

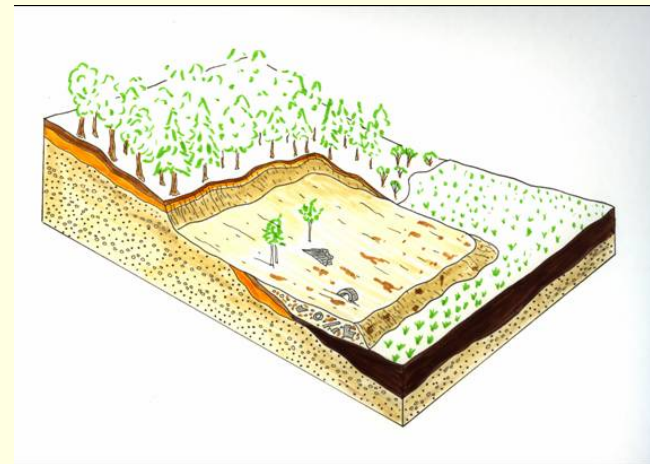
# New Horizon Designation for ^Anthropogenic Soils

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# Why Needed?

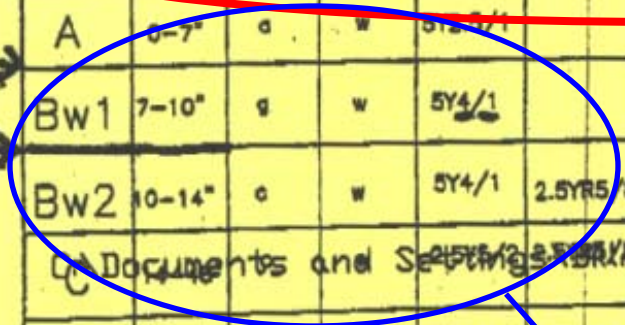
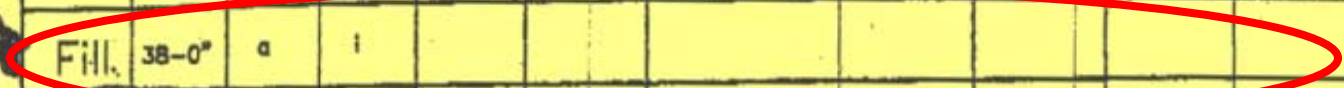
- Major human modification of soils along eastern seaboard (and urbanizing areas).
- Major soil work involves describing and interpreting soils for septic system evaluations and hydric soil delineation.
- Need to use this new nomenclature consistently.



Horizon	Depth	Horizon Boundaries		Soil Colors		Redox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Redox Features	Ab.	S.	Con.				
Fill	38-0"	a	i									
A	0-7"	a	w	5Y2.5/1					gifs	1fabk	fr	6
Bw1	7-10"	g	w	5Y4/1					gifs	1fabk	fr	6
Bw2	10-14"	c	w	5Y4/1	2.5YR5/8	m	f	p	gifs			
C	14-48"	c	w	5Y4/1	2.5YR5/8	m	m	p	gms	Osg	loose	1
2C	48-70"	c	w	5Y4/1	2.5YR5/8	m	m	p	gms	Osg	loose	1
Horizon	Depth	Horizon Boundaries		Soil Colors		Redox Description			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Redox Features	Ab.	S.	Con.				
Fill	36-0"	a	i									
A	0-8"	a	w	5Y2.5/1								6
Bw1	8-10"	g	w	5Y4/1								6
Bw2	10-14"	c	w	5Y4/1	2.5YR5/8	m	f	p				6
C	14-72"	c	w	5Y6/1	2.5YR5/8	m	m	p	sil	Om	fi	9
2C	72-84"	c	w	5Y4/2	2.5YR5/8	m	m	p	gifs	Om	fr	6

7/1

7/2



No information described.

Hydric soil (?) – may want to check and describe any redox features in fill.



# Is it Soil?

**No: misc. area –  
active gravel pit.**

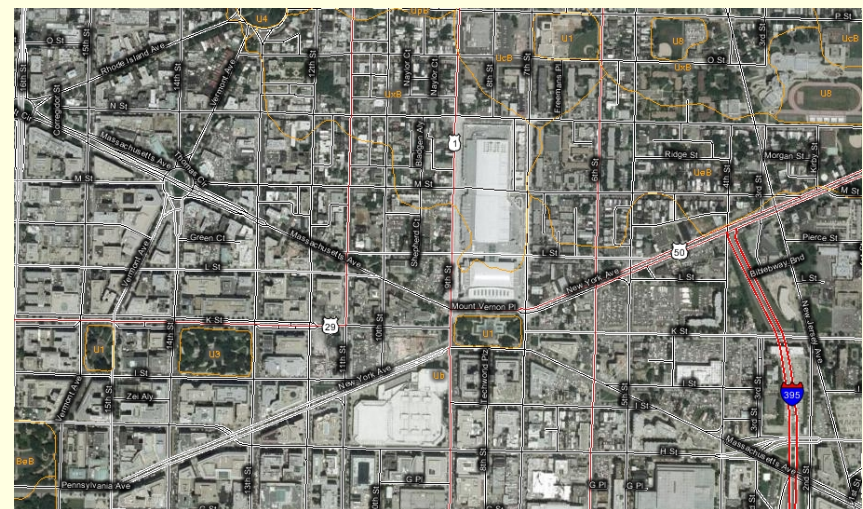
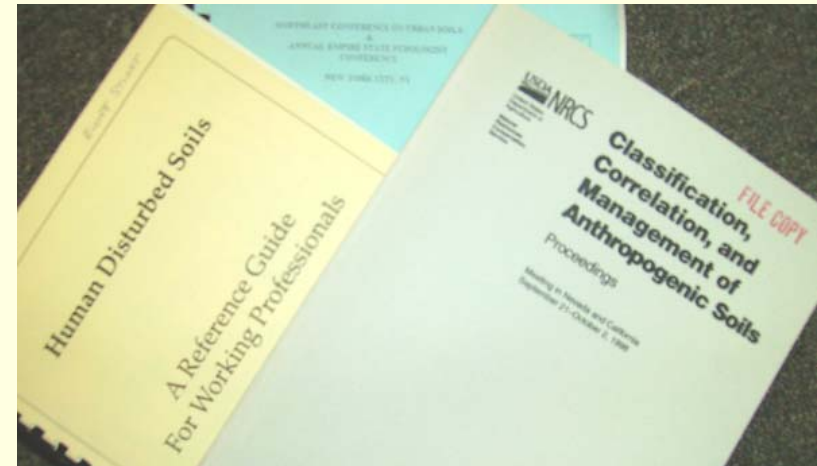


**No: pavement and  
buildings**

**Yes: vegetated  
area, Fortress  
and Tihonet  
Series.**

# Recent History of Anthropogenic Soils

- ICOMANTH – formed in 1995, charged with defining appropriate classes in Soil Taxonomy for soils that have their major properties derived from human activities.
- Prior – most soil surveys mapped undifferentiated units for human altered landforms (Udorthents, Udipsammments, Arents, etc.).
- Ideas ranged from a new soil order, great group level (urbic, garbic), map unit phases and series, master horizons for fill and so on.





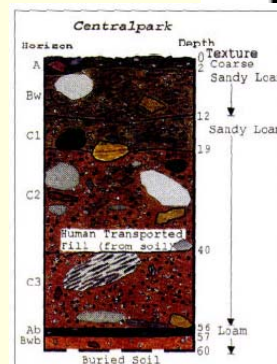
# History

- Major soil survey work on anthropogenic soils were made with the mapping of DC & NYC.
- 24 soil series established in NYC (numerous more), urban interpretations built, pedon descriptions taken.
- Anthropogenic tours conducted.

United States  
Department of  
Agriculture  
  
Natural  
Resource  
Conservation  
Service

Soil Survey of  
**SOUTH LATOURETTE PARK,  
STATEN ISLAND,  
NEW YORK CITY, NY**

1997



In cooperation with

Cornell University Agricultural Experiment Station and  
U.S. Dept. of Agriculture, Natural Resources Conservation Service and  
New York City Soil & Water Conservation District

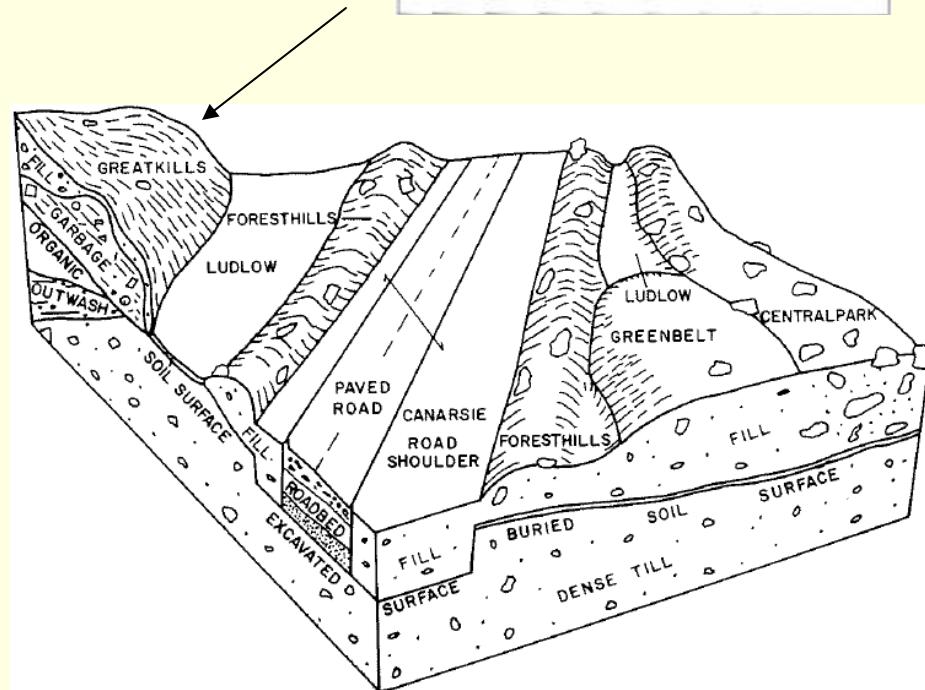
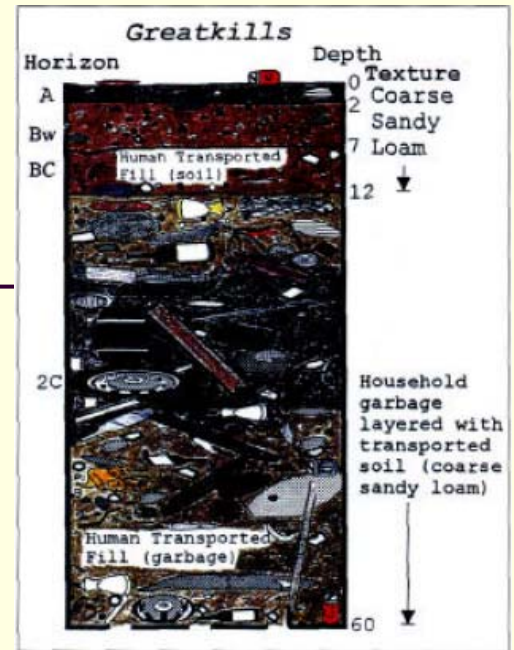
# Soil Series and MapUnits

Soils formed in dredge material –  
ED Bigapple, MWD Fortress,  
PD Jamacia.

Soils formed in excavated outwash  
deposits (abandoned gravel  
pits) – MWD – Burrage, PD  
Tihonet.

Soils formed in HTM overlying  
refuse (capped landfills) –  
Centralpark, Greatkills, etc.

Getting away from mapping  
Urbanland and Udorthents  
(none mapped in NYC) and  
setting up series/catenas to  
provide interps.



# ICOMANTH Circular 6 – most recent

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- [http://clic.cses.vt.edu/icomanth/circlet6\\_rev.pdf](http://clic.cses.vt.edu/icomanth/circlet6_rev.pdf)

## **New Type of Parent Material:**

**Human Transported Material (HTM)** – Organic or mineral soil material (or any other material that can function as a soil material) that has been moved horizontally onto a pedon from a source area outside of that pedon by directed human activity, usually with the aid of machinery. There has been little or no subsequent reworking by wind, gravity, water, or ice. Human transported materials are most commonly associated with building sites, mining or dredging operations, land fills, or other similar activities that result in the formation of a constructional anthropogenic landform. – NSSH Definition.



# Circular 6 highlights

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- Does not address classification of HTM – main purpose is in describing HTM.
- Make recommendations for NSSH, SSM, etc.
- Define HTM as a type of parent material.
- Define Anthropogenic features, manufactured layers, and artifacts (along with categories of artifacts)
- Detailed descriptions of artifacts.
- Horizon designation: M, ^, u.

# Anthropogenic Landform

- a type of landform having a characteristic shape and range in composition, composed of unconsolidated earthy, organic materials, artificial materials, or rock, that is the direct result of human manipulation or activities; can be either constructional (e.g., artificial levee) or deconstructional (quarry).



Dig Deep!

# Soil Features

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- Anthropogenic features – Evidence of directed human habitation or soil manipulation: i.e. spade marks, scrape marks on soil or rock made by machinery, constructional evidence of human manipulation such as trenches, terraces, clay liners, and sand topdressing.
- Manufactured layers - layers constructed by humans and placed on or in the soil: i.e. asphalt, concrete, plastic, geotextiles, and rubber.
- Artifacts - created by humans for a practical purpose of a manufacturing, excavation, or construction process: i.e. wood products, petroleum products, coal combustion by-products, asphalt, fabrics, bricks, concrete, plastic, glass, rubber, paper, metals, garbage and landfill waste.



# Artifacts

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- Human-safety Categories:  
Innocuous artifacts - Harmless; producing no injury,  
Noxious artifacts - Potentially harmful;
- Size Categories:  
Fine artifacts < 2 mm (sewage sludge),  
Medium, coarse, and very coarse artifacts 2 to 600 mm across the smallest axis;
- Types:  
Wood Products, asphalt, concrete, bricks, glass, etc.
- Describing – same as coarse fragments (15-35% artifactual, 35-65% very artifactual, etc.

# Keys to Taxonomy 10<sup>th</sup> edition

**M layers:** *Root-limiting subsoil layers consisting of nearly continuous, horizontally oriented, human-manufactured materials*

Examples of materials designated by the letter M are geotextile liners, asphalt, concrete, rubber, and plastic.

u *Presence of human-manufactured materials (artifacts)*

This symbol indicates the presence of manufactured artifacts that have been created or modified by humans, usually for a practical purpose in habitation,

## Use of the Caret Symbol

The "caret" symbol (^) is used as a prefix to master horizon designations to indicate mineral or organic layers of human-transported material. This material has been moved horizontally onto a pedon from a source area outside of that pedon by directed human activity, usually with the aid of machinery. All horizons and layers formed in human-transported material are indicated by a "caret" prefix (e.g., ^A-^C-Ab-Btb). When they can contribute substantially to an understanding of the relationship of the horizons or layers, Arabic numeral prefixes may be used before the caret symbol to indicate the presence of discontinuities within the human-transported material or between the human-transported material and underlying layers (e.g., ^A-^C1-2^C2-3Bwb).



United States  
Department of Agriculture

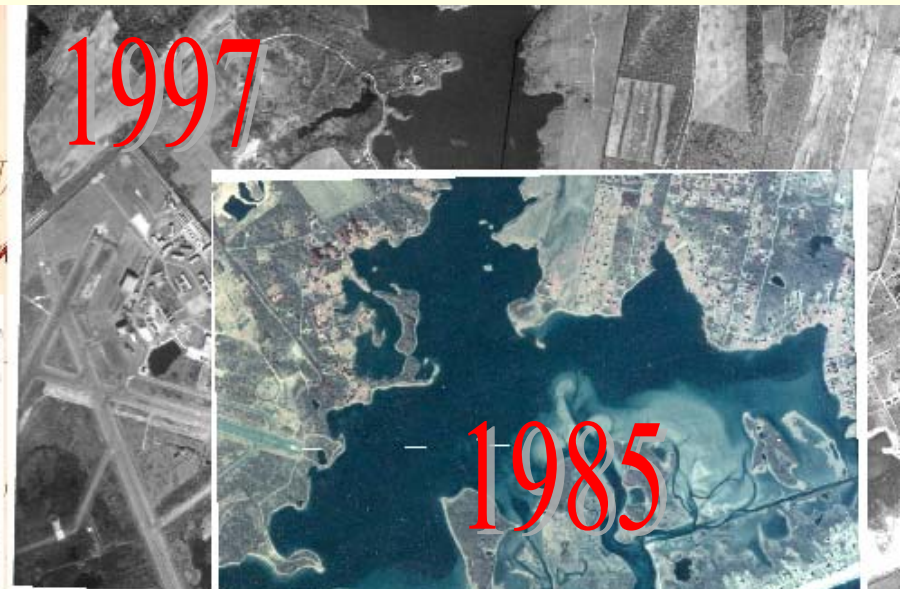
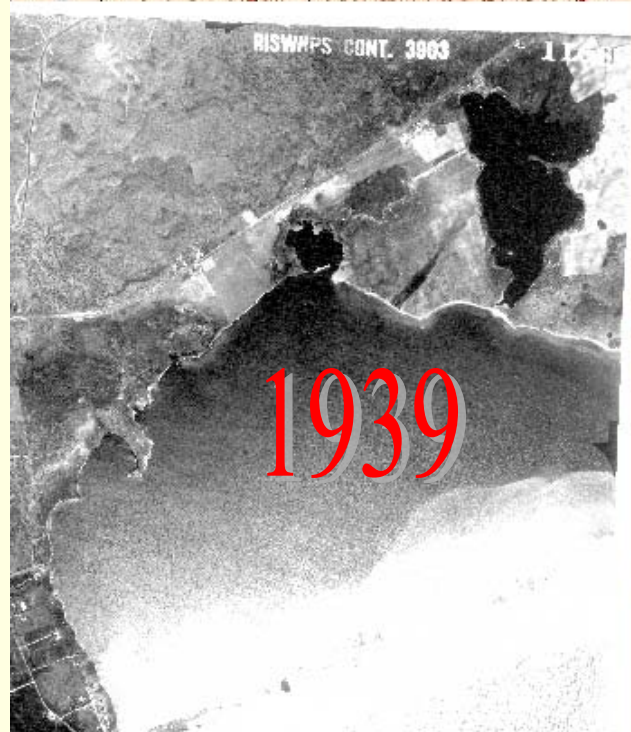


## Keys to Soil Taxonomy

Tenth Edition, 2006



# Historic Imagery – 1800's to 2005





**^A: 0-4", 10YR 3/1,  
sl, 0,m, Fr.**

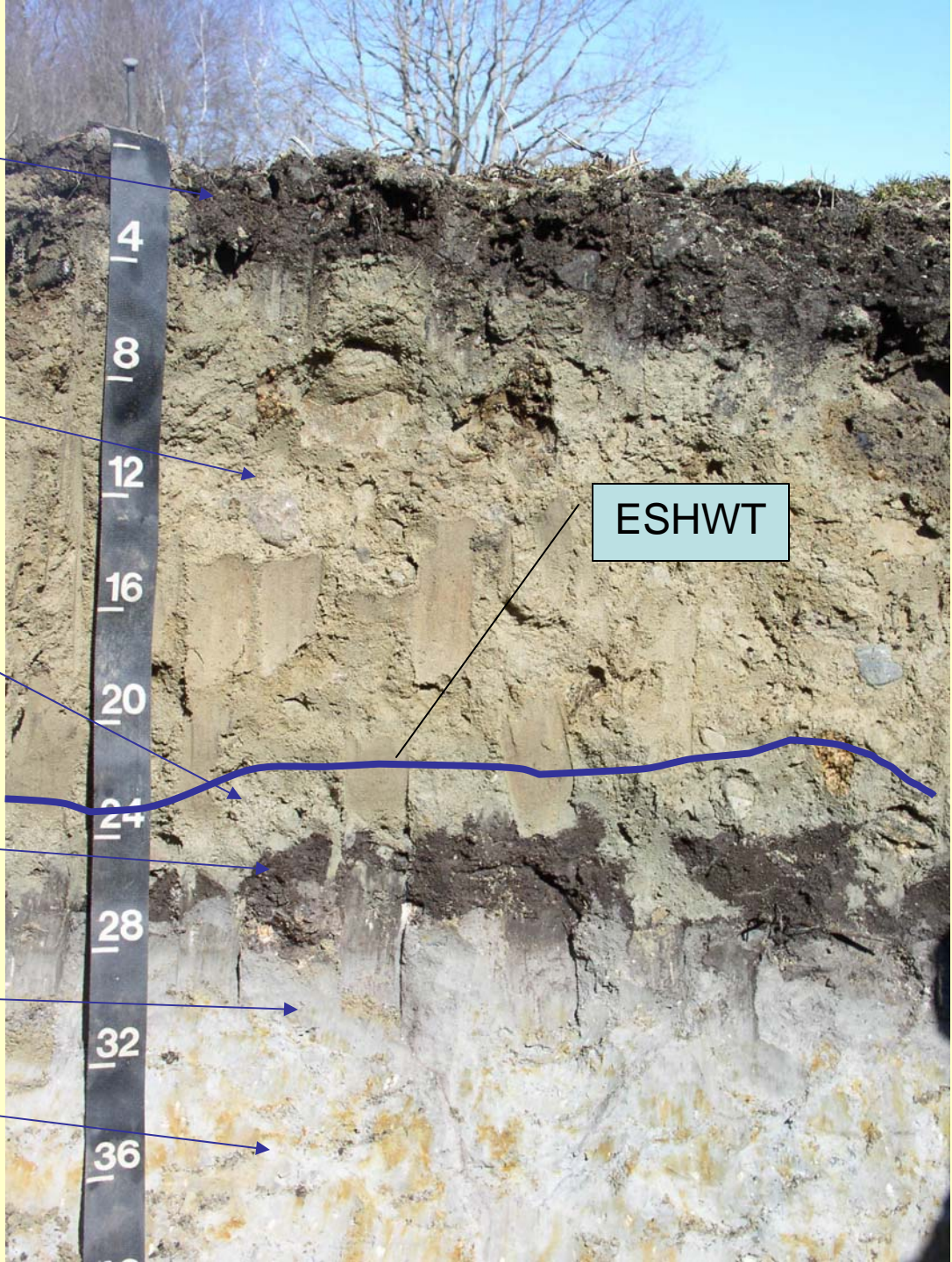
**^C1: 4-23", 2.5Y 5/3,  
ls, 0,m, Fr (no  
artifacts).**

**^Cg: 23-26 5Y 5/2,  
5% 5Y 5/1 redox  
depletions, ls, 0,m,  
Fr, **+rx to alpha dye.****

**2Ab: 26-28", 2.5Y  
2.5/1, msl, 1,f,sbk, fr**

**2Bg: 28-33" 2.5Y 5/1,  
sl, 1msbk, fr.**

**2Cd: 33-65" 5Y 5/1,  
20% 10YR 5/6 conc.  
Fi.**



ESHWT



# Recommend using alpha alpha

Positive  
reaction  
(turns pink)  
in ^Cg =  
reduced  
iron = my  
call for  
ESWT.



# Redox or Mottles?

Need to determine if the color patterns in the HTM are just mixing of material, redox features that were formed originally in place then placed as HTM or if they formed in place after being transported – often difficult!



Redox formed in place



Mottling caused by mixing



## HTM over buried Sutton Soil

**^Apu: SI, AW boundary, 5% artifacts of electrical wire and plastic.**

**2^C: AW boundary, sand, 0,sg, loose, thin 1 cm layer of black material along bottom of horizon.**

**3^A/Cu: Abrupt irregular boundary, artifcatual sandy loam, 15% artifacts of wood, metal, and concrete.**

**4Bwb – buried solum of the Sutton soil**

**5Cd<sub>g</sub>: 2.5Y 5/2, gsl, 0,ma, fr, positive rxn to alpha alpha.**



# Pedogenesis?







Natural  
Alluvial  
Deposits  
(Winooski  
Soils) = Ap –  
C – Ab – C' –  
Ab' , etc.

HTM –  
buried  
foundation  
17<sup>th</sup>  
century =  
2<sup>^</sup>Cu





**^M: 0-5", 10YR  
3/1,  
manufactured  
layer, asphalt,  
extremely firm.**

**2^C1**

**Buried  
Hinckley Soil  
3Ab, etc.**

**Cranberry Bed Soil – HTM  
added late 70's – 80's – tape  
is in CM (< 50 cm not a  
buried soil but a sanded  
phase of Freetown).**

**^A**

**^Bw – 10YR 5/3  
with Redox  
concentrations.**

**^Cg**

**2Oab – buried  
Freetown Soils**

**Question arise about use of the  
“b” for organic horizons. It is OK  
to have Oab!**





**Hinesburg – overwash  
phase (not buried <  
50cm)**

**Not HTM – all  
natural soil  
material (eolian  
sand over  
Hinesburg  
series).**

**A**

**C**

**A'**

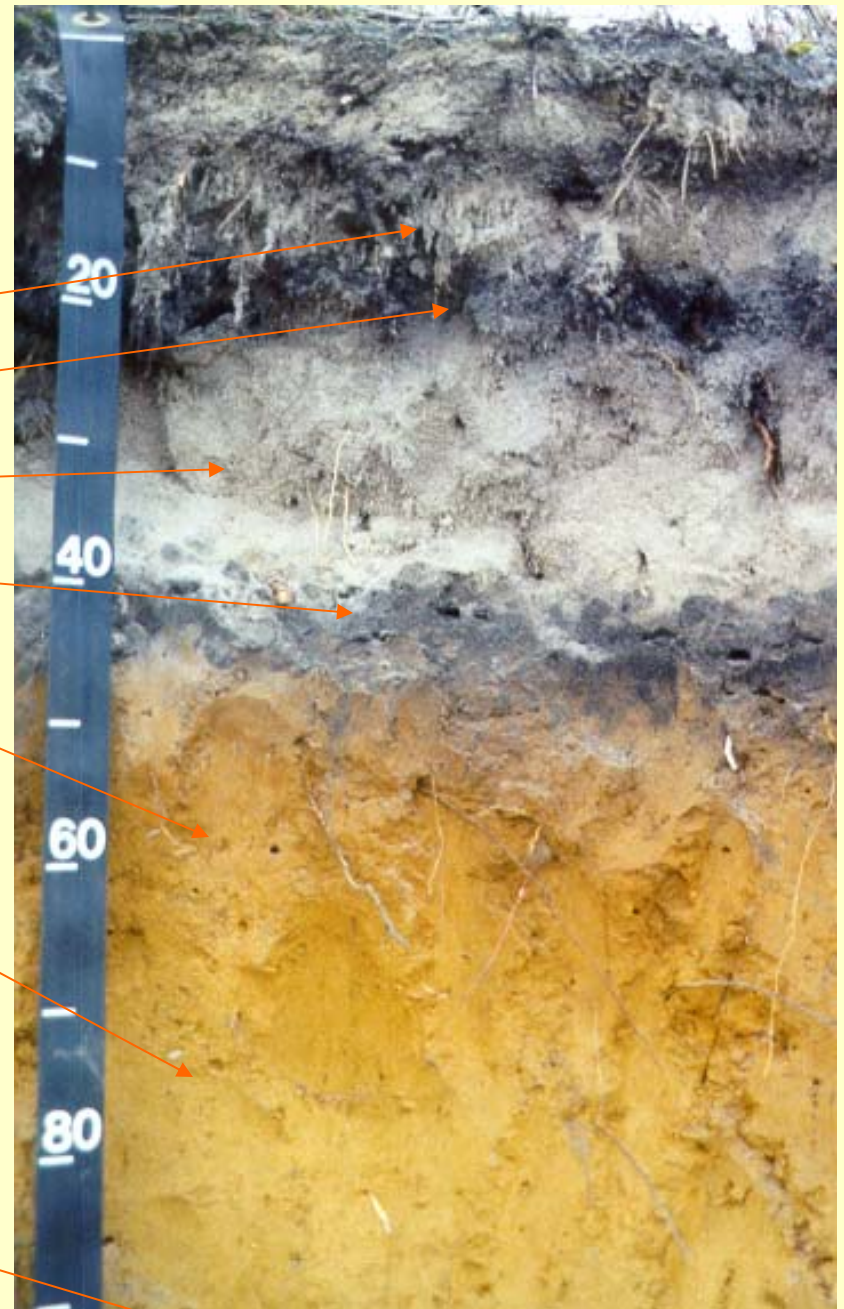
**C'**

**2Ab**

**2Bw1**

**2Bw2**

**3C**





**Hinckley Soil with  
Outwash material  
used for HTM**

**^A**

**^C**

**Ab**

**Bwb**

**C1**

**C2**





**Tihonet Soil – gravel pit  
excavated to water  
table (PD hydric soil)**

**Oe**

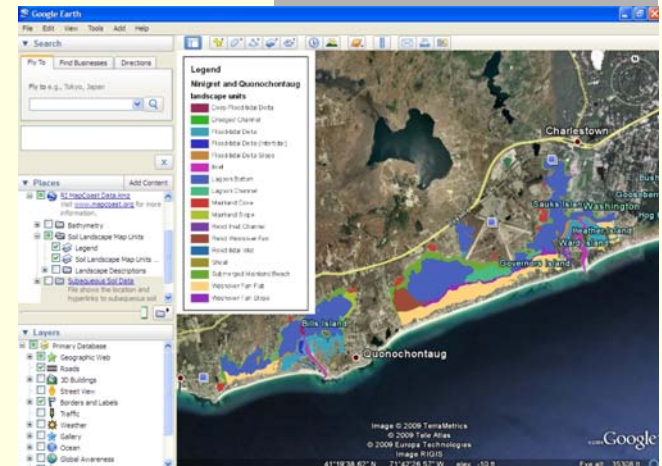
**2C1**

**2Cg**



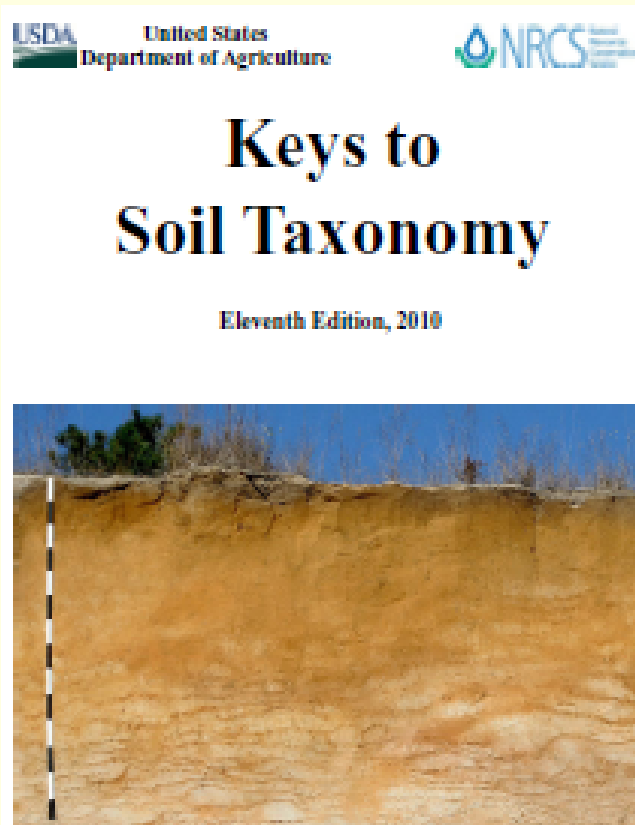
# What's Up in RI

- Major initiative to complete Coastal Zone Soil Survey (Coastal soils and shallow water soils – fresh and saline). Visit [www.Mapcoast.org](http://www.Mapcoast.org)
- 2<sup>nd</sup> National Subaqueous Soil Workshop.
- Long range plan to update soil survey – include new urban and HTM units, map areas of water now considered soil, fix spatial errors.
- Soil mapping products – Google Earth, DVD, etc.





# 11<sup>th</sup> Edition of Soil Taxonomy



## CHAPTER 8

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### Key to Suborders

LA. Entisols that have a positive water potential at the soil surface for more than 21 hours of each day in all years.

Wassents, p. 142

## CHAPTER 10

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### Key to Suborders

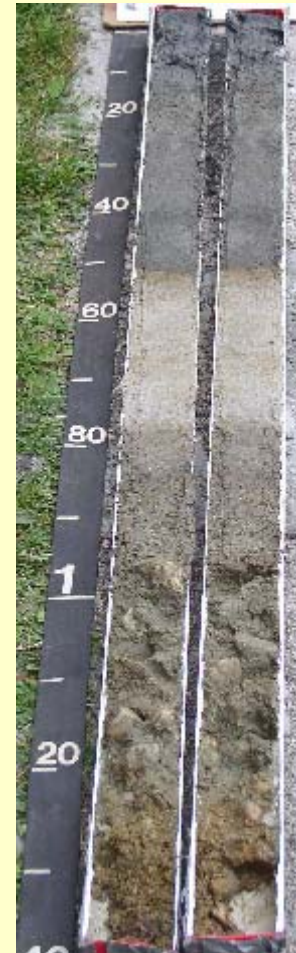
BA. Histosols that are saturated with water for less than 30 cumulative days during normal years (and are not artificially drained).

Folists, p. 156

BB. Other Histosols that have a positive water potential at the soil surface for more than 21 hours of each day in all years.

Wassists, p. 159

# End / Questions



^A –  
dredge  
sand

2Bg1 –  
loess

3C – sand  
and gravel  
(outwash).

Nagunt sand, dredge phase

# b vs “Buried Soil”

- ”b Buried genetic horizon

This symbol is used to indicate identifiable buried horizons with major genetic features that were formed before burial. Genetic horizons may or may not have formed in the overlying material, which may be either like or unlike the assumed parent material of the buried soil. The symbol is not used to separate organic layers forming at the soil surface from underlying mineral layers. It is not used in organic soils, unless they are buried by mineral soil materials.”



<b>Profile 1</b>	<b>Profile 2</b>	<b>Profile 3</b>	<b>Profile 4</b>	<b>Profile 5</b>
<b>Soil deeply cultivated to 75 cm but not transported</b>	<b>Soil buried by HTM from similar on-site material</b>	<b>Soil buried by HTM from off-site soil material</b>	<b>Soil buried by HTM containing a few artifacts and on-site soil material</b>	<b>Soil with HTM over a geotextile layer over landfill material</b>
<b>0 cm HTM</b>	<b>75 cm HTM</b>	<b>75 cm HTM</b>	<b>75 cm HTM</b>	<b>200 cm HTM</b>
<b>System proposed by ICOMANTH</b>				
<b>Ap</b>	<b>*A</b>	<b>*A</b>	<b>*Au</b>	<b>*A</b>
<b>C1</b>	<b>*C1</b>	<b>*Bw</b>	<b>*ACu</b>	<b>*C</b>
<b>C2</b>	<b>*C2</b>	<b>*C</b>	<b>*Cdu</b>	<b>*Cd</b>
<b>Cky</b>	<b>Cky</b>	<b>2BAb</b>	<b>Btb1</b>	<b>*M (1 cm thick)</b>
<b>Ckyz (&gt; 1m thick)</b>	<b>Ckyz (&gt; 1m thick)</b>	<b>2Btb</b>	<b>Btb2</b>	<b>*2C1</b>
		<b>2Cr</b>	<b>BC</b>	<b>*2C2 (&gt; 50 cm thick)</b>

## **Table 4. A hypothetical pedon formed in HTM over a buried natural soil.**

**\*Ap** -- 0 to 26 cm; reddish brown (2.5YR 4/4) loam; common, common fine distinct dusky red (10R 3/4) **lithochromic mottles**; weak coarse subangular blocky structure; friable; common fine and medium plus few coarse roots; no pores; 5 percent sandstone pebbles; moderately acid; clear wavy boundary.

**\*Cu1** -- 26 to 50 cm; reddish brown (2.5YR 4/4) loam; few, medium distinct dusky red (10R 3/4) **lithochromic mottles**; structureless, massive; firm; common fine and medium plus few coarse roots; few very fine pores; 5 percent sandstone pebbles; **3 percent medium, brick fragments**; slightly acid; clear wavy boundary.

**\*Cu2** -- 50 to 117 cm; reddish brown (2.5YR 4/4) **artifactual** gravelly loam; common, medium distinct dusky red (10R 3/4) **lithochromic mottles**; structureless, massive; firm; few fine and medium roots; no pores; 5 percent sandstone cobbles, and **15 percent coarse concrete fragments, 5 percent medium brick fragments**; slightly alkaline; abrupt smooth boundary.

**Ab** -- 117 to 126 cm; dark brown (2.5YR 3/3) loam; moderate medium granular structure; very friable; common fine and medium roots; few very fine pores; moderately acid; clear wavy boundary.

**Btb** -- 126 to 200 cm; reddish brown (2.5YR 5/4) clay loam; moderate medium subangular blocky structure; friable; common clay films on ped surfaces; few fine and medium roots; common very fine pores; moderately acid.