

Region IV Soils Contest
Oct. 3-7, 2016
Texas Tech University
Ruidoso, NM



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CONTEST RULES

Team Composition

A team is composed of three or four undergraduate students who are enrolled in a full-time, four-year curriculum in the institution they are representing. Each institution may enter only one team in the contest. Additionally, up to four alternate competitors from each team are allowed to compete in the contest activities, but their scores will not count towards the sweepstakes (overall) total. However, alternate competitors are eligible for individual awards. All students must be eligible to represent their institution according to the rules and regulations governing eligibility at their institution. Team and alternate students should be designated by Wednesday night, Oct. 5, 2016.

Contest Format

This contest will be a "**closed book**" contest; the contest handbook may not be used during the contest. Prohibited items include Soil Taxonomy, Keys to Soil Taxonomy, and Field Book for Describing & Sampling Soils and/or any notes. Cell phones are prohibited. Each site will have its own scorecard indicated by a unique color. Each individual contestant will be given color scorecards corresponding to each site. Students must correctly enter their contestant ID number on their scorecard. Scorecard entries must be made according to the instructions for each specific feature to be judged (see following sections of the handbook). Only one response should be entered in each blank, unless otherwise instructed.

The contest will consist of three parts: a) four individually judged pits (Thursday morning), b) one team-judged pit (Thursday afternoon) and c) the sweepstakes (overall) score, a combination of both team and individual results. The sweepstakes placings will be used to select which teams advance to nationals (Northern Illinois). The team scores from the individually-judged pits will be the sum of the top three individual scores for each pit. Therefore, the sum of 13 scorecards (3 individuals x 4 individual pits + 1 team judged pit) will determine the sweepstakes score per team. Students from institutions having less than three team members are allowed to compete, but they are only eligible for individual awards.

The clay content of the third horizon (pit 1) will be used to break ties in both the individual and team competitions. In order to break a tie in the sweepstakes scores, the mean clay content will be calculated from the estimates provided by all members of a given team. The team with the mean estimate closest to the actual value will receive the higher placing. If this does not break the tie, the next lowest horizon will be used in the same manner. For individual ties, the clay content of the third horizon at sites 1, 2, and so on will be compared to that estimated by the individual in order to break a tie between individuals. If this does not break the tie, the next lowest horizon will be used in the same manner. For the team judged pit, the team estimate of the clay content of the third horizon will be compared to the actual value. The team with the estimate closest to the actual value will receive the higher placing. If this does not break the tie, the next lowest horizon will be used in the same manner.

Results will be announced Friday morning and will be final. Plaques will be awarded to the top three sweepstakes teams, top three in team-judging, and top five in individual-judging.

At each site, a pit will be excavated and an area will be designated on one of the pit walls for the measurement of horizon depth and boundary distinctness. A restricted area of the pit wall

will be outlined with flagging and a nail will be placed 'somewhere in the third horizon'. A tape measure will also be attached to the restricted area. THE FLAGGED AREA IS NOT TO BE DISTURBED! Picking, taking samples, or other disturbances within the flagged area are not permitted. The pit ID, depth to be considered, the number of horizons to describe, pertinent chemical data, and other relevant information will be displayed on a sign at each pit (Fig. 1). Contestants should expect to evaluate between four and six horizons per pit. Slope stakes will be placed along the grade for determination of % slope and vegetative cover designation.

PIT 1			
Describe five mineral horizons between the surface and a depth of 112 cm.			
Horizon	% B.S.	ESP (%)	% O.C.
1	100	2	0.9
2	100	5	0.7
3	100	12	0.3
4	100	28	0.1
5	100	12	0.1

The nail is 36 cm from the surface.

Figure 1. Example of information provided at each pit.

Fifty minutes will be allowed for the judging of each site. During registration, each contestant will be assigned a number-letter combination corresponding to team-group designations. This will uniquely identify each contestant and be used to facilitate rotations at the pit (Table 1):

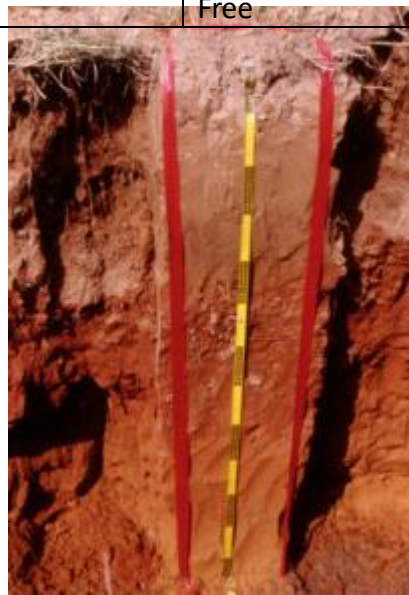
Table 1. Contestant rotations.

Time	Pits 1 and 3		Pits 2 and 4	
	Odd team no.	Even team no.	Odd team no.	Even team no.
First 5 min.	In*	Out	Out	In
Next 5 min.	Out	In	In	Out
Next 10 min.	In	Out	Out	In
Next 10 min.	Out	In	In	Out
Next 20 min.	Free**	Free	Free	Free

*In designates authorization to be inside the pit.

**Free time designates authorization for any competitor to enter the pit.

The restricted area on the pit wall will be outlined with flagging and a tape measure mounted that is NOT to be disturbed, and a nail will be inserted somewhere in the third horizon of each pedon (Fig. 2). Contestants should provide the following for their personal use: tape measure,



clinometers (or Abney level), water bottle or sprayer, acid bottle, knife, pencils, Munsell color charts (10R to 5Y), hand towel, hand lens, and containers for soil samples. Calculators, 2 mm diameter sieves, and clipboards may also be used. No other materials other than those supplied by the host will be permitted during the contest. Cell phones, pagers, or other communication devices are prohibited during the contest. Talking is NOT permitted between contestants during the 50 minutes of pit judging. Pit monitors will be instructed to collect scorecard from contestants and they will receive a zero for that pit if any of the above rules are broken. Contestants should show respect for each other and avoid creating distractions during the competition.

Figure 2. Example of restricted area of pit wall.

Scoring and Abbreviations

Grading will be done by individuals competent in soil morphology and classification. Each grader will grade only one pit and scores will be re-counted by another grader for accuracy. Variable credit may be given at the discretion of the judges. For horizons, two points will be given for the correct master horizon designation even if other components are in error. Where an answer is not needed or is inappropriate, **a dash (-) must be recorded for credit.**

Contestants may use the official abbreviations (preferred, see Attachment 1) or write out answers. Use of abbreviations other than official abbreviations is strongly discouraged, but graders may use their discretion if the meaning of an unofficial abbreviation is obvious.

A team is composed of three or four undergraduate students. The team score will be the sum of the top three individual scores at each pit (Table 2). This method maximizes the opportunity for all four team members to contribute to the final team score.

Table 2. Score tabulation example.

Contestant	Team Pit	Site 1	Site 2	Site 3	Site 4	Total
A		132	130	110	144	516
B		146	116	141	138	541
C		130	112	160	158	560
D		125	114	129	145	513
Total score:	117	408	360	430	447	1762

The score from the team-judged pit will be added to the individual scores for the sweepstakes team total.

Scorecard

The scorecard consists of four parts: I. Soil Morphology; II. Site Characteristics; III. Soil Taxonomy; and IV. Interpretations (refer to the attached example). The *Soil Survey Manual, Field Book for Describing and Sampling Soils* (Schoeneberger et al.), and *Keys to Soil Taxonomy* should be used as guides during practice.

Part I. Soil Morphology

A. Horizon Designations

Horizon designation will follow standard procedures, including a master, transitional or mixed horizon symbol in the “Master” column, and when needed, a lower case symbol in the subordinate column, and appropriate numbers in the “No.” column. All B horizons **must** have a subordinate. Numbers indicating lithologic discontinuities and prime symbols to distinguish otherwise identical designations should be placed in the “Master” column. If no designation is necessary, contestants **must place a dash in that position to receive credit.**

B. Depth

The depth of the lower boundary as measured from the soil surface should be recorded (cm). Alternately, the depth of both the upper and lower boundary may be given, but only the depth to the lower boundary will be graded. For example, a Bt1 horizon occurring from 30-45 cm may be recorded as “45 cm” (preferred) or “30-45 cm”. The last horizon boundary will not be described; simply place a dash in that position to receive credit.

Depth measurements should be made between the tapes in the flagged area on the pit wall. A range for the depth considered correct will be based on the distinctness of the boundary. No horizon less than 10 cm will be described. If a horizon less than 10 cm thick occurs, it should be combined with the adjacent horizon that is most similar for the depth measurement purposes. When two horizons combine to a total thickness of 10 cm or more, the properties of the thicker horizon should be described.

If a lithic contact, paralithic contact, petrocalcic, or petrogypsic horizon occurs at or above the specified pit depth on the site card, the contact should be considered in evaluating the water retention difference, effective soil depth, and hydraulic conductivity. Otherwise, the last horizon should be assumed to extend to 150 cm for making all relevant evaluations. If a lithic or paralithic contact occurs within the specified depth, the contact should be considered as one of the horizons to be included in the description, and the appropriate horizon nomenclature should be applied (e.g., R, Cr, etc.). However, morphological features need not be provided except for effervescence, REDOX, and structural conditions, as appropriate; **dashes** should be used on the scorecard in all other places in place of morphological descriptors. In some practice sites, relic redox features were found in Cr materials and described. Similarly, Cr horizons were structurally described with a 0 grade as massive. R and Cr horizons will be considered lithic and paralithic contacts, respectively. However, petrocalcic and petrogypsic horizons are not considered paralithic.

C. Boundary Distinctness

Distinctness refers to the thickness of the zone within which the boundary can be located. The distinctness of a boundary depends partly on the degree of contrast between the adjacent layers and partly on the thickness of the transitional zone between them. The topography of the boundary will not be required for this contest. The boundary distinctness of the lowest horizon will not be described; a dash should be recorded.

Distinctness classes are:

Abrupt (A): 0.1 - 2.0 cm

Clear (C): 2.1 - 5.0 cm

Gradual (G): 5.1-15.0 cm

Diffuse (D): > 15 cm

D. Clay Percentage and Texture

Estimates of the clay percent should be placed in the space provided. A scaled range for correct answers compared to the lab-determined values will be used as follows:

Actual %	Allowed deviation
<20	+/- 2%
20-40	+/- 3%
>40	+/- 4%

The textural class and % clay for each horizon will be determined from laboratory data. Soil texture classes from the USDA textural triangle (not provided) and their official abbreviations (provided) will be used. Deviation from standard nomenclature will be incorrect (i.e., sandy silt, clayey sand). Credit for sand, loamy sand, and sandy loam textures must contain the appropriate sand subfraction modifiers when appropriate for credit (e.g., very fine, fine, coarse, or very coarse).

Modification of the textural class will be required if the horizon contains >15% by volume coarse fragments (>2mm), which includes carbonate nodules. Sieves will be allowed during the contest. For the purpose of this contest, only the following terms will be used to describe coarse fragments:

Gravelly – fragments 2-75 mm diameter of any lithology and shape.

Cobbly – fragments of any shape and lithology that are > 75 mm diameter by their long axis.

If gravel and cobbles occur in the same horizon, the dominant condition should be described.

Coarse fragment modifiers are required as follows:

Coarse fragment (vol/vol)	Modifier
0-15%	none needed
16-35%	gravelly or cobbly
36-60%	very gravelly or cobbly
>60%	extremely gravelly or cobbly

For example, if the horizon has a texture of clay loam with 40% by volume gravel-size fragments, the correct texture designation should be VGR CL (very gravelly clay loam).

E. Color

The Munsell color notation to include hue, value, and chroma will be used to describe the moist soil color of each horizon. The moist color should be determined on briefly rubbed samples. For instances where depletions are being evaluated to indicate reduction, raw moist samples should be used (not rubbed).

F. Redoximorphic Features (RMF)

Redoximorphic features are soil morphological features caused by alternating reduction/oxidation processes. The reduction/oxidation of iron (Fe) and, to a lesser extent, manganese (Mn), minerals result in most RMF features. Iron is a major pigment that influences soil color. The loss, accrual, and valence/mineral state of Fe are a major determinate of color patterns within or across entire soil horizons. Iron or Mn reduction occurs when free oxygen is limited or excluded from a soil volume or horizon by water saturation for extended time. Reduced iron (Fe^{2+}) is comparatively much more soluble and mobile than oxidized iron (Fe^{3+}), and moves with water flow and by diffusion gradients. When soil is reduced, Fe and Mn in local zones can be removed, leaving uncoated mineral grains (depletions) of lighter color. Reduced Fe is oxidized and precipitates when water drains from soil (reentry of free oxygen), or where oxygen is present in, or along, soil pores, including root channels or along roots. The re-oxidized Fe or Mn may form crystals, soft masses, or hard concretions or nodules (concentrations). Oxidized Fe will generally have a redder or yellower color than adjacent soil particles, while Mn often will have a darker color than adjacent soil particles.

Therefore, redox **concentrations** are defined as zones of Fe-Mn accumulation from:

1. Nodules and concentrations. Concentrations have internal rings and nodules do not.
2. Masses. Masses are non-cemented concentrations.
3. Pore linings. Pore linings may be either coatings on pore surfaces or impregnations from the matrix adjacent to pores.

Redox **depletions** are defined as zones with chromas less than, or values higher than those in the matrix where either Fe, or Mn, or both Fe, and Mn, and clay have been removed through reduction and transport processes. They may be identified as:

1. Iron depletions. Zones that contain lesser amounts of Fe and Mn oxides but have clay content similar to that of the adjacent matrix.
2. Clay depletions. Zones that contain lesser amounts of Fe, Mn, and clay compared to the adjacent matrix.

Report the moist abundance as few, common, many (<2%, 2-20%, and >20%, respectively) of the *most dominant* RMF. Indicate if it is a concentration or depletion (Con/Dep). If both concentrations and depletions occur, contestants should simply divide the description cell in half and record the abundance of each (e.g., common/few Con/Dep). If no RMF features are present, mark both "Abundance" and "Con/Dep" with a dash.

G. Structure

Both grade (structureless, weak, moderate, or strong) and type (shape) of structure should be recorded. Acceptable types of structure are: granular, platy, subangular blocky, angular blocky, prismatic, columnar, and wedge. If two structure types are present in a given horizon, describe the structure with the stronger grade. If the two structures are of equal grade, describe the one with the larger physical size. If there is no structure, indicate "structureless" (SL or 0) in the grade column and "massive" (MA) or "single grain" (SG) in the shape column.

H. Effervescence Class

The gaseous response (seen as bubbles) of soil to applied HCl.

Non-effervescent (NE): No bubbles form.

Very slightly effervescent (VS): Few bubbles form.

Slightly effervescent (SL): Numerous bubbles form.

Strongly effervescent (ST): Bubbles form a low foam.

Violently effervescent (VE): Bubbles rapidly form a thick foam.

Part II. Site Characteristics

A. Site Position

The following are the designations for site positions that will be used in this contest. For contest purposes, the site position should be determined at the location of the pit itself, NOT between the slope stakes. Efforts will be made to place the slope stakes in accordance with the position found at the pit site as well. However, if in doubt, use the location of the pit itself for designating site position.

Summit: The topographically highest position of a hillslope profile with a nearly level (planar or only slightly convex) surface. Ridge tops are included under summit since they are topographic highs and are usually planar in one direction.

Shoulder: The hillslope profile position that forms the convex, erosional surface near the top of a hillslope. If present, it comprises the transition zone from summit to backslope.

Backslope: This position includes all landscape positions between the shoulder and toeslope.

Footslope: The hillslope profile position that forms the concave surface at the base of a hillslope. It is a transition zone between upslope sites of erosion and transport (shoulder, backslope) and downslope sites of deposition (toeslope).

Toeslope: The hillslope position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear, and are constructional surface forming the lower part of a hillslope continuum.

Floodplain: The lowest geomorphic surface which is adjacent to the stream bed and which floods *first* when the stream goes into flood stage. It is formed by the deposition of alluvium. Each stream has only one floodplain. Floodplains will only be marked adjacent to active rivers/streams or large ephemeral streams more than 200 ft in width.

Stream terrace: These are geomorphic surfaces formed by the deposition of alluvium and are higher in elevation than the floodplain. A stream may have one or more terraces. For the purpose of this contest, a landform will NOT be designated as a stream terrace unless its association with a present-day stream (draw) is reasonably apparent.

Depression: These are low positions on the landscape where water and/or sediment accumulate. They have no free surface water drainage outlet.

Drainage: Low places on landscapes where sediment is infrequently deposited by small ephemeral streams (only in large flooding events). Think of these as depositional areas adjacent to or in small runoff channels that are much narrower than floodplains, providing only localized runoff drainage.

B. Parent Material

Parent material kind is a term describing the general physical, chemical and mineralogical composition of the material, mineral or organic, from which the soil develops. Mode of deposition and/or weathering may be implied or implicit. The following parent materials will be used in this contest:

Alluvium: Unconsolidated, clastic material deposited by running water, including gravel, sand, silt, clay, and various mixtures of these.

Colluvium: Unconsolidated, unsorted sediments detached from the hillslopes and generally deposited at a footslope or toeslope.

Eolian: Wind deposited sediments.

Lacustrine deposit: Clastic sediments and chemical precipitates deposited in lakes.

Marine deposit: Sediments (predominantly sands, silts, and clays) of marine origin; laid down by oceanic waters.

Residuum: Unconsolidated, weathered, or partly weathered mineral material that accumulates by disintegration of bedrock in place.

Fluvial deposit: Fluvial deposits are laid down by rivers as a result of bank erosion where the material is transported and redeposited by meanders in the form of bars, points and floodplains.

Sometimes two parent materials may be evident in a profile (e.g., colluvium over residuum). If evident, indicate the transition with numbers in the Master horizon column beginning with the number 2 for the first transition. It is implied that the overlying parent material is number 1. For example, the following sequence may be found in a profile with two parent materials: A – E – Bt1 – 2Bt1 – 2Bt2....

C. Slope Classes

Slope classes to be used in the contest are listed on the scorecard. If a site falls on the boundary of two slope classes, mark the steeper class. The slope is to be determined between the two slope stakes at each site. The student is responsible for checking the heights of the stakes.

D. Erosion Classes

The degree to which accelerated erosion has modified the soil may be estimated during soil examination. The conditions of eroded soil are based on a comparison of the suitability for use and the management needs of the eroded soil with those of the uneroded soil. The eroded soil is identified and classified on the basis of the properties of the soil that remains. The original thickness of the A and E horizons (if present) will be supplied at each pit. The following classes will be used based upon the thickness of the original surface.

Deposition: The soil is in a position that could receive additional sediments and there is evidence that the soil regularly receives additional sediments. The thickness of the A and E horizon (if present) currently at the site is greater than the original thickness of the A and E horizons.

Class 1: The class consists of soils that have lost some, but on the average <25%, of the original A and/or E horizons or of the uppermost 20 cm if the original A and/or E horizons were less than 20 cm thick.

Class 2: This class consists of soil that have lost, on the average, 25 to 75% of the original A and/or E horizons or of the uppermost 20 cm if the original A and/or E horizons were less than 20 cm thick.

Class 3: This class consists of soils that have lost, on the average, 76% or more of the original A and/or E horizons or of the uppermost 20 cm if the original A and/or E horizons were less than 20 cm thick.

Class 4: This class consists of soils that have lost all of the original A and/or E horizons or the uppermost 20 cm if the original A and/or E horizons were less than 20 cm thick.

Part III. Soil Taxonomy

Keys to Soil Taxonomy should be used for details on soil classification. Pertinent data (e.g., organic carbon, CaCO₃, BSP) will be displayed at each pit sign. The general area of the contest and practice sites closely bounds the ustic/aridic line. When deciding whether the given area is ustic or aridic for classification purposes, use vegetation as a guide. Look carefully at the differences in vegetation on steep slopes of the Lower Hondo Valley (e.g., Hondo to Lincoln) (aridic) versus higher elevational sites on the outskirts of Capitan (ustic). For example, a reas with pine will be ustic.

Part IV. Interpretations

A and B. Hydraulic Conductivity

Saturated hydraulic conductivity of the surface horizon and the *most limiting* horizon (Hydraulic Conductivity/Soil) within the depth specified for judging will be estimated. Should a lithic or paralithic contact occur at the specified judging depth, it should be considered in evaluating hydraulic conductivity.

High. Greater than 3.6 cm/hr. This class includes all sands and loamy sands as well as sandy loams with strong structure. Horizons containing large quantities of coarse fragments with insufficient fines to fill many voids between the fragments are also included in this class.

Moderate. Between 0.036 and 3.6 cm/hr. This class includes materials excluded from the “Low” and “High” classes.

Low. Less than 0.036 cm/hr. Normally, low hydraulic conductivity is associated with clay, silty clay, and sandy clay horizons. Massive horizons and all root-limiting horizons have low hydraulic conductivity.

C. Water Retention

The amount of water that a soil can hold between 33 kPa (1/3 bar) and 1500 kPa (15 bars) soil-water tension within the zone accessible to roots is the water retention of the soil. The water retention of the whole soil is calculated by estimating the amount of water each horizon can hold, determining which horizons are sufficiently accessible to plant roots to be significant sources of water, and summing the water retentions of the accessible layers. Water retention is commonly expressed in cm water/cm soil. Classes are based on the amount of water retention in the upper 1.5 m of soil, or above a root-limiting layer, such as a lithic or paralithic contact. A number of factors are used to determine the water retention of individual horizons. These include texture, clay mineralogy, soil structure, volume of coarse fragments, organic matter content, and bulk density. For the contest, only texture and volume of coarse fragments will be used to estimate the water retention of individual horizons above 1.5 m. Estimated water retention in relation to texture is given in Table 3. If the instructions for a pit require judging a profile that is less than 1.5 m deep, then assume the last horizon extends to a depth of 1.5 m unless it is directly underlain by a lithic or paralithic contact, or root limiting layer. Contestants are to assume that lithic and paralithic contacts, petrogypsic and petrocalcic horizons have no water retention and that water retention is not to be calculated for any horizon below these contacts. Coarse fragments are considered to have negligible (assume zero) moisture retention so estimates must reflect the coarse fragment content (subtract the percentage of coarse fragment volume, see example below). Table 4 is a sample calculation of water retention. The five classes recognized are: Very High >30 cm, High 22.50-29.99 cm, Medium 15.00-22.49 cm, Low 7.50-14.99 cm, and Very Low <7.50 cm.

Table 3. Estimated relationships of water retention difference to texture.

Texture Class of Soil Horizon	cm H ₂ O/cm soil
silt, silt loam, silty clay loam, loam, clay loam, very fine sandy loam	0.20
sandy loam, loamy very fine sand, very fine sand, fine sand, fine sandy loam, sandy clay loam, sandy clay, clay, silty clay	0.15
coarse sandy loam, loamy fine sand, loamy sand	0.10

Table 4. The following is a sample calculation of water retention difference.

Horizon	Depth	Text.	Crs. Frag.	Water Ret.
Ap	0-12	sil	0	(12cm)(0.20) = 2.4
Bt1	12-28	sil	0	(16cm)(0.20) = 3.2
Bt2	28-54	sicl	0	(26cm)(0.20) = 5.2
Bt3	54-105	sicl	5	(51cm)(0.20)(0.95) = 9.69
Bt4	105-132	cl	15	(27cm)(0.20)(0.85) = 4.59
R	132+	-	-	0

Total water retention difference = 25.08 cm
= HIGH

D. Wetness Class

Free-water classes are determined by the depth to specific redoximorphic features (RMF) in soil, those with chroma 2 or less and value of 4 or more, i.e., gray depletions of *any* abundance as defined by the NRCS. Mark the shallowest occurrence of wetness as defined by reduction features in the soil. Be sure to carefully distinguish between inherent parent material color and reduction; they are not the same. Relic redox features will be recognized and described if present. The soil free-water classes for this contest are:

- Very Shallow: <25 cm
- Shallow: 25-49.9 cm
- Moderately Deep: 50-99.9 cm
- Deep: 100-150 cm
- Very Deep: >150 cm

If no evidence of wetness exists within the specified depth for characterization and that depth is less than 150 cm, assume Very Deep. These classes indicate where free-water and reduction occur, but do not indicate the duration of occurrence of the free-water.

E. Surface Runoff

Surface runoff refers to water that flows away from the soil over the land surface. Surface runoff is controlled by a number of factors including soil properties, climate, and plant cover. Runoff can be significantly altered by management (e.g., natural cover, cultivation, minimum tillage operations, etc.). For the purpose of this contest, only the runoff classes in Table 5 will be used. If the surface has a dense vegetative or debris cover (< 10% exposed soil), the surface runoff class should be assigned *one lower class rate* to a minimum of 'Very Slow'. Sites in depressional positions will be considered to have very slow runoff. Determinations of vegetative cover should be made **between the slope stakes**.

Table 5. Surface runoff classes.

% slope	Hydraulic Conductivity of the Surface Horizon		
	High	Moderate	Low
	----- surface runoff class -----		
0-1	very slow	very slow	very slow
1.1-3	very slow	slow	slow
3.1-5	slow	medium	medium
5.1-8	medium	medium	rapid
8.1-12	medium	rapid	very rapid
12.1-20	rapid	very rapid	very rapid
>20	very rapid	very rapid	very rapid

Attachment 1

Official Abbreviations

(contestants will be provided with this at the contest site)

Coarse Fragments

Gravelly	-GR	Cobbly	-CB
Very Gravelly	-VGR	Very Cobbly	-VCB
Extremely Gravelly	-XGR	Extremely Cobbly	-XCB

Texture

Coarse sand	-COS	Fine sandy loam	-FSL
Sand	-S	Very fine sandy loam	-VFSL
Fine sand	-FS	Loam	-L
Very fine sand	-VFS	Clay loam	-CL
Loamy coarse sand	-LCOS	Silt	-SI
Loamy sand	-LS	Silt loam	-SIL
Loamy fine sand	-LFS	Silty clay loam	-SICL
Loamy very fine sand	-LVFS	Silty clay	-SIC
Coarse sandy loam	-COSL	Sandy clay loam	-SCL
Sandy loam	-SL	Sandy clay	-SC
Clay	-C		

RMF, Abundance/Concentration

Abundance:	Few – F	Common – C	Many – M
Concentration:	Concentration – CON		Depletion – DEP

Structure, Grade

Weak – 1	Moderate – 2	Strong – 3	Structureless – 0
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Structure, Type

Granular	-GR	Angular Blocky	-ABK
Platy	-PL	Subangular Blocky	-SBK
Prismatic	-PR	Single grain	-SG
Columnar	-CO	Massive	-M

Non-effervescent - NE
Very slightly effervescent - VS
Slightly effervescent - SL
Strongly effervescent - ST
Violently effervescent - VE

Attachment 2

Texture Triangle (not provided on the contest)

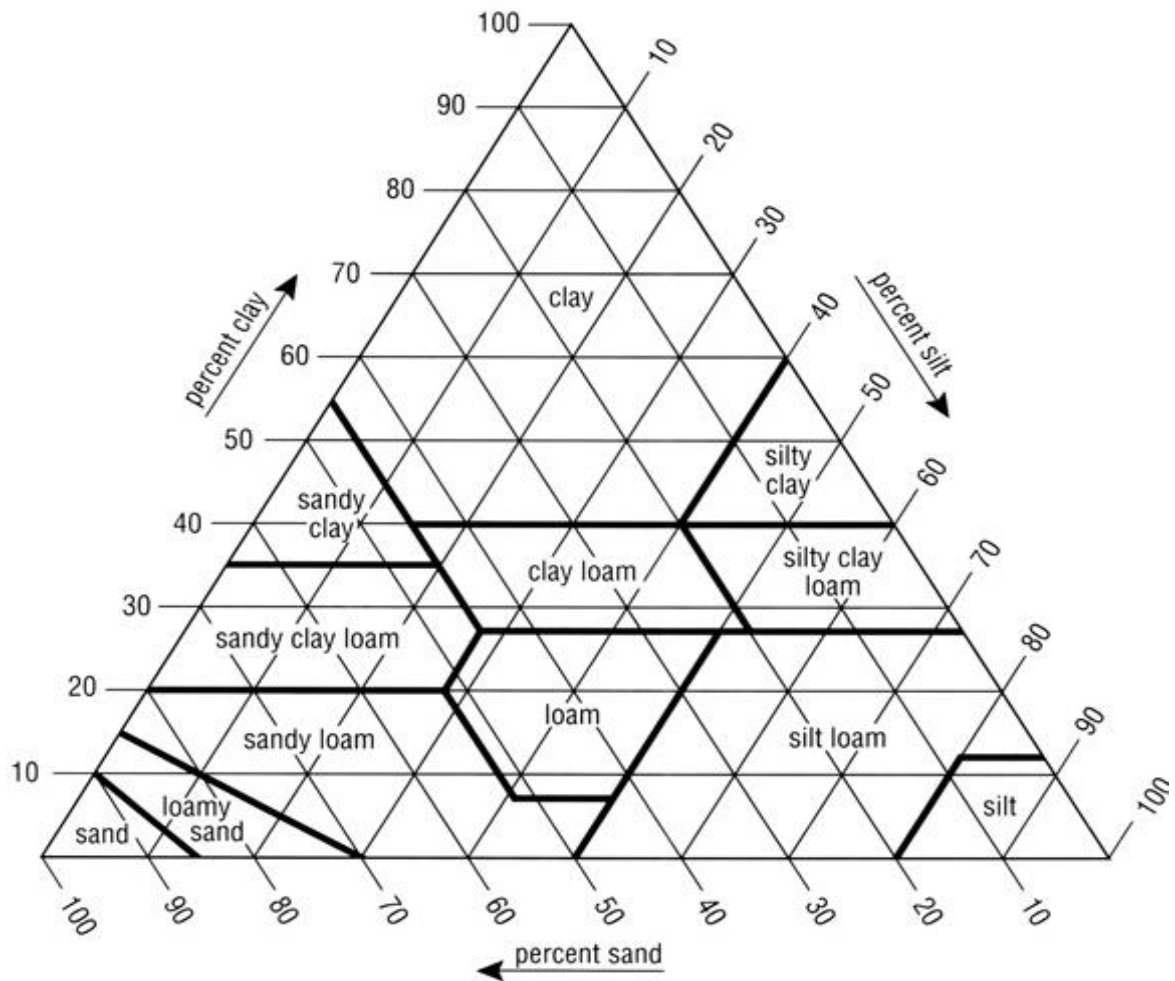


Chart showing the percentages of clay, silt, and sand in the basic textural classes.

Source: Soil Survey Manual

SCORE CARD

REGION IV COLLEGIATE SOIL JUDGING
 TEXAS TECH UNIVERSITY
 Oct. 6-7, 2016

Score.	Part I	
	Part II	
	Part III	
	Part IV	
	TOTAL	

SITE NUMBER _____

CONTESTANT ID _____

PART I. SOIL MORPHOLOGY

Describe _____ mineral horizons within a depth of _____ cm.

Horizon			Lower Depth (cm) (2)	Bound Distinct. (2)	Clay % (2)	Texture (4)	Color			Redoximorphic Features		Structure		Efferves. Class (2)
Mas. (2)	Sub. (2)	No. (2)					Hue (2)	Val. (2)	Chr. (2)	Abund. (2)	Con/Dep (2)	Grade (2)	Type (2)	

PART I. SCORE _____

PART II. SITE CHARACTERISTICS

A. Site Position (5)				B. Parent Material (5) (Mark all that apply)				C. Slope (5) %				D. Erosion Class (5)	
	Summit		Stream terrace		Alluvium				0-1		8-12		Deposition
	Shoulder		Depression		Lacustrine		Marine deposit		1-3		12-20		Class 1
	Backslope		Drainage		Colluvium		Residuum		3-5		20-45		Class 2
	Footslope				Eolian		Fluvial deposit		5-8		>45		Class 3
	Toeslope												Class 4
	Floodplain												

PART II. SCORE _____

PART III. Soil Taxonomy

A. Diagnostic Surface Horizons (10)		B. Subsurface Horizons and Features Mark all that apply (10 each)		C. Order (10)	
	Mollic Epipedon		Argillic		Alfisols
	Ochric Epipedon		Albic		Aridisols
	Umbric Epipedon		Buried		Entisols
	None		Calcic		Inceptisols
			Cambic		Mollisols
			Fragipan		Vertisols
			Gilgai		
			Gypsic		

PART III. Score _____

PART IV. Interpretations

A. Hydraulic conductivity Surface (5)		B. Hydraulic conductivity Soil (5)		C. Water retention difference (5)	
	High		High		Very High (≥30 cm)
	Moderate		Moderate		High (22.50-29.99 cm)
	Low		Low		Medium (15.00-22.49 cm)
					Low (7.50-14.99 cm)
					Very Low (<7.50 cm)

D. Internal free-water occurrence (5)		E. Surface Runoff (5)	
	Class 1...>150 cm		Ponded
	Class 2...100-149 cm		Very Slow
	Class 3...50-100 cm		Slow
	Class 4...25-50 cm		Medium
	Class 5...<25 cm		Rapid
			Very Rapid

Part IV. Score _____