. The following terms are used:

Angular - particles have sharp edges, and relatively plane sides, and with unpolished surfaces.

Subangular - particles are similar to angular but have somewhat rounded edges.

Subrounded - particles exhibit nearly plane sides but have well-rounded corners and edges.

Rounded - particles have smoothly curved sides and no edges.

Group name: To complete the field description of coarse-grained soils, you should include the group name in addition to the USCS symbol of the soil. You will recall that the group name is based on the percentages of other grain sizes present in the soil and upon plasticity characteristics of the fine-grained portion of the soil. Part B of this module (Activities 14 and 15) contains details on group names.

Other descriptions

Add appropriate descriptive notes on the lithology of the coarse particles, color, natural water content, cementation, degree of compactness, local or geologic origin name, and structure.

The following information is used in these supplemental descriptions:

Structure:

Stratified - soils consist of alternating layers of varying types of soil or colors. If layers are less than about 1/4 inch in thickness, describe as laminated or lensed.

Non-stratified - soils are homogeneous

ACTIVITY 13 - Continued

Heterogeneous - Soil that has a mottled texture with pockets of differing nature.

Lithology - Describes hardness. Note especially the presence of mica flakes and shaly particles. Describes the parent rock source for granular pieces, such as quartz, limestone, etc.

Degree of compactness: Dense sand or gravel is difficult to penetrate more than a few inches with a 2- by 2-inch wooden stake. The stake may be easily driven into loose soil.

Particle shape: The particle shapes should be described as follows where length, width, and thickness refer to the greatest, intermediate, and least dimensions of a particle, respectively.

Flat - Particles with $\frac{\text{width}}{\text{thickness}} > 3$.

Elongated - Particles with $\frac{\text{length}}{\text{width}} > 3$.

Flat and elongated - Particles meet criteria for both flat and elongated.

Water content: Describe the water content using the following terms

Dry - Absence of moisture, dusty, dry to the touch.

Moist - Damp but no visible free water.

Saturated - Visible free water, usually soil is below water table.

An example description of a coarse-grained soil follows:

Alluvial Sand. About 5 percent cobbles with maximum size of 8 inches. About 20 percent gravel, 65 percent sand, and 15 percent fines. Gravel is subrounded, igneous origin. Sand is subrounded to subangular quartz. Light brown, moist and dense in place. Stratified. Not cemented. Well-graded size distribution. (SM) [Silty sand with gravel]

START THE PLAYER WHEN YOU HAVE FINISHED

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 14 - BORDERLINE CLASSIFICATIONS

Because field classification is based on estimates of particle size distribution and plasticity characteristics rather than on laboratory data, clearly placing a soil in one category may be difficult. In those cases, a borderline classification may be used, separating two symbols with a slash. The following examples illustrate cases where borderline classification may be desirable.

When the estimated percent fines is between 45 and 55%: One symbol should be for a coarse-grained, dirty classification, and the other for a fine-grained soil. For example, GM/ML, CL/SC.

When the estimated percent sand and percent gravel are about equal. For example; GP/SP, SC/GC, GM/SM.

When the soil is not clearly well-graded or poorly graded. For example; GW/GP, SW/SP.

When plasticity characteristics are not clear on fine-grained soils. For example; CL/ML, CH/MH, and also when plasticity characteristics are not clear for dirty coarse-grained soils. For example, SC/SM.

When liquid limit determinations are not clear on fine-grained soils. For example; CL/CH, ML/MH, CL/MH.

Borderline symbols and classifications are used only when clearly placing a soil in a single classification is not possible. Every effort should be made to place a soil in a single classification before using a borderline designation.

Do not confuse the use of borderline classifications in field procedures with dual classification groups as used in laboratory determination procedures such as SP-SM, GP-GC. The dual classifications apply to coarse-grained soil that has between 5 and 12 percent fines and are a precise group identification rather than a borderline classification. The use of the slash (/) symbol designates the borderline use.

START THE PLAYER WHEN YOU HAVE FINISHED

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 15 - QUESTIONS ON FIELD CLASSIFICATION

Answer the following questions

True or False

1. A CH soil has a rapid dilatany reaction. ____

2. Evaluating the liquid limit of clean coarse-grained soils is not necessary. _____

3. Beach sand is an example of a poorly graded soil. _____

4. GW-GP is a good example of a borderline classification using field procedures. _____

Discussion Questions

5. In your own words, briefly list the procedures for running a

   a. Dilatency test

   b. Ribbon test

   c. Shine test

   d. Dry strength test

6. Discuss how you would use the flow chart to classify a fine-grained soil using field procedures.

START THE PLAYER WHEN YOU HAVE FINISHED

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 15 - SOLUTION

1. False.

2. True.

3. True.

4. False. It should be GW/GP.

5. a. Refer to Activity 5.

   b. Refer to Activity 7.

   c. Refer to Activity 8

   d. Refer to Activity 9.

6. Refer to Activity 2.

START THE PLAYER WHEN YOU HAVE FINISHED

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 16 - FIELD PROCEDURES ON KNOWN SOIL SAMPLES

You will be given 14 samples representing each of the USCS field sample classes. Using the procedures in this module, develop expertise in each field test by comparing known laboratory data for each sample with your visual and manual identification tests.

Each sample will be clearly marked with its grain-size analysis, liquid limit and plasticity characteristics as well as the USCS.

Use the flow chart in Activity 2 and go through the field procedures step by step, verifying each step with given laboratory data.

Carefully evaluate the differences in liquid limit values for the range of soils given. Note that the two most difficult soil classes to differentiate between in this exercise are the MH and CL classes because they may have about the same plasticity index. The major difference is in the respective values of liquid limit. Because liquid limit is perhaps the most difficult field test to evaluate, the differentiation is difficult. Verify for yourself on the plasticity chart that these two soils can have similar values of PI.

Verify the usefulness of each of the field test procedures given. You will find that as you gain experience in field identification, all tests are not conclusive on every sample.

Therefore, consider all the field tests and concentrate on those field tests that you are able to evaluate the best. To evaluate the liquid limit and plasticity, no test should be eliminated without trying the test.

You may find the attached worksheet useful for recording the results of field identification tests performed on the fine-grained samples. Do not use this worksheet for clean coarse-grained soils. It may be used in recording test results for the plasticity characteristic identification tests on the dirty coarse-grained soils, but note that you will not need to perform the liquid limit test evaluation for those soils.

START THE PLAYER WHEN YOU HAVE FINISHED

UNIFIED SOIL CLASSIFICATION

FIELD INDENTIFICATION TESTS FOR FINE GRAINED SOILS

Sample No.	Liquid Limit	Dilatancy	Dry Strength	Toughness	Ribbon	Shine	Plasticity	CLASS SYMBOL	CLASS MODIFIER
	High or Low	Rapid, Slow, or None	Very High, High, Medium, Low, or None	High, Medium, or Low	Strong, Weak, or None	Shiny, Dull, or None	High, Medium, Low, or Nonplastic		

PART C - UNIFIED SOIL CLASSIFICATION SYSTEM USING FIELD PROCEDURES

ACTIVITY 17 - CLASSIFICATION OF UNKNOWN SOIL SAMPLES

The last Activity in Part C is to classify 14 unknown soil samples. You will be given the samples which have been air-dried but no other information is furnished.

Use the information previously given and the experience gained in classifying the 14 samples. One each of the 14 field classes is provided, and no two classes are duplicated.

After classifying each soil sample, you will be given the laboratory data for each sample. You may return to the samples and further verify any field tests.

A form is provided for recording the results of field identification tests on the fine-grained soils. The form may also be used for recording plasticity test results for the fines in the dirty coarse-grained samples. Record your observations on the clean coarse-grained soils separately.

START THE PLAYER WHEN YOU HAVE FINISHED

UNIFIED SOIL CLASSIFICATION

FIELD INDENTIFICATION TESTS FOR FINE GRAINED SOILS

Sample No.	Liquid Limit	Dilatancy	Dry Strength	Toughness	Ribbon	Shine	Plasticity	CLASS SYMBOL	CLASS MODIFIER
	High or Low	Rapid, Slow, or None	Very High, High, Medium, Low, or None	High, Medium, or Low	Strong, Weak, or None	Shiny, Dull, or None	High, Medium, Low, or Nonplastic		

UNIFIED SOIL CLASSIFICATION

FIELD INDENTIFICATION TESTS FOR FINE GRAINED SOILS

Sample No.	Liquid Limit	Dilatancy	Dry Strength	Toughness	Ribbon	Shine	Plasticity	CLASS SYMBOL	CLASS MODIFIER
	High or Low	Rapid, Slow, or None	Very High, High, Medium, Low, or None	High, Medium, or Low	Strong, Weak, or None	Shiny, Dull, or None	High, Medium, Low, or Nonplastic		