SOIL COLOR

SOIL COLOR DETERMINATION:

Most common system to describe soil color is Munsell Color System.

Three components - Hue, Value, Chroma

Hue - (page) measure of chromatic composition of light reaching the eye.
2.5 Y Yellow --- in back of book
10YR
7.5YR ↓
5YR
2.5YR
10R Red --- in front of book

Value - (vertical scale) degree of lightness or darkness of a color in relation to a neutral gray scale.
LOW values (1 or 2): dark colors
HIGH values (6, 7): light colors

Chroma - (horizontal scale) relative purity or strength of the spectral color.
LOW chromas (≤2): dull colors indicating low pigmentation (Fe removal by reduction, or stripping)
HIGH chromas (>2): brighter colors, often oxidized forms of Fe pigmentation

Complete color description - 10YR 5/6; Hue - 10YR, value - 5, chroma - 6.

SOIL TEXTURE

Texture refers to size and relative abundance of mineral particles comprising a soil horizon or soil sample.

Textural class is modified for coarse fragments (particles >2 mm diameter), but only if more than 15% (by volume) of the horizon is coarse fragments.

Volume of	SIZE OF FRAGMENT		
Fragments (%)	½ - 3 inches	3 – 10 inches	> 10 inches
15-35	gravelly	cobbly	stony
35-60	very gravelly	very cobbly	very stony
>60	extremely gravelly	extremely cobbly	extremely cobbly

SOIL STRUCTURE

Refers to the aggregation of primary soil particles into compound particles. The cohesion within structural units is greater than the adhesion among units. Thus, under stress, the soil mass tends to rupture along predetermined planes or zones. Only horizons in the solum have structure; C horizons are structure-less.

Structure described in terms of Shape and Grade

Shape

platy - units are flat and platelike

prismatic - units are bounded by flat or slightly rounded vertical faces. Units are distinctly longer vertically. Vertices are angular or subrounded. Tops are indistinct and normally flat.
columnar - similar to prisms except that tops are very distinct and are rounded.

blocky - units are blocklike and nearly equidimensional
angular blocky - faces intersect at relatively sharp angles.

subangular blocky - faces are a mixture of rounded and plane faces and the angles are mostly rounded.

angular blocky - similar to subangular blocky but block-like units that have flattened faces and many sharply angular vertices

granular - units are spherical and are bounded by curved or very irregular faces that are not casts of adjoining peds.

Grade - distinctness of units. Criteria are the ease of separation into discrete units and the proportion of units that hold together when the soil is handled.

weak - The units are barely observable in place. When disturbed, the soil parts into a mixture of whole and broken units and much material that exhibits no planes of weakness.

moderate - The units are well formed and are evident in undisturbed soil. When distrubed, the soil parts into a mixture of many whole units, some broken units, and material that is not in units.

strong - The units are distinct in undisturbed soil. They separate cleanly when the soil is disturbed. When removed, the soil separates mainly into whole units.

C horizons are **structureless:**

Massive: cemented or consolidated into large units which break randomly (not along lines of weakness)

Single grain: v. sandy materials lacking aggregates

SOIL CONSISTENCE

Describes degree of adhesion and cohesion or resistance to deformation among soil matterials.

Depends on moisture state - different terms for different moistures - moist and dry

CONSISTENCE TERMS

Moist	Operation
Loose	Specimen not obtainable
Very friable	Fails under very slight force between thumb and forefinger (<8 N)
Friable	Fails under slight force between thumb and forefinger (8-20 N)
Firm	Fails under moderate force between thumb and forefinger (20-40 N)
Very firm	Fails under strong force applied between thumb and forefinger (40-80 N; about 80 N maximum force that can be applied)
Extremely firm	Cannot be failed between thumb and forefinger, but can be between both hands or by placing on surface and appling gentle pressure with foot (80-160 N)

Specimen to be tested should be 25-30 mm (1 in.) on edge.

HORIZON BOUNDARY

The horizon boundary refers to lower boundary of horizon being described and is intended to estimate the thickness and shape of the transition from the horizon described to the subjacent horizon.

Distinctness - thickness of transition from one horizon to the subjacent horizon

Abrupt:	< 1 inch	Gradual:	2 – 6 inches
Clear:	1 – 2 inches	Diffuse:	> 6 inches

HORIZON NOMENCLATURE

Horizon nomenclature consists of two major parts, the master horizon and the subordinate designation. There are also a few minor components of the nomenclature that should be kept in mind.

Master Horizons

O - layers dominated by organic material in various stages of decomposition from fully decayed "humus" to fresh litter.

A - mineral horizons formed at the soil surface or below an O horizon; characterized by accumulation of organic matter (dark color) or having properties resulting from cultivation, pasturing, etc.

E - mineral horizons in which the main feature is loss of clay, Fe, and Al leaving a concentration of quartz and other resistant minerals. (light colored eluvial horizon with clay content similar to the A horizon)

B - mineral horizons formed below an A, E, or O horizon that are dominated by obliteration of the rock structure and by

(1) illuvial accumulation of clay, Fe, humus, carbonates, gypsum, or silica;
(2) evidence of carbonate removal;
(3) residual concentration of sesquioxides;
(4) coatings of sesquioxides that make the horizon lower in value, higher in chroma, or redder in hue than the overlying and underlying horizons;
(5) alteration that forms clay or liberates oxides and forms soil structure; or
(6) brittleness
(7) strong gleying

C - horizons, excluding hard bedrock, that are little affected by pedogenic processes. Generally does not have soil structure.

R - hard bedrock.

Transition Horizons

Often soils have one or more horizons with properties that are intermediate between those of two master horizons. There are referred to as transition horizons and there are two types.

1. Homogenous horizon dominated by properties of one master horizon but having subordinate properties of another. Use two capital letter symbols, i.e. EB, BE, BC etc. to designate the horizon. The first letter is the master horizon with dominate properties. A BE horizon has properties of both B and E horizons but is more like a B horizon than an E horizon.

2. Horizon that has distinct zones with recognizable properties of two master horizons, i.e. a mixed horizon but the components can be recognized as distinct zones rather than being homogenized. The horizon is designated by two master horizon symbols separated by a "/". The first letter symbol is the dominate component. Example: B/E is horizon dominated by B horizon material with a subordinate amount of distinct areas of E horizon material. Commonly, more that 15% of the horizon should be composed of the subrodinate horizon material before it is recognized in the horizon nomenclature.

Subordinate distinctions within master horizons - used with master horizons and with transition horizons, i.e. BEt, BCtg, BCg

a - highly decomposed organic material (sapric material); used with O
b - buried genetic horizon
c - concretions (or nodules) of Fe, Al, Mn, or Ti; not used for carbonates or soluble salts
d - physical root restriction
e - organic material of intermediate decomposition (hemic material); used with O
f - permanently frozen soil
ff - dry permafromst
g - strong gleying; horizon has **dominant** color with chroma of 2 or less (redox depletions with chroma 2 or less **do not** qualify the horizon for a "g" designation); if used with A or E horizons, there must be evidence of seasonal saturation in the underlying horizons
h - illuvial accumulation of organic matter; used with B
i - slightly decomposed organic material (fibric material); used with O
j - accumulation of jarosite
jj - evidence of cryoturbation
k - accumulation of carbonates
m - cementation or induration; used with symbol for cementing material, i.e. Bkm, Bsm, etc.
n - accumulation of sodium
o - residual accumulation of sesquioxides
p - plowing; used only with surface horizon
q - accumulation of silica
r - weathered or soft bedrock; only used with C, i.e. Cr
s - illuvial accumulation of sesquioxides and organic matter
ss- slickensides
t - illuvial accumulation of silicate clay; clay films or bridges
v - plinthite
w - development of color or structure; used with B horizon
x- brittle consistence
y - accumulation of gypsum
z - accumulation of salts more soluble than gypsum

Conventions for using letter suffixes

More that one letter may be used.
Suffixes immediately follow the capital letters.
No other suffix is used with "p".
If more than one suffix is needed, a,e,i,h,r,s,t, and w are written first. These suffixes are not used in combination in a single horizon except Bhs and Crt.
A horizon is never designated Bth, Bts, or Btw. The "t" has precedence over h, s, and w.
The "t" may be used with g, k, q, y, z, or o. In these cases, write the "t" first.
Do not use "g" and "w" together. "g" implies "w"
If a horizon is buried, "b" is written last.
If more that one suffix is needed; c, f, g, m, and x are written last.

Vertical subdivision

In many cases, more than one horizon will have the same designation. For these cases, Arabic numerals are used to differentiate the horizons. The numerals follow the letters. For example, E1, E2; BE1, BE2, Bt1, Bt2; Btgx1, Btgx2, BC1, BC2, C1, C2.

Discontinuities

Arabic numerals are used as prefixes to indicate lithologic discontinuities as indicated by abrupt changes in particle size distribution. The parent material at the surface of the soil is understood to be "1". Stratified alluvium does not carry Arabic prefixes unless genetic horizons have developed.

Examples:

A, E1, E2, Bt, 2BC, 2C1, 2C2
A, Bt1, 2Bt2, 2Bt3, 2BC, 3R

Use of Prime (')

Use prime (') for the lower of two horizons with identical designations that are separated by at least one horizon.

Examples: A, E, Bt, E', Btx, BC A, Bt1, Bt2, Btc, B't1, B't2, BC, Cr