Interpreting Soils for Seasonal High Water Table & Basement Floor Separation

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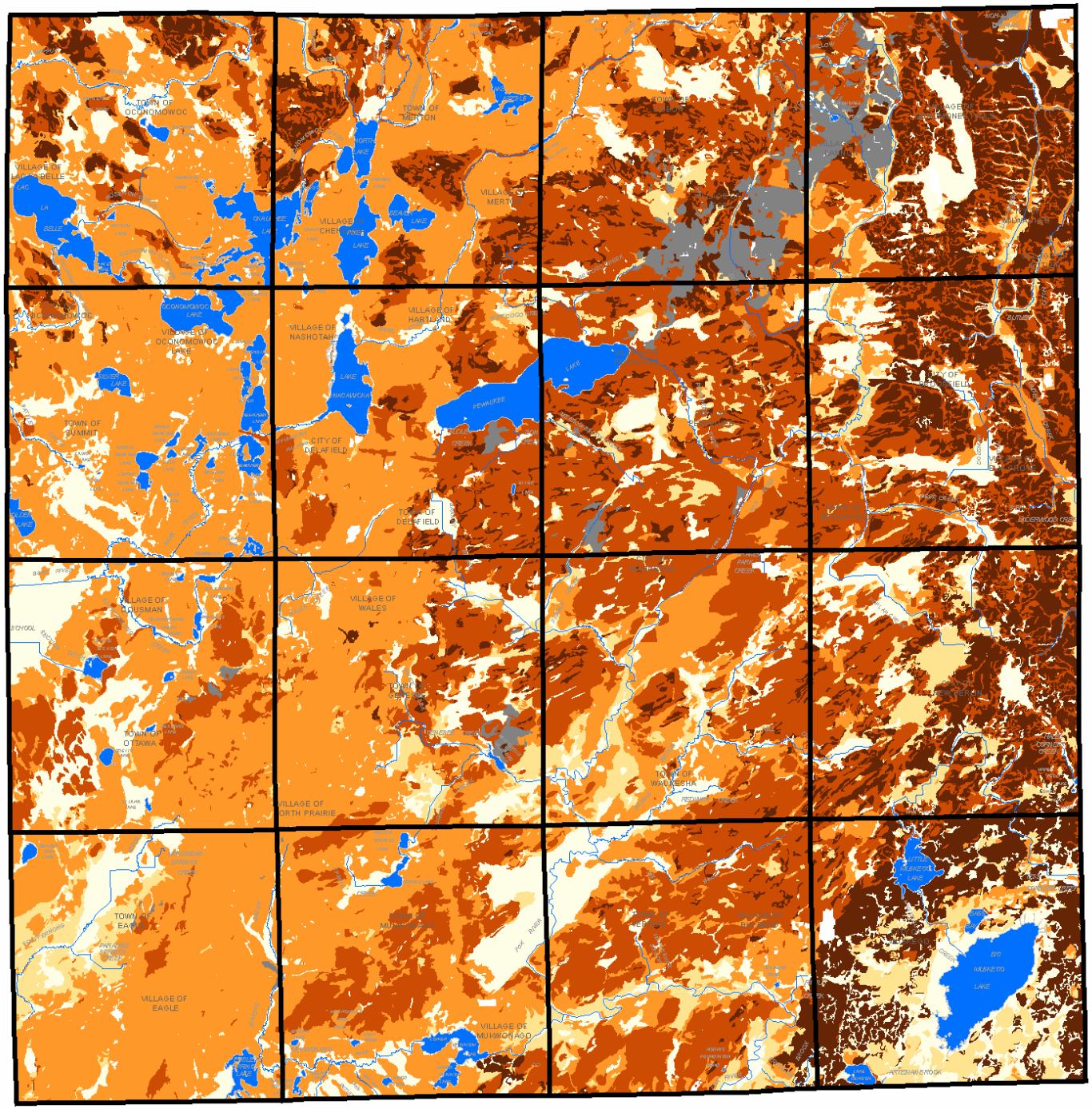
Environmental Health Division

Key Soil Formation Factors

- Parent material
  - Glacial, organics, wind/water deposits, etc.
- Climate
  - Precipitation, freeze/thaw, etc.
- Living organisms
  - Plants and animals (bacteria, fungi, etc.)
- Topography
  - Slope, drainage patterns, etc.
- Time
  - Last glacial period here 10,000 years ago

Generalized Soil Parent Material Groups

Waukesha County



Legend

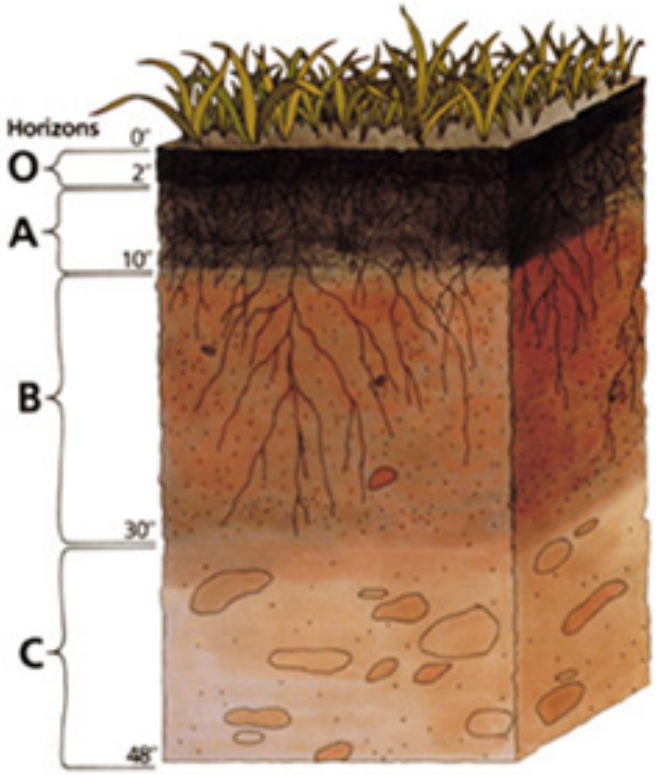
- Dense Glacial Till
- Loamy Glacial Till
- Glacial Outwash
- Lacustrine Deposits
- Alluvium / Organic
- Loess Over Dolomite

Source: Waukesha County & NRCS

USDA Soil Classification System

Key features in a soil profile description:

- Texture
- Structure
- Soil Color
- Redoximorphic features



General Soil Horizons

A = “Topsoil” - organically enriched mineral horizon

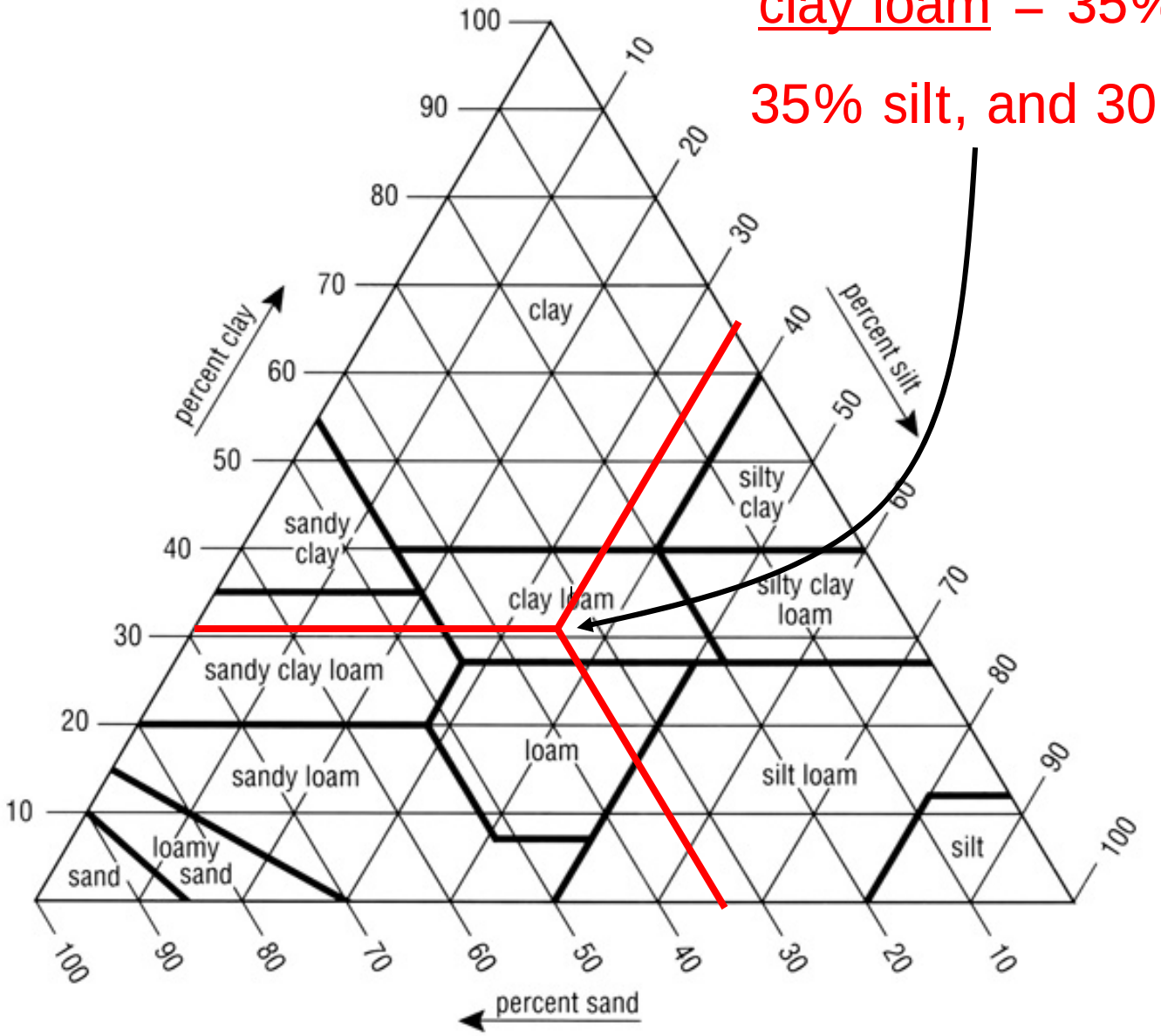
B = “Subsoil” - where minerals from A horizon accumulate from weathering

C = “Substratum” – parent material with little affect by soil formation factors

R = Hard bedrock (if present within the profile)

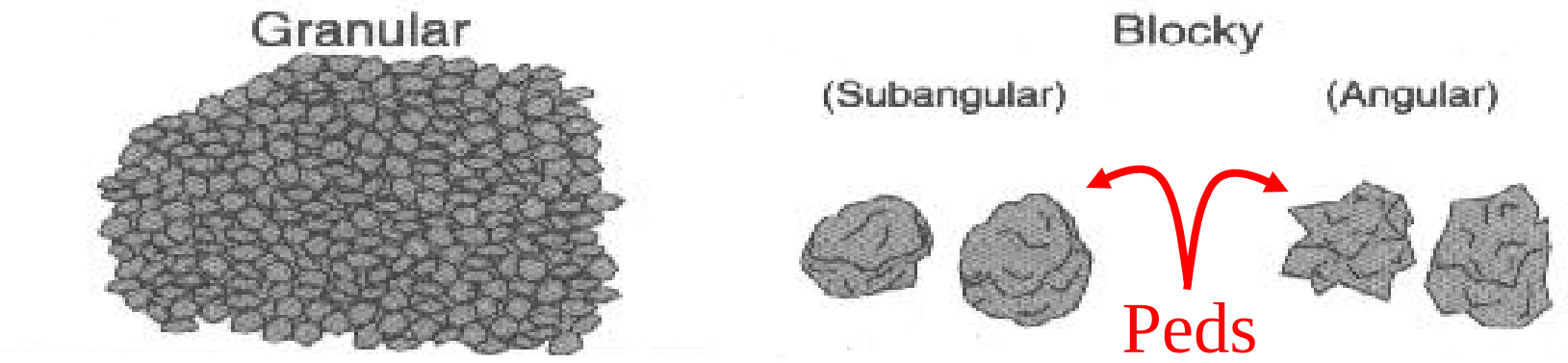
USDA Texture Triangle

clay loam = 35% sand, 35% silt, and 30 % clay



Soil Structure

- The arrangement of particles of sand, silt or clay into clusters called “peds”
  - Classified by distinctiveness, size and shape
  - Affects water movement through the soil
- Example shapes found locally:



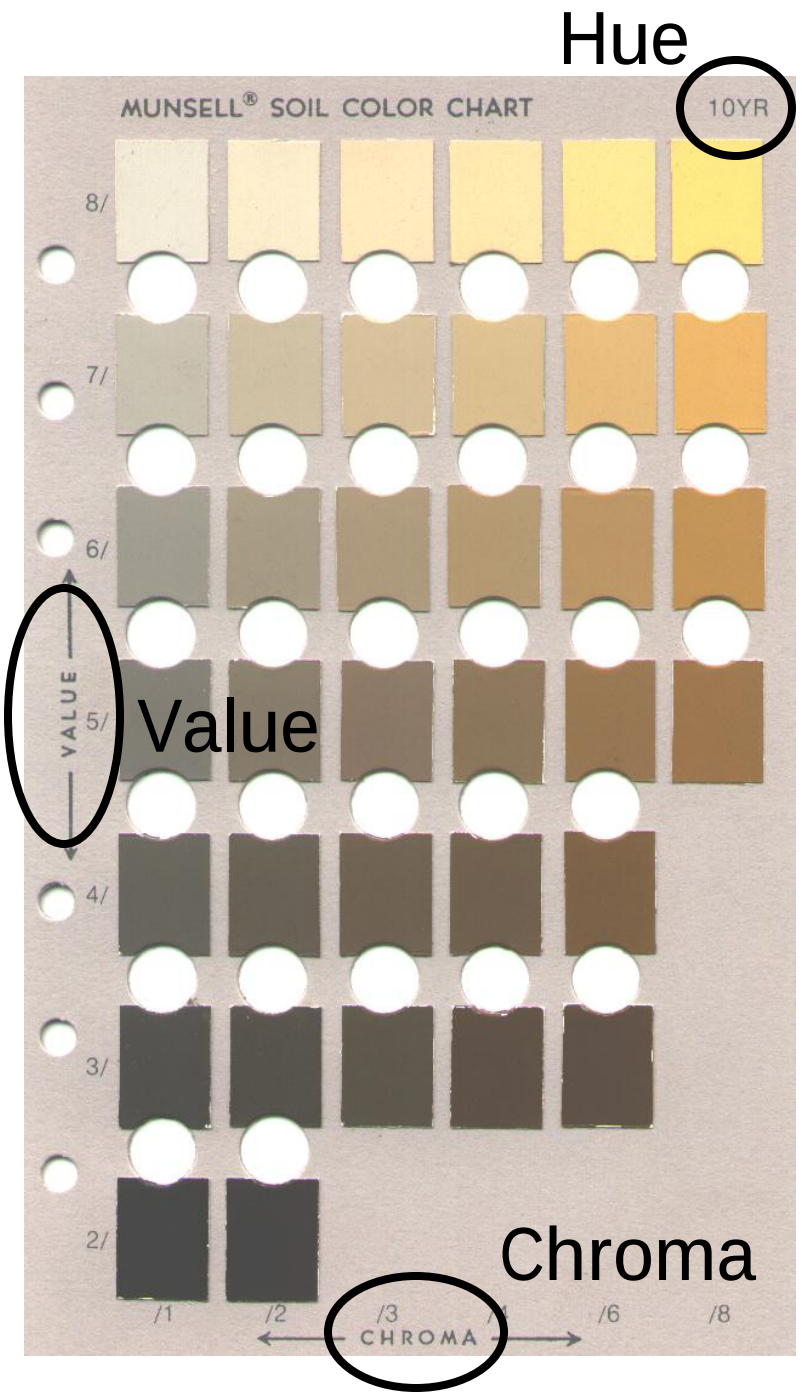
Soil Structure

Blocky

Platy over Subangular Blocky

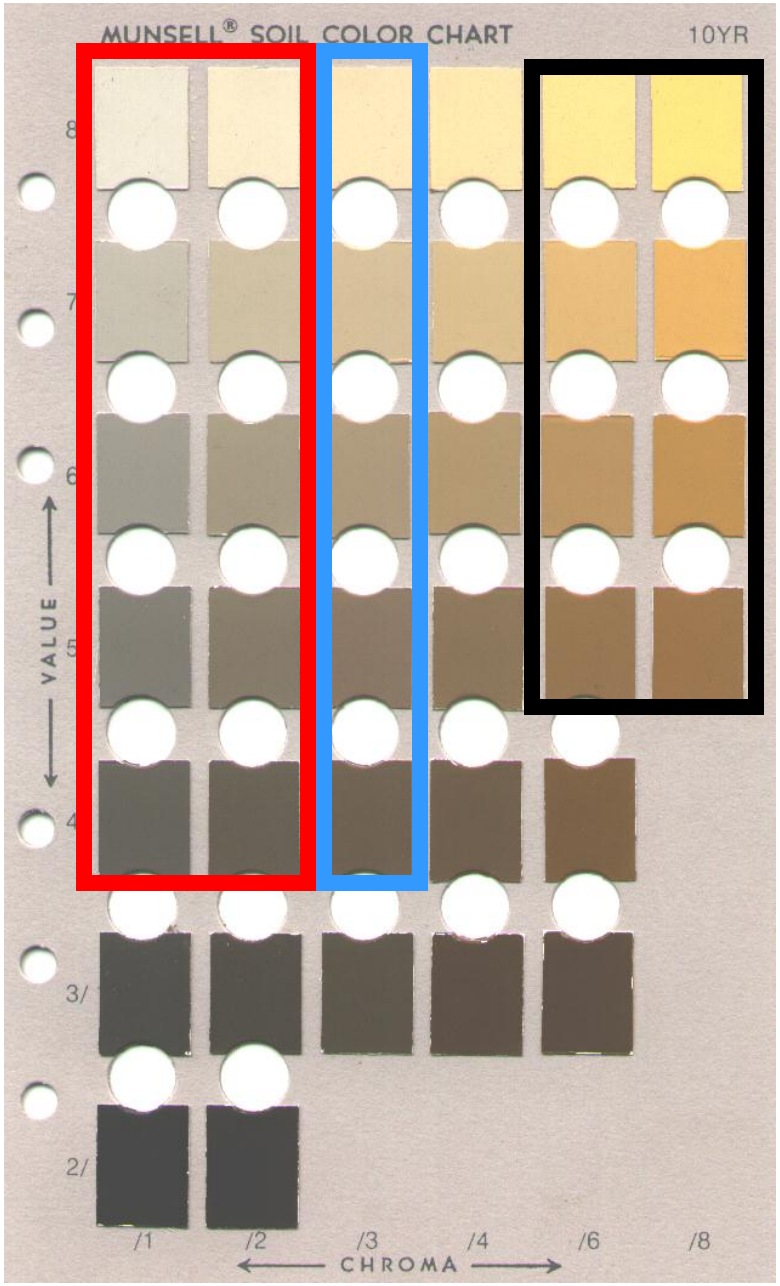
Soil Color

- Hue - dominate spectral color
- Value - relative lightness or darkness
- Chroma - relative purity or strength of a color

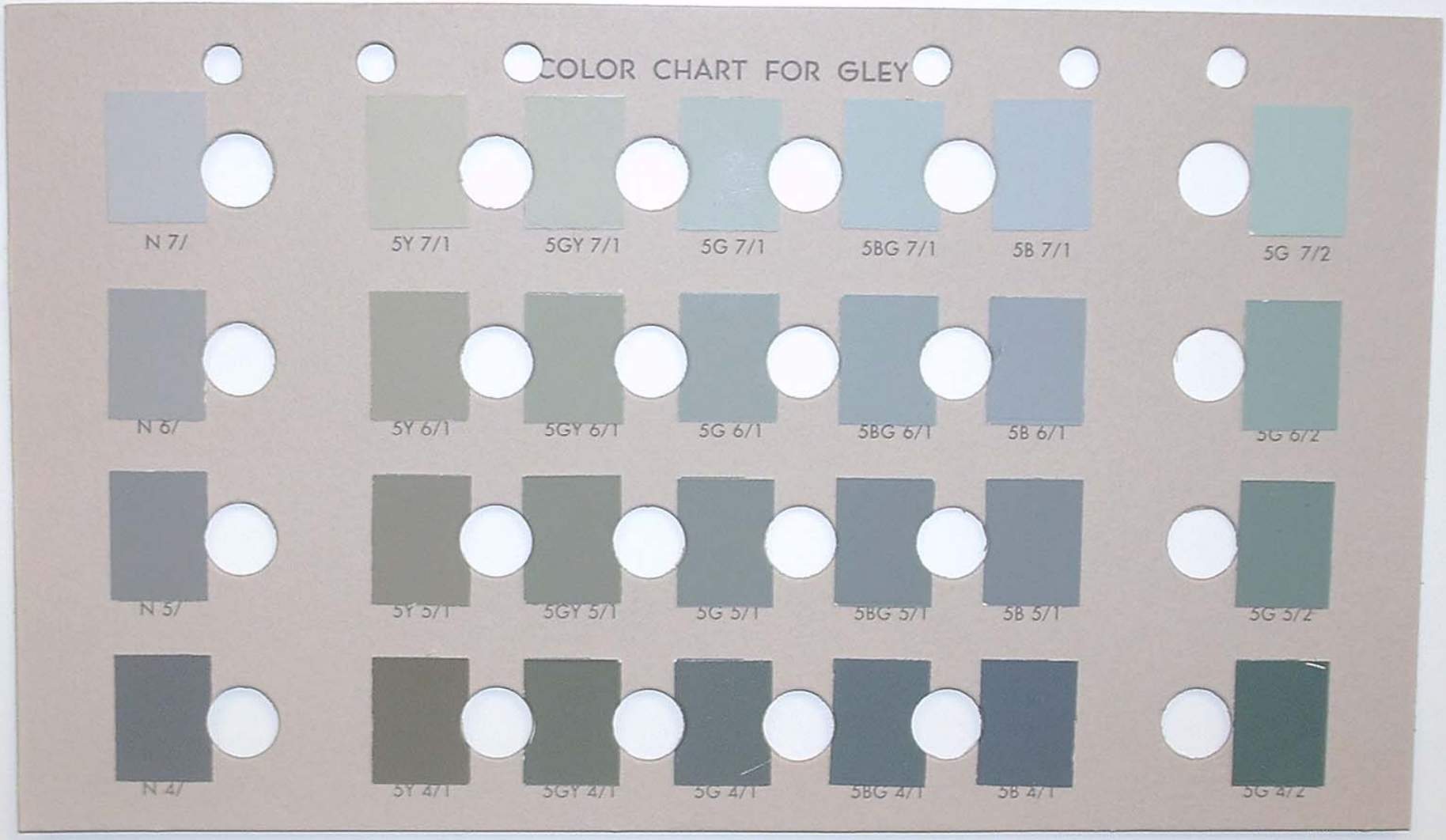


Low Chroma Colors

- Value of 4 or more and a chroma of 2 or less.
  - Redox depletions
  - Reducing conditions
- Suspicious conditions with chromas of 3 or less.
- Relocation of iron oxides (oxidation)

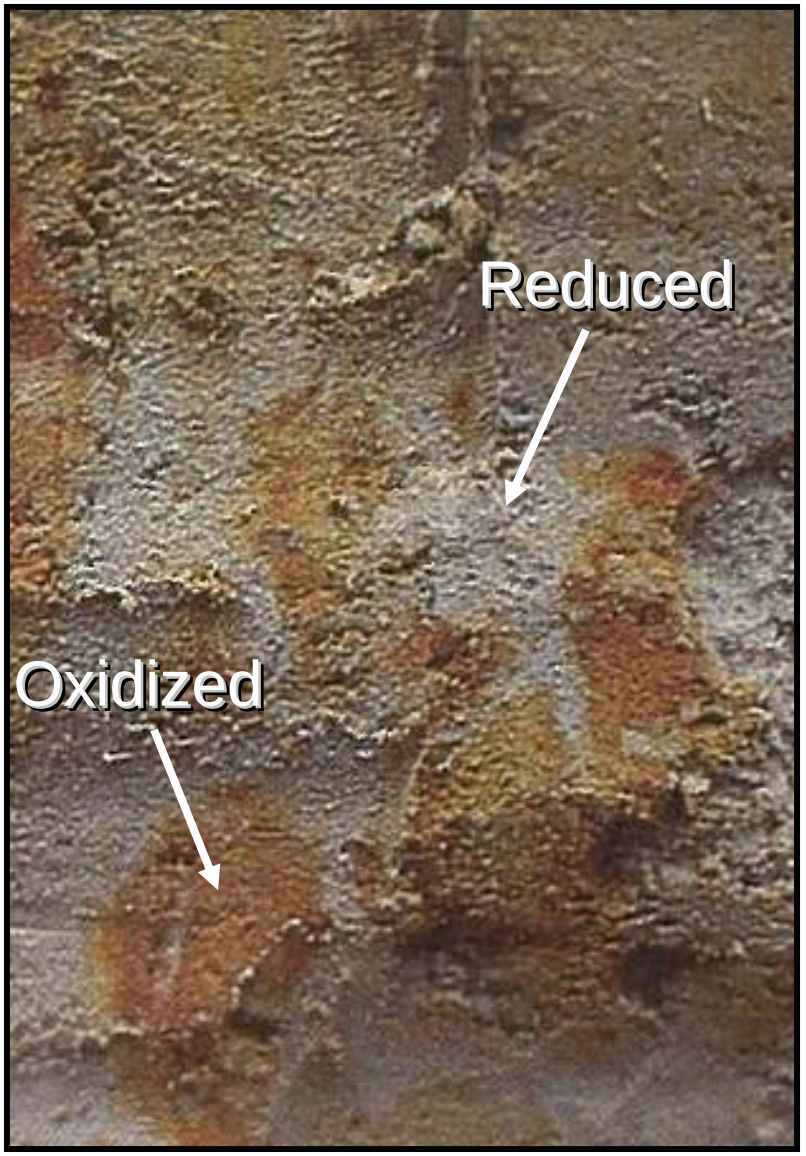


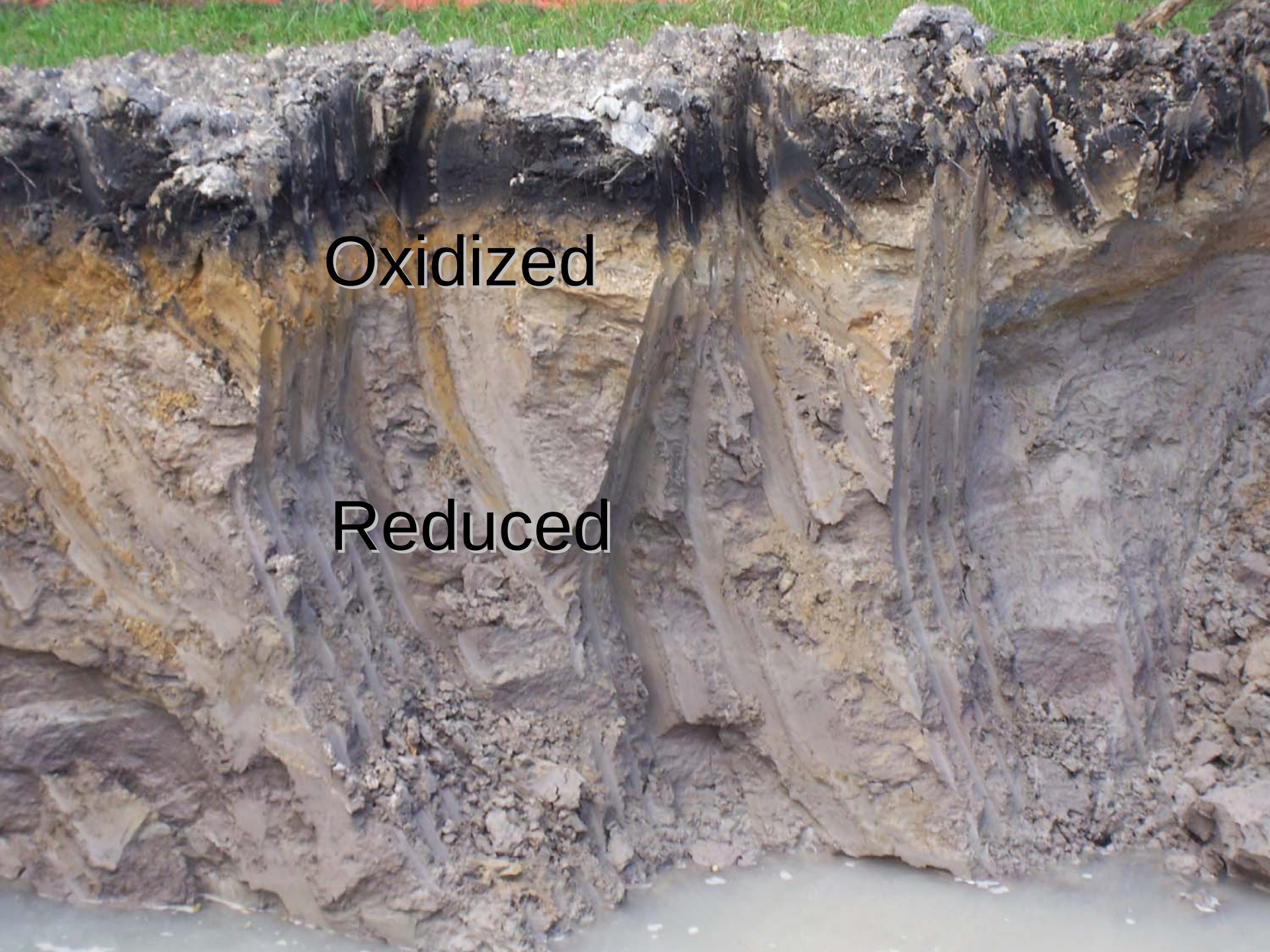
Gley Colors – Very Wet

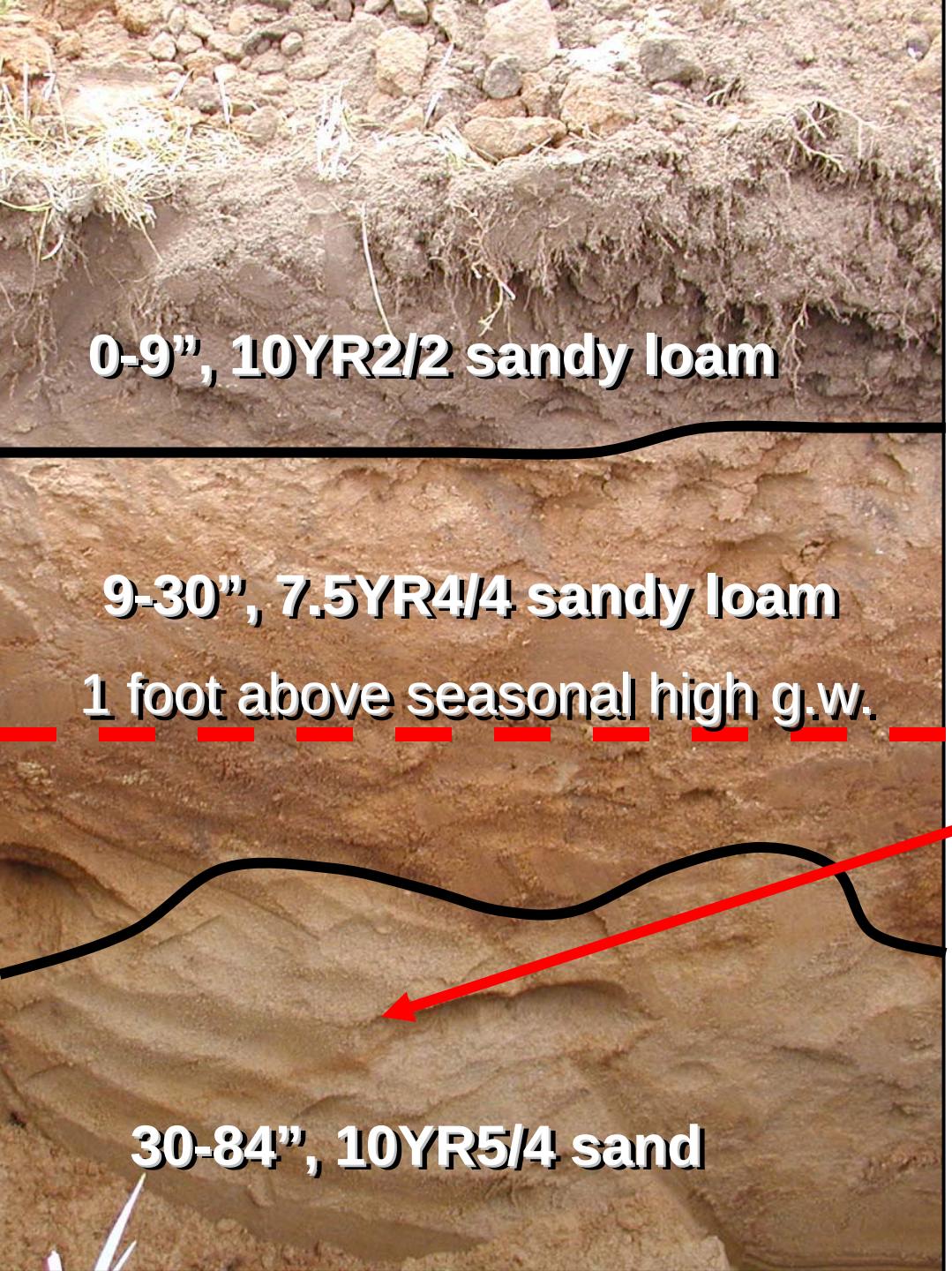


Redoximorphic Features

- Quantity
  - Few, common, many
- Size
  - Fine, medium, coarse & very coarse
- Contrast (relative to matrix color)
  - Faint - barely observable
  - Distinct - readily seen
  - Prominent - obvious
- Color - Munsell colors
- Type - concentrations, depletions, concretions, nodules




Oxidized
Reduced

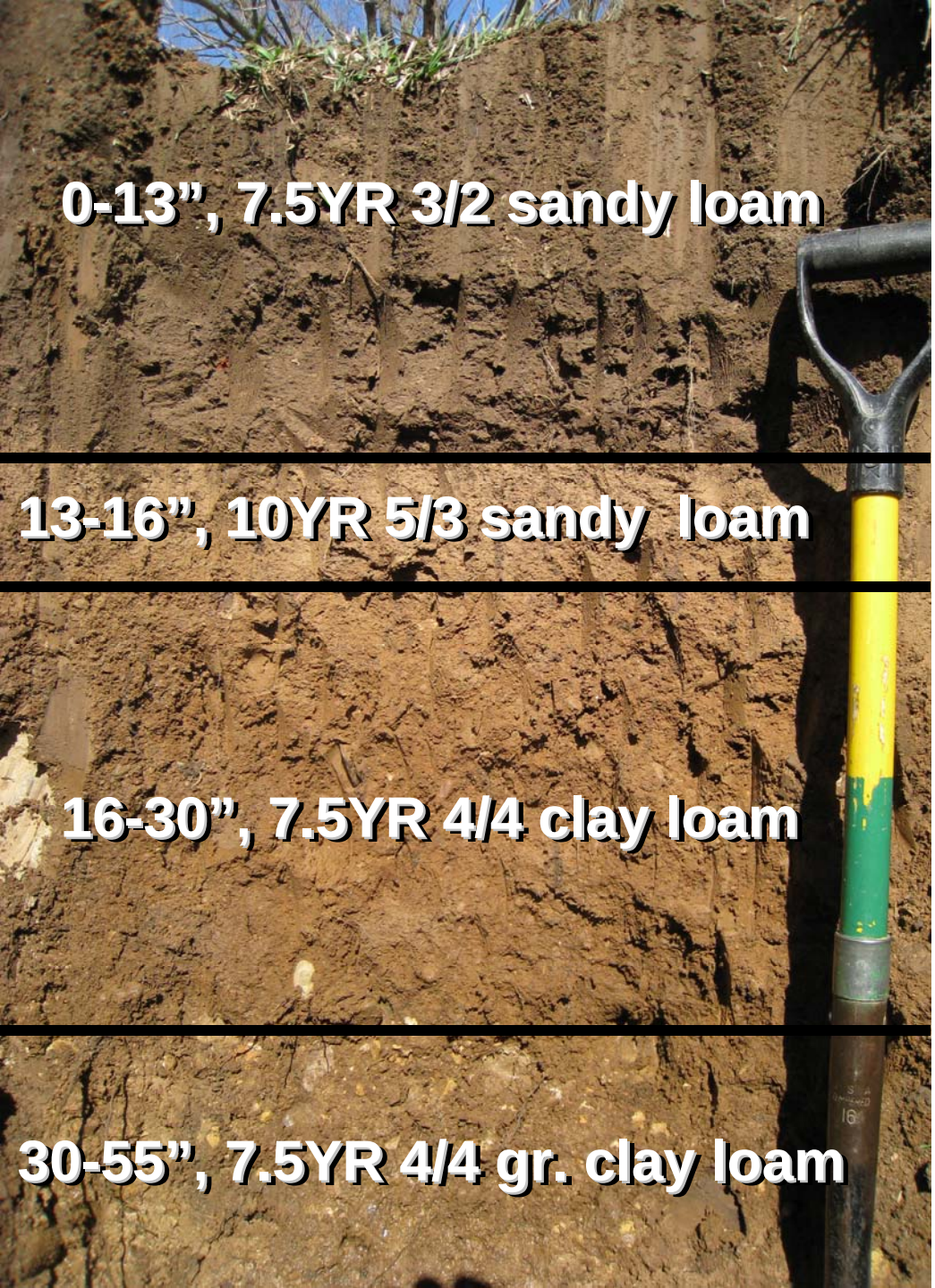


Boyer sandy loam

- Outwash parent material
- Good infiltration
- This one found near Fox River
- Groundwater indicators (redox)

Hochheim loam

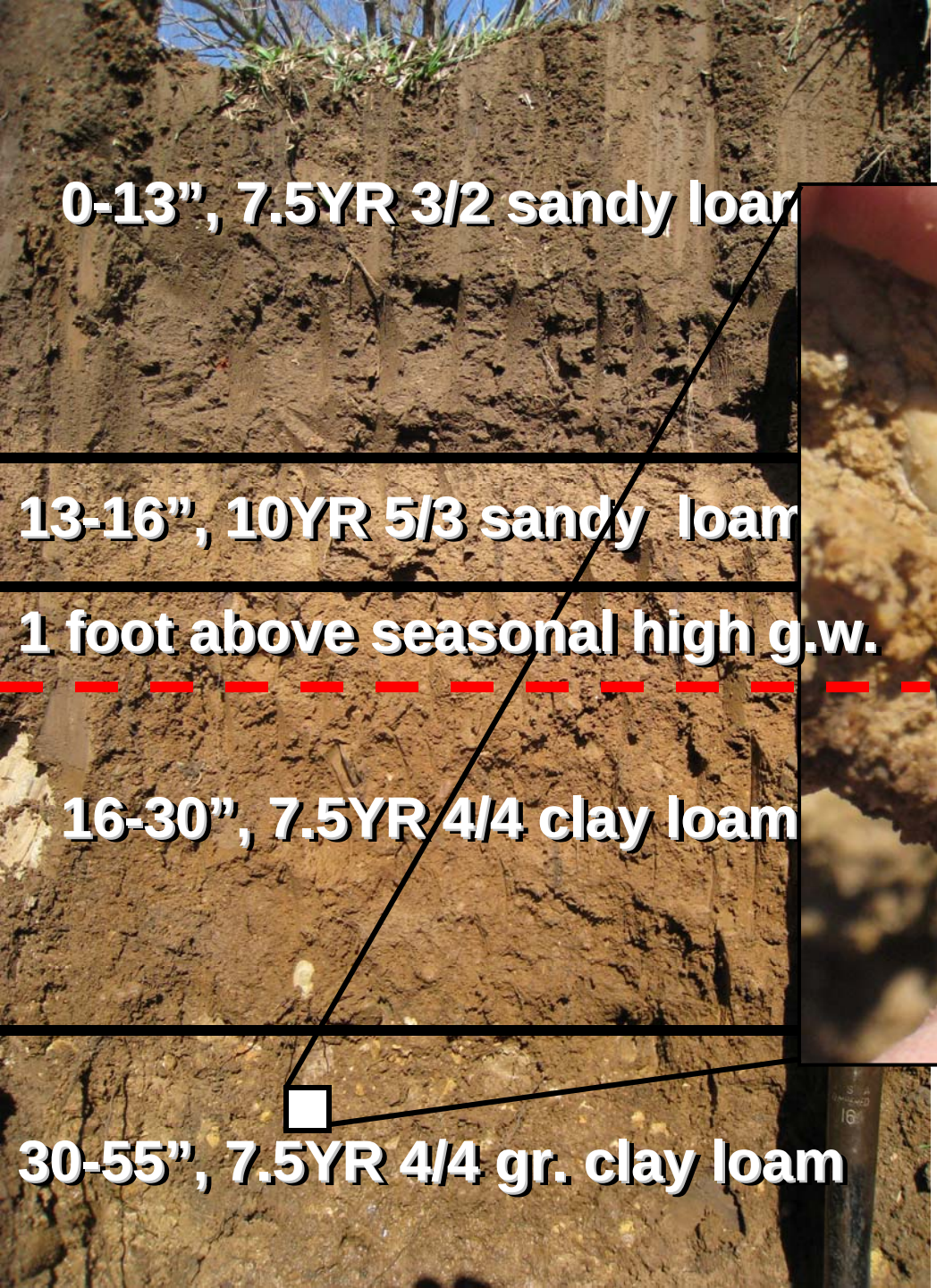
- Loamy till soil
- Located at bottom of hill next to wetland
- Observed water table & redox above

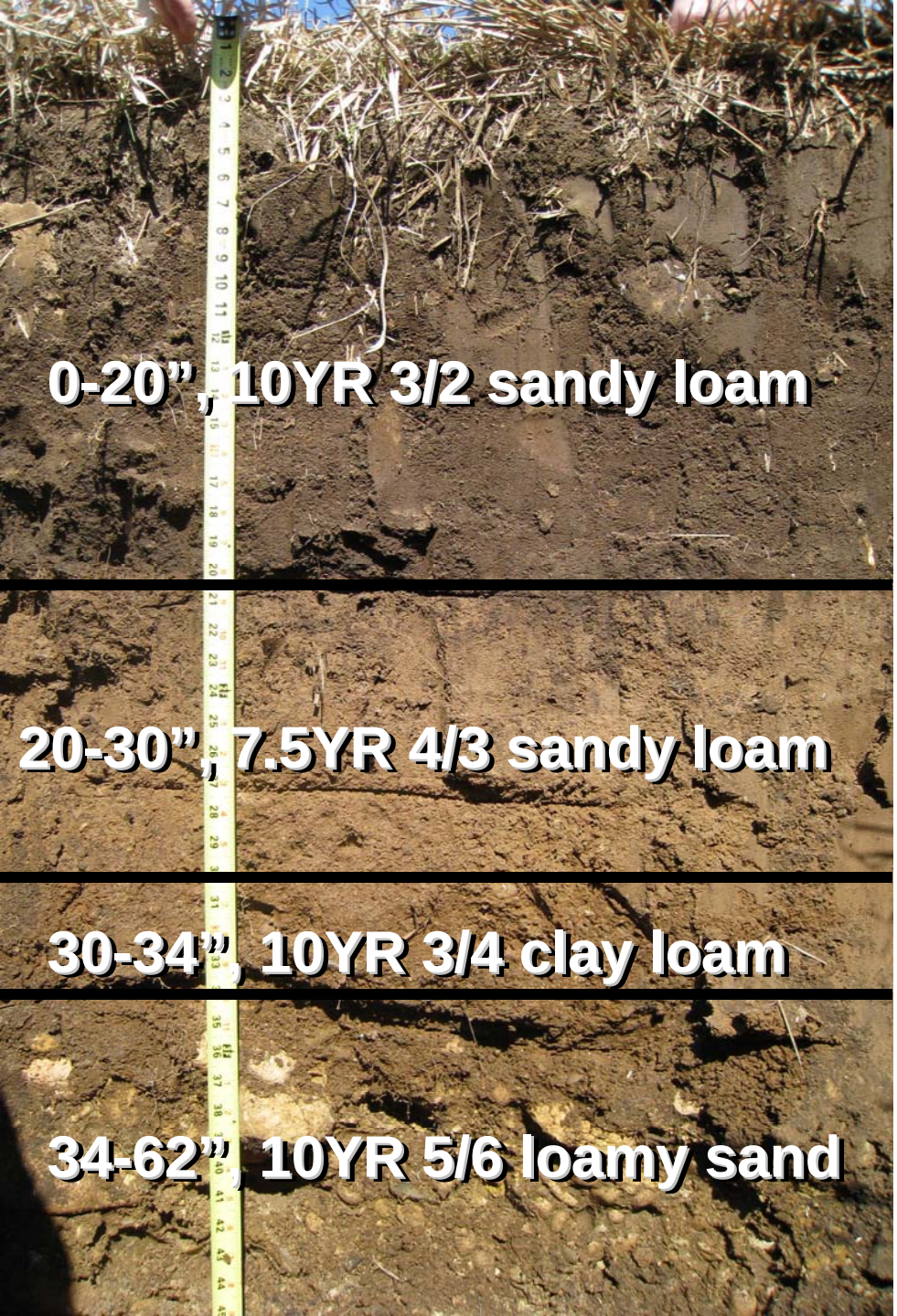


Hochheim loam

- Loamy till soil
- Clayey layer
- Found at bottom of hill near wetland
- Redox at 30”
- Saturation at 42”

Hochheim


0-13”, 7.5YR 3/2 sandy loam
13-16”, 10YR 5/3 sandy loam
1 foot above seasonal high g.w.
16-30”, 7.5YR 4/4 clay loam
30-55”, 7.5YR 4/4 gr. clay loam



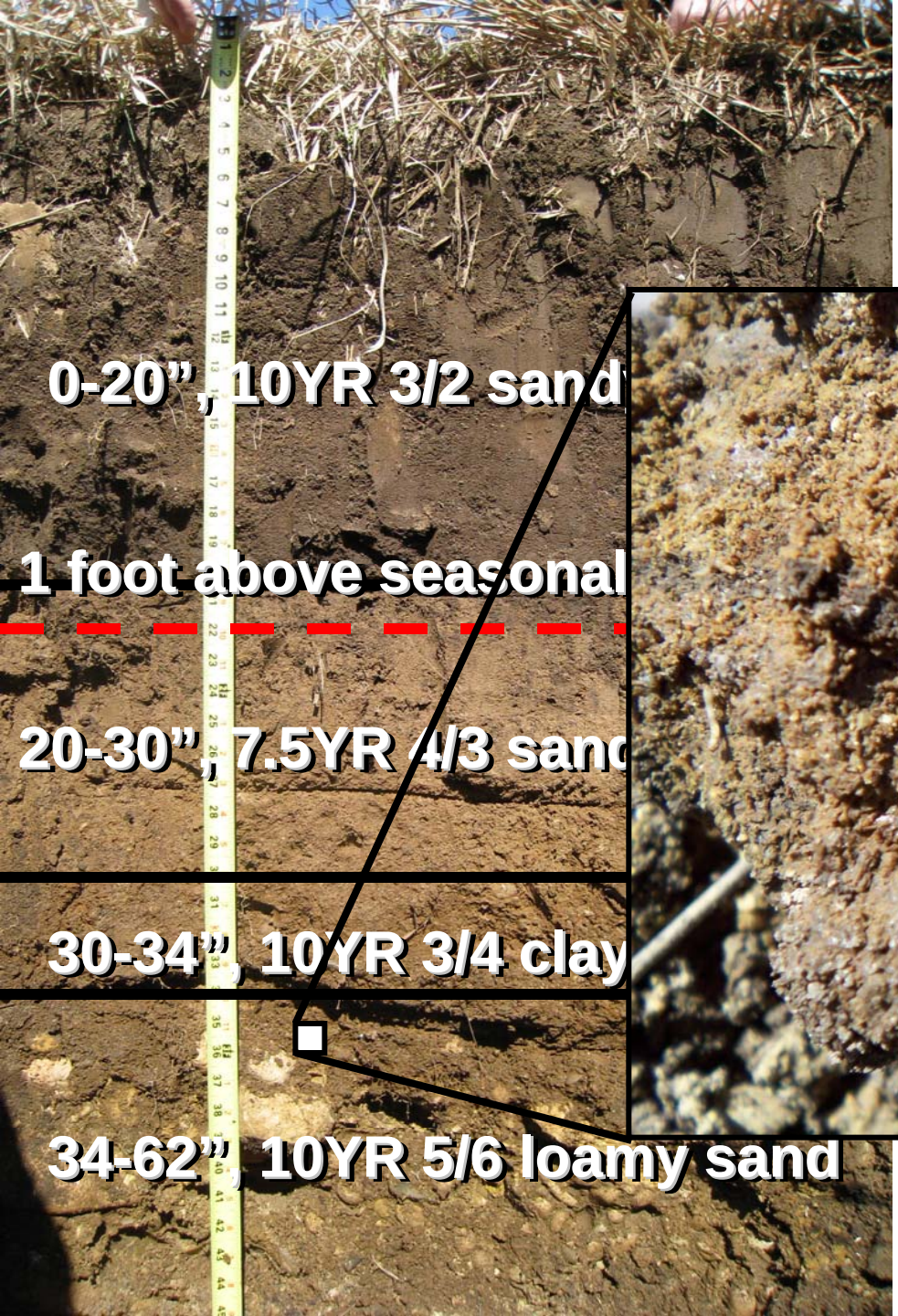
Virgil loam

(St. Charles/Drummer group)

- Outwash soil
- Located in drainage way near wetland
- Redox at 34”
- Saturation at 42”

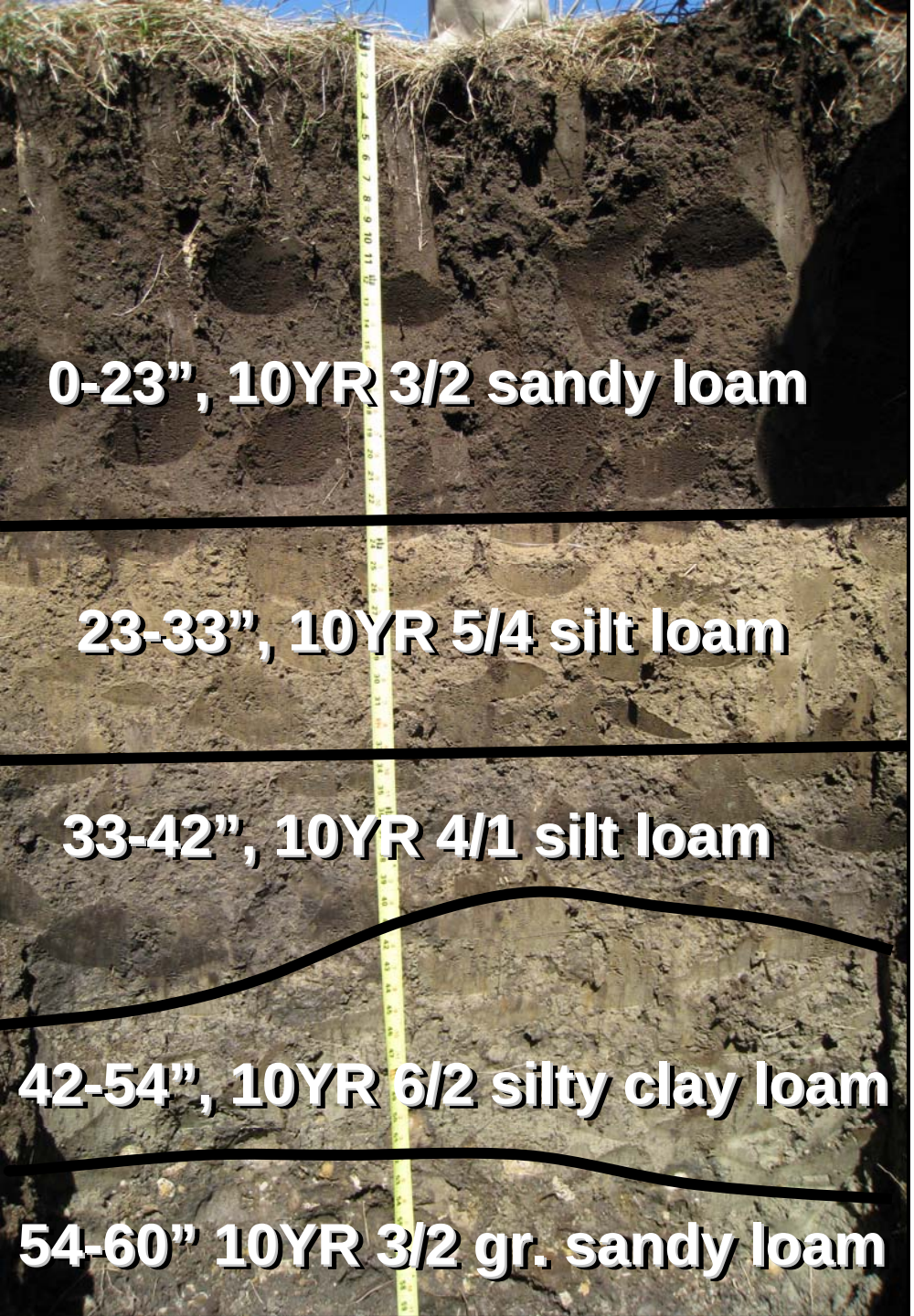
Virgil loam

(St. Charles/Drummer group)



Virgil loam

- 1 hour later
- Water at 42”



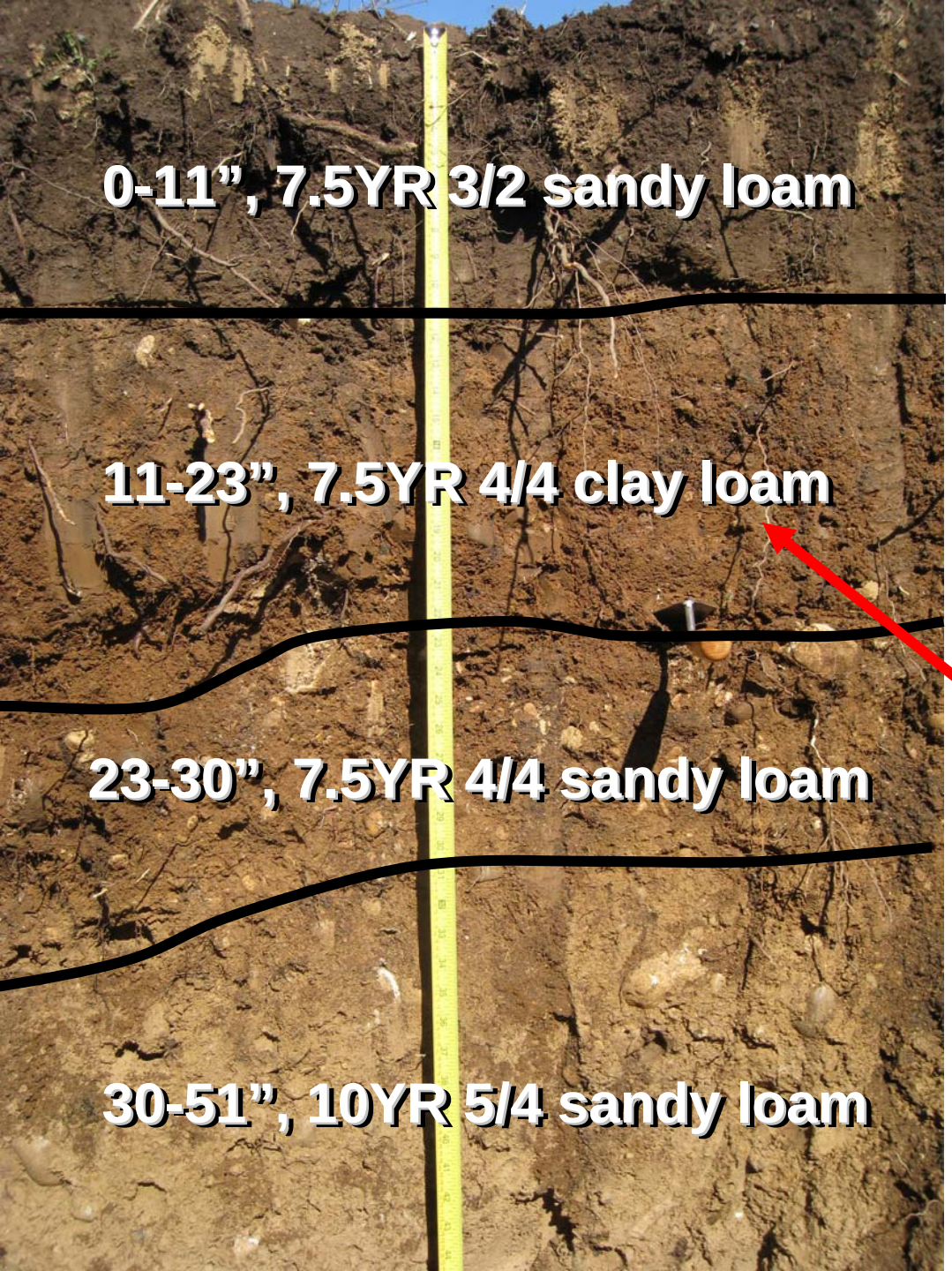
Juneau silt loam

- Loamy colluvial over glacial fluvial
- Located in internally drained field
- Redox at 42”
- Saturation at 58”

Juneau

0-23”, 10YR 3/2 sandy loam
1 foot above seasonal high g.w.
33-42”, 10YR 4/1 silt loam
42-54”, 10YR 6/2 silty clay loam
54-60” 10YR 3/2 gr. sandy loam

Massive structure



Hochheim loam

- Loamy till soil
- Clayey subsoil
- Located top of hill in Town of Genesee
- No groundwater indicators or basement limitations
- Redox may occur in silt loam or finer soils over substratum of loamy sand or coarser
  - Tension zone
  - Requires “Seasonal High Groundwater Determination Report” (Form A)

Example Profile with Tension Zone

Remarks: _____

Boring # 12

Ground elev. 981.5 ft.

Depth to limiting factor 36"

1	0–9	10YR3/3	None	sil	1fsbk	mfr	cs	2f	0.2	0.3
2	9–36	10YR4/4	None	cl	2msbk	mfr	cs	1f	0.4	0.5
3	36–80	10YR5/4	m3p 10YR5/8 10YR6/1	sil	0vfsg	mfi	cs	--	N.A.	N.A.
4	80–134	10YR5/4	None	ms&gr	0msg	ml	--	--	0.7	0.8

Remarks:

Form A - Seasonal High Groundwater Determination Report *(with sample language)*

Project/Plat Name: _____ Date: _____

Project Location (PLS/CSM#): _____

The following table summarizes my interpretation of the soil profile evaluations conducted on the above noted site. The purpose of this report is to demonstrate compliance with a Waukesha County ordinance requirement to maintain basement floor elevations at least 1 foot above the seasonal high water table. I understand that the definition for seasonal high water table means the upper limit of the zone of soil saturation caused by underlying groundwater at its highest level. I certify that the information presented in this report represents my best professional judgment in estimating seasonal high water table based on soil and site evaluations in accordance with the procedures contained in Chapter COMM 85 Wisconsin Administrative Code.

(Stamp/sign here)

Interpreters Signature: _____

Interpreters Printed Name/Credentials/Lic. #: _____

Interpreters Company Name/Address: _____

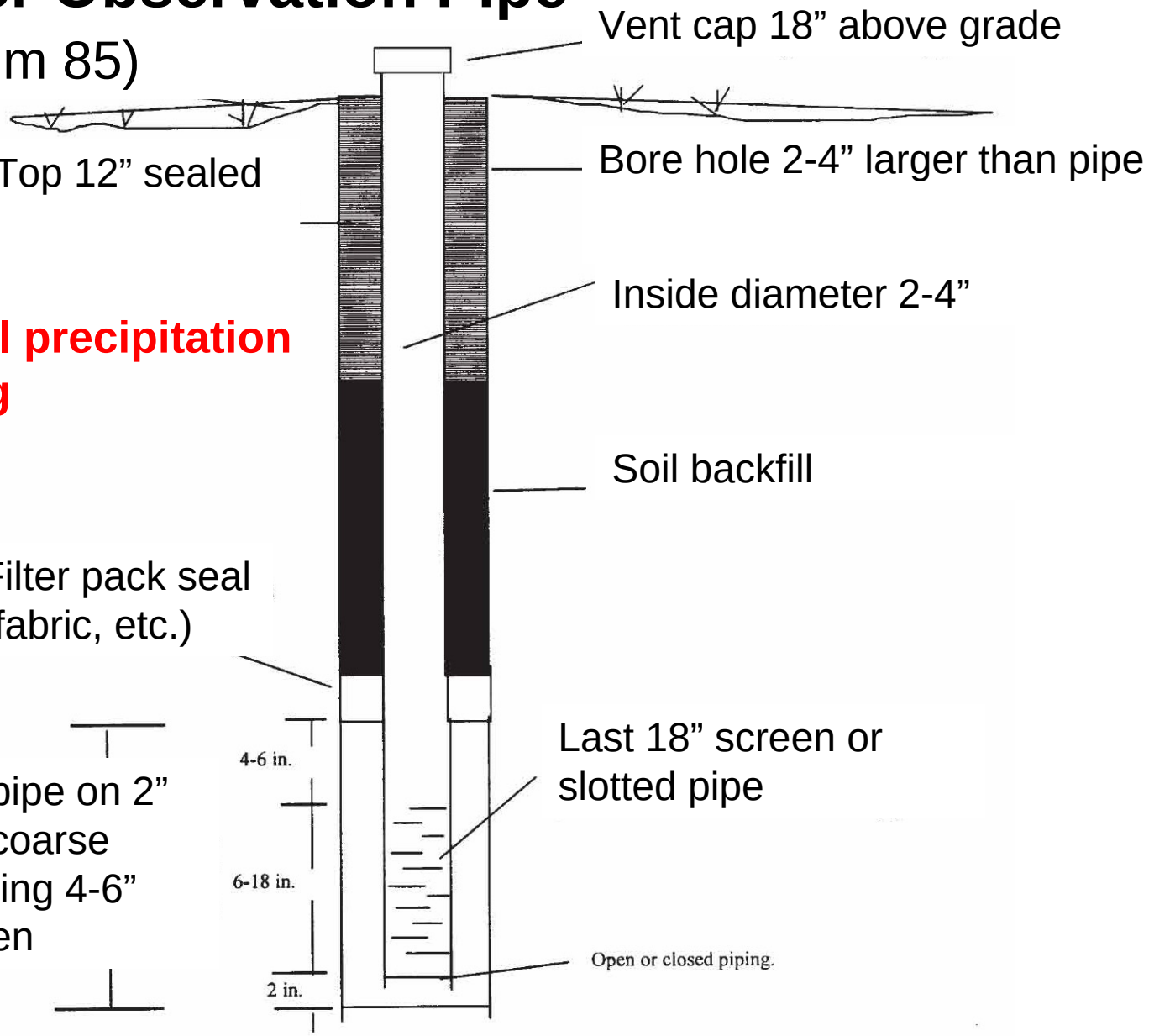
Site Benchmark/Elevation (Co. Stds.): _____

References: (sample) The following references apply to the data presented herein: 1) Map 1 for soil test pit locations; 2) Dept. of Commerce Soil Evaluation forms (5 sheets); and 3) "Soil Profile Interpretation Report" (in accordance with COMM 85.60) for additional interpretative explanation for lots 23 and 24.

Lot #	Soil Observ. (#)	Surface Elev.	Bottom Elev. of Soil Profile	Soil Map Unit Symbol (NRCS)	Elevation of Seasonal High Water Table	Proposed Basement Floor Elevation	**Notes: List information used to determine seasonal high water table, including any soil color pattern exemptions under COMM 85.30(3) for a basement floor proposed less than 1-foot above redoximorphic features shown in the referenced soil evaluation reports.**
(sample)	103	100.0	89.2	HmB	93.4	94.4	Soil saturation at elev. 89.8 and redox features up to 93.4. Less prominent redox features at elev. 97.4 determined to be caused by texture of B2t horizon [tension zone under COMM 85.30(3)2.], not seasonal high groundwater conditions, as defined above.

Groundwater Observation Pipe

(per Comm 85)



Must have normal precipitation from fall to spring

Filter pack. Set pipe on 2” of pea gravel or coarse sand soil, extending 4-6” above slots/screen

Questions?