Urban Geoarchaeology in the Age of Heritage Management and Sustainability: A Perspective from New York City

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Opening the Past 2013
Archaeology of the Future
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Contemporary Urban Archaeology

- What are the constraints imposed on Contemporary Urban Archaeology
- Formulating Research Designs within the contexts of such constraints
- It requires a Conceptual overhaul in Method and Theory
- Adjusting fieldwork to development concerns and construction footprints
- Securing critical relationships with developers and regulators.
- Maximize inter-disciplinary approaches and mobilize all available resources to secure COMPREHENSIVE results
- Developing new VISIONS of archaeology and its interpretive potential
Urban Geoarchaeology: Tools and Tasks

• Baseline geomorphology: Terminal Pleistocene to Holocene transition sequences and landscape successions

• Historic maps and accounts of land use transformations

• Early Euroamerican accounts and archival documents

• Field work based on background and project objectives

• Use of GIS, earth science techniques, and high tech methods to maximize data yield while minimizing actual digging and invasive strategies

• Synthesize site formation histories in such a way as to develop models that have regional and extra-regional applications

• Demonstrating the Cost-Efficiency of urban geoarchaeology
Two dominant factors influencing archaeological record of New York City Area:

• Rising sea level associated with global-scale warming through the Holocene

• Historical development and nearly wholesale reworking of landscape and environment
Site locations

- Riverside
- Five Points
- 2nd Avenue Subway
Lower Manhattan: the Five Points area
Landscape History of Lower Manhattan: Late Pleistocene
The geography of Kettle and Kame complexes

Kettle-kame complex:
http://gemini.oscs.montana.edu/~geol445/hyperglac/meltwater1/kamekettle.htm

Cross-section of a classic North American Kame (Dundee, WI).
http://www.geology.wisc.edu/~maher/air/air11.htm
Subsurface Coring: New York Harbor
Landscape History of Lower Manhattan: Holocene Estuary

Terrestrial

Sub-tidal

2490 ± 60 B.P.
Detail of Red Hook and Governor’s Island
Sea level rise model

- **Green** – Carbotte et al. (2004) - dated oyster reef in Tappan Zee
- **Pink** – Kenen (1999); Schuldenrein et al. (2007); and Carmichael (1980)
- **Blue** – Field et al. (1979) and La Porta et al. (1999)
New York Harbor: Paleolandscape Reconstruction

- Sea level 8,000 B.P. -22 m, Early Archaic
- Sea level 5,200 B.P. -9 m, Late Archaic
- Sea level 3000 B.P. -4.5 m, Early Woodland
- Sea level 1000 B.P. -1.5 m, Late Woodland
The Federal Courthouse at Foley Square
Recently Excavated Sites, Lower Manhattan
Lower Manhattan Testing Sites
Landscape History of Lower Manhattan: Dutch Land Use (17th Century)
Landscape History of Lower Manhattan: Historic Geography

Landscape Features Near Collect: 1793

Only Known Painting of Collect: 1798

Kame

African American Burial Ground

MCC Tunnel

Marshes

Kames

111 Worth Street

MAP OF COLLECT POND

AND ITS VICINITY IN THE CITY OF NEW YORK IN 1795

0 0

0 500 ft

0 150m
The geography of Kettle and Kame complexes

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Lower Manhattan Testing Sites
Stratigraphy of Worth Street: Pleistocene with Historic Feature
Landscape History of Lower Manhattan: Soil Chronology

8290 ± 50 B.P.
(Beta - 158800)

Bt soil horizon
Stratigraphy of Foley Square Core: 19th Century Building Rubble Above Middle-Late Holocene Shore Sands and Estuarine Peats and Silts
Site of the Collect Pond: April 2011
Maerschalk Map of Lower Manhattan-1754

- Marshland
- Collect Pond
- Tin Yards
- Lutheran Church
- Jews Synagogue
- Fish Market
- Old Slip Market
Machine Excavation through the MCC Tunnel: Initial Exposure

Heavy equipment penetrates asphalt and 14’ of modern and historic utilities. Construction crews and archaeological teams work simultaneously to meet deadlines.

Graders used to level surfaces for construction benchmarks, geotechnical exploration and activities attendant to foundation placement. Archaeologists monitor changes in stratigraphy.
Stratigraphy of MCC Tunnel: Early Collect Pond Sedimentation (17th-18th Century) Above Weathered Holocene Sands

- Refuse and fill
- Oyster shell and tannery debris
Tanning related artifacts from MCC Tunnel excavations

Horn cores and bones from tanning trench

Iron hook used for hide processing
Elements of the Tannery Stratigraphy
Layout of a typical small colonial tanyard
There is little doubt that on the western borders of [the pond] was situated an Indian village… deposits of shells were abundantly strewn over the hill, on the western side of the lake, and gave to that promontory in early times, the Dutch name of the “Kalchhook,” or, as translated, “Lime Shell Point.”

D. Valentine, 1860

William Duer, 1849

It was the grand resort in winter of our youth for skating; and no person who has not beheld it, can realize the scene it then exhibited in contrast to that part of the city under which it now lies buried. The ground between the Collect and Broadway rose gradually from its margin to the height of one hundred feet…

Common Council, 1803

The piece of ground in question… is a high hill, and cannot be applied to any profitable use in its present state. The Corporation owns the Collect, and a quantity of low marsh adjoining to it to the amount of between five and six acres. It is a desirable thing that this low ground should be filled up for both the health of that part of the town, and also that the ground be applied to some beneficial purpose. It is recommended that contracts be made with suitable persons for digging out this hell and filling up the meadows with earth to a suitable height.

Common Council, 1803
Early Historic Landform Configurations in Lower Manhattan
Landscape History of Lower Manhattan: Synthesis of Stratigraphy

19-20th Century Fill

19th Century Fill

Prehistoric to Early Historic Landscape
Synthetic Geography of Lower Manhattan

Historic Landforms of Lower Manhattan
(c. 1750)
Diachronic Model of Site Formation: Terminal Pleistocene-Dutch Settlement (17th Century)
Diachronic Model of Site Formation: Dutch Settlement (17th Century) - Present
Upper East Side: the 2\textsuperscript{nd} Avenue Subway
2nd Avenue Subway – Hellgate Bay

- 91st to 99th Street located in infilled and urbanized Hell Gate Bay

- State Historic Preservation Officer identified peat in core logs as potentially significant

- Excavated 5 cores, synthesized MTA core logs, 10 new radiocarbon dates, pollen, macroflora, sedimentology, and macrofauna studies

(Veile 1874 Topographical Atlas of the city of New York Including the Annexed Territory.)
Coring operation along 2\textsuperscript{nd} Avenue

Split core in the field

Core locations relative to historical drainages
2\textsuperscript{nd} Avenue stratigraphy
Synthetic Project Area Cross Section

AU-VI: Historical fill
AU-V: Historical high energy sands
AU-IV: Estuarine Silts
AU-III: Complex of Fluvio-shoreline Sands
AU-II: Glacio-Lacustrine silts
AU-I: till and regolith Over schist bedrock
2nd Avenue Paleolandscape Model

- Inundation by pro-glacial lakes (20,000 yr B.P.)
- Erosional surface with the establishment of local freshwater drainages (13,000 yr B.P.)
- Freshwater environments, nearshore setting (6,000 yr B.P.)
- Freshwater dominated estuary (4,000 yr B.P.)

Glacial Lake Hudson / Bayonne
Modern Analogue to Hellgate Bay: Inwood Hill Park
Conclusions

• In the dense substrate underlying city streets geoarchaeological methods are the most cost-efficient means of detecting ancient landscapes and occupations

• Investments in background research on geology, historic records and maps will enhance the interpretive potential of limited stratigraphic windows

• “Patchwork” reconstructions of site-specific geoarchaeological sequences can be extrapolated to a variety of scales enhancing predictive potentials

• In this way the systematics of the archaeological record can prove useful and effective for promoting comprehensive heritage planning

• The utility of comprehensive inter-disciplinary research designs can and must be communicated to planning agencies charged with development in urban areas in the age of sustainability.
So now do we really know where to dig?