Update Report
NCPTT 2007 Grants

Aerial Thermal Survey of New Philadelphia, Illinois Town Site
Grant No. MT-2210-07-NC-02
University of Illinois

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September 8, 2009.

Abstract:
A Final Report on this project was submitted by Fennell to NCPTT on December 30, 2008. Fennell and the survey team continued work in 2009 on testing anomalies identified by Hailey and Haley in this aerial thermal survey. By agreement of Robert Ruff, Grants Administrator, and David Morgan of NCPTT, memorialized in a letter from Ruff received by Fennell on July 14, 2009, the time period of this grant was extended to September 30, 2009, to allow time for expenditure of unspent grant funds for the purposes of supporting additional ground-testing of thermal anomalies by Fennell and his excavation team. This Update Report describes the results of ground-testing undertaken in July, 2009 for that purpose.

Background

The December 30, 2008 Narrative Final Report provides background information on the history of New Philadelphia, Illinois, and the research activities conducted at this town site to date. The town site was designated as a National Historic Landmark in January 2009.

In May, 2008, researchers employed a thermal infrared survey at the 42-acre historic town site of New Philadelphia (Figure 1). This survey method was employed to locate buried cultural materials situated within the town site, which consists today of agricultural fields and prairie grass. The survey was conducted through the use of a Destiny 2000 Powered Parachute (PPC) and images were captured with an Agema 570 thermal infrared camera. The PPC was piloted by Dr. Tommy Hailey of Northwest State University and the images were collected and analyzed by Bryan Haley of the University of Mississippi. In prior field seasons, ground based geophysical surveys have been conducted by Dr. Michael Hargrave of the U.S. Army Engineer Research and Development Center, Construction Engineering Research Laboratory (CERL). Through these multiple research tools, the archaeologists will select locations which contain the highest level of probability for buried remains of this nineteenth-century community.

The Agema 570 infrared camera was used to obtain heat source differences of the soils in a given area. Due to diurnal heating cycles, buried remains collect or deflected heat from the

Figure 1. 1998 high-altitude photograph of New Philadelphia town site, with overlay of 1836 plat (U.S.G.S. archives, overlay by C. Fennell).

sun. The collection or deflection of solar heat allows the Agema 570 to recognize these temperature differences. Buried cultural remain such as a house foundation will display different temperature between the lighter-compacted inner fill dirt, the stone foundation, and the harder-

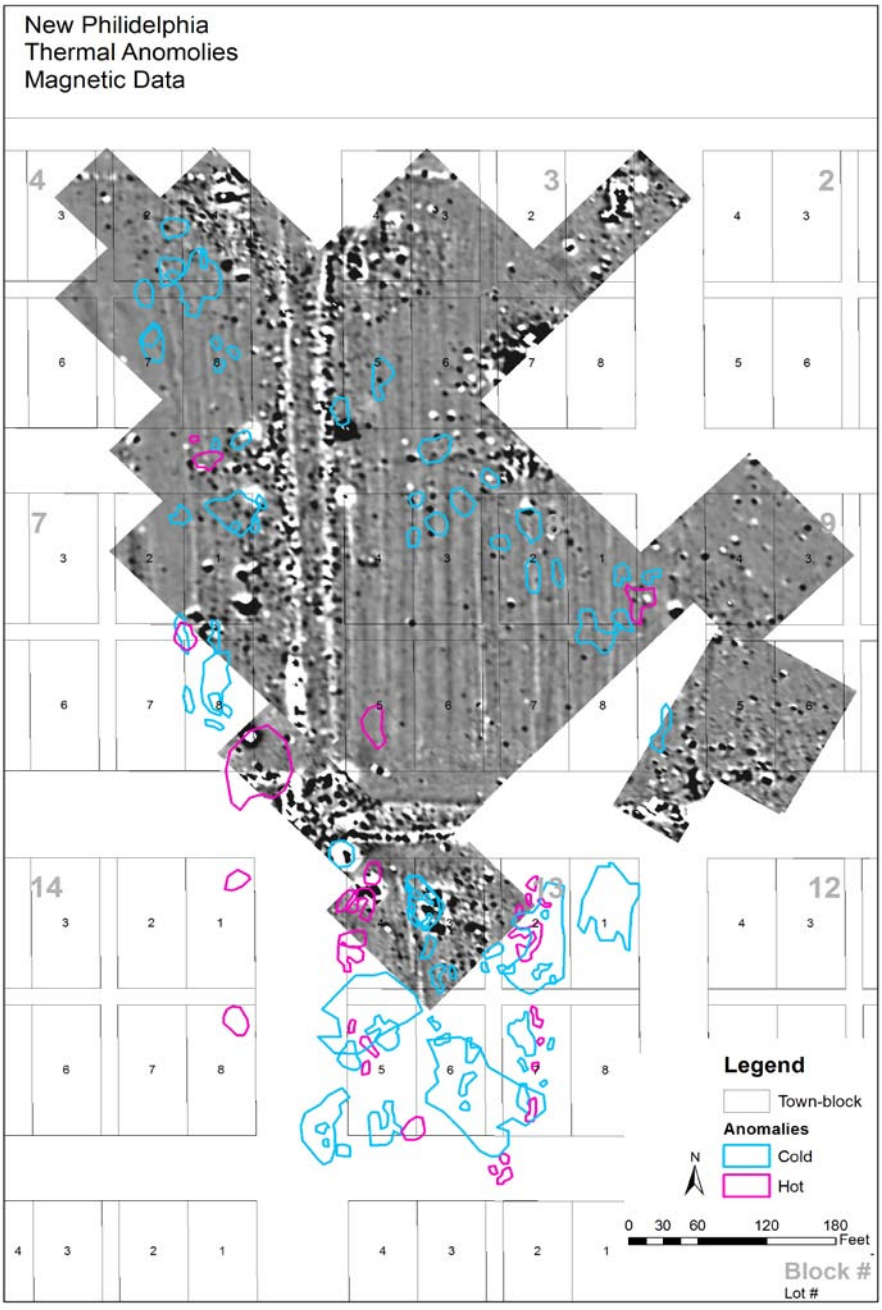

Figure 2. Aerial thermal anomalies identified by Bryan Haley, overlain on an image of the town blocks and lots and magnetic gradient data images obtained through ground-based geophysical surveys conducted by Michael Hargrave (Image data overlays courtesy of Bryan Haley and Michael Hargrave).

packed exterior soils. These temperature differences in a given space are marked as anomalies and have been set for soil core testing. The research goal was to select Thermal Infrared (TIR) anomalies for areas that display either a "Hot" (H#) or "Cold" (C#) signatures (Figure 2).

During the Summer of 2009, thermal anomalies situated in Blocks 13 and 14 of the town site were selected for soil core testing (Figures 3 and 4). Soil core testing was undertaken by George Calfas, Kathryn Fay, Annelise Morris, and Christopher Fennell of the University of Illinois, using a one-inch diameter Oakfield soil sampler and the two-inch diameter AMS slide hammer core sampler. All soil cores obtained with Oakfield samplers were taken to a depth of 3 feet, below the depth at which buried cultural materials are typically detected at New Philadelphia. The team encountered a mechanical flaw with the AMS slide hammer assembly, and consequently only four samples were taken with this device to a depth of 4 feet. Each of these four-foot-deep samples obtained by the AMS assembly was compressed into a sample of lesser length due to the slide-hammer method employed by this equipment.

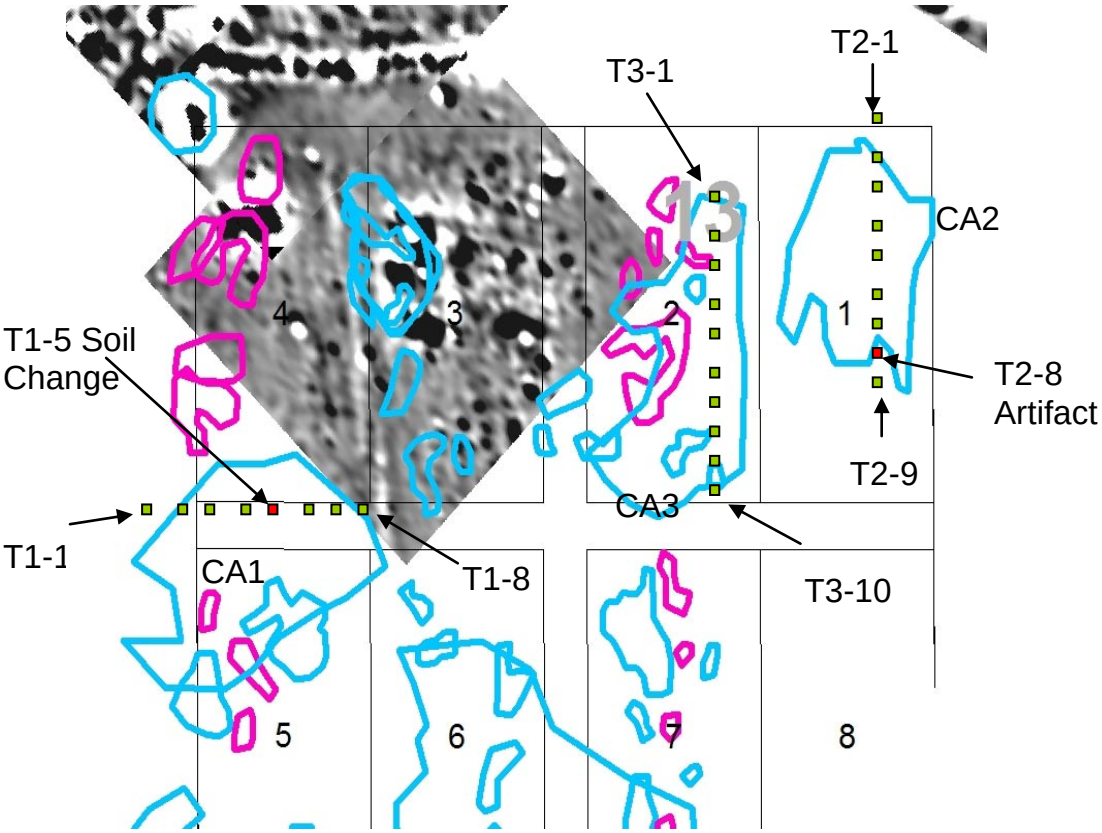

Figure 3. Soil core survey transects across selected "cold" aerial thermal anomalies identified by Bryan Haley in Block 13, overlain on an image of the town block and lots and magnetic gradient data images obtained through ground-based geophysical surveys conducted by Michael Hargrave. (Image data overlays courtesy of George Calfas, Bryan Haley, and Michael Hargrave).

Systematic core samples were taken with a 10-foot separation in the following locations in Block 13 of the town site: Block 13 Lot 4 (T1-1, T1-2, T1-3, T1-4, T1-5, T1-6, T1-7, T1-8 for TIR C1), Block 13 Lot2 (T2-1, T2-2, T2-3, T2-4, T2-5, T2-6, T2-7, T2-8 for TIR C2), Block 13 Lot 1 (T3-1, T3-2, T3-3, T3-4, T3-5, T3-6, T3-7, T3-8. T3-9, T3-10 for TIR C3) (Figure 3). Systematic core samples were taken with a 10-foot separation in the following locations in Block 14 of the town site: Block 14 Lot 8 (T1-1, T1-2, T1-3, T1-4 for TIR H1), and Block 14 Lot 1 (T1-1, T1-2, T1-3 for TIR H2) (Figure 4).

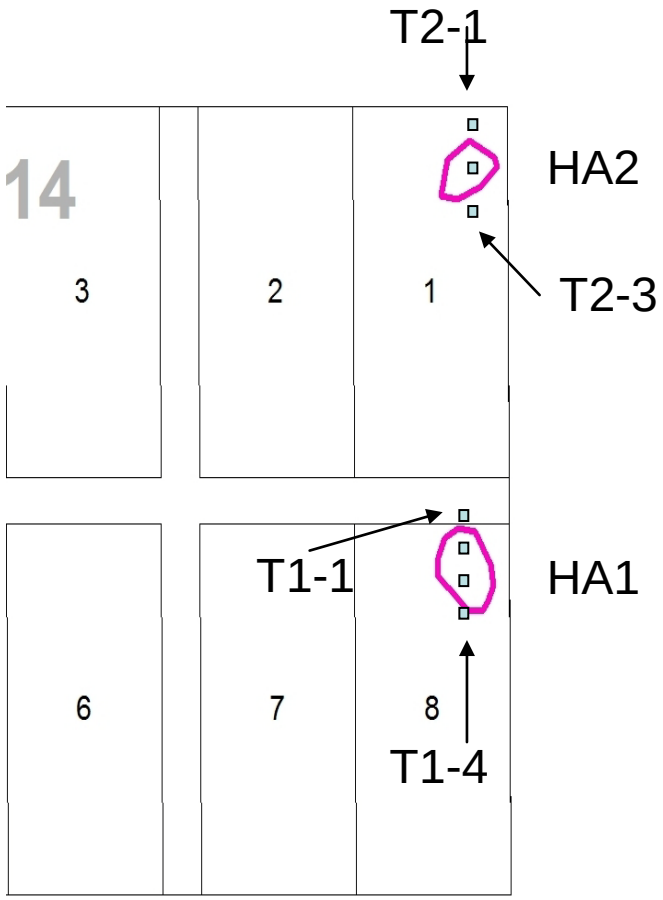

Figure 4. Soil core survey transects across selected "hot" aerial thermal anomalies identified by Bryan Haley in Block 14, overlain on an image of the town block and lots (Image data overlays courtesy of George Calfas, Bryan Haley, and Michael Hargrave).

Cold thermal anomaly 1 (CA1) is situated in the southern section of Block 13 Lot 4 (Figure 3). The northern section of this lot is known to have a buried house foundation and made this anomaly suitable for testing in attempts of locating additional remains associated with the dwelling. Testing began outside of the lot line and outside of CA1 in an attempt to distinguish sterile soil from disturbed soil in the area. T1-1 through T1-8 were then sampled in a easterly direction within the boundary of CA1. Core sample T1-1 was collected with the AMS and contained the following soils: 7.5YR 3/2 Loam to .4ft. below surface level (BSL), 7.5 YR 4/3 Loamy Clay mottled with 7.5YR 6/2 to .8ft. BSL, and 7.5YR Clay to a termination of 1.6 ft.

BSL. T1-2 was sampled with the Oakfield and contained the following soils: Loam 7.5YR 3/2 to a depth of 1.25 ft. BSL, Loamy clay 7.5YR 5/6 to 1.8ft BSL, Loamy Clay 7.5YR 6/6 to 2ft. BS, and Clay 7.5YR 6/6 mottled with 7.5YR 3/2. T1-3 core sample was obtained by using the AMS and contained 10YR 3/2 Loam to .7ft. BSL, 10YR 4/4 Loamy Clay mottled with 10YR 3/2 to 1.5 BSL, and 10YR 5/6 Clay to 2.2ft. BSL. T1-4 was sampled with the Oakfield and contained 10YR 3/3 Sandy Loam to .75ft BSL, 7.5YR 4/4 Loamy Clay to a depth of 1.55 BSL, 10YR 5/6 Clay to a depth of 2.35 BSL and terminated with 10YR 6/8 Clay at 3ft BSL. T1-5 core sample was obtained by using the AMS and contained 10YR 3/2 Loam to .75ft. BSL, 10YR 5/4 Loamy Clay mottled with 10YR 6/4 to 1.8ft. BSL, and 10YR 5/6 Clay at a termination depth of 2.8ft. BSL. T1-6 was sampled with the Oakfield and contained 10YR 3/4 Loam to .85ft BSL, 10YR 5/6 Clay to a depth of 1.35ft. BSL, 10YR 5/8 Clay to a depth of 2ft. BSL and terminated with 10YR 5/8 Clay at 3ft BSL. T1-7 core sample was obtained by using the AMS and contained 10YR 3/2 Loam to .7ft. BSL, 10YR 4/3 Sandy Loamy Clay to 1.4ft. BSL, and 10YR 6/8 Clay to a final depth of 2.2ft. BSL. T1-8 was sampled with the Oakfield and contained 10YR 3/3 Loam to .9ft BSL, 10YR 4/6 Loamy Clay to a depth of 1.45ft. BSL, 10YR 5/6 Clay to a depth of 2ft. BSL and terminated with 10YR 5/8 Clay at 3ft BSL.

Soil Core samples during the remainder of the research project were sampled using only the 1-inch diameter Oakfield sampler due to a mechanical malfunction of the AMS assembly.

Cold thermal anomaly 2 (CA2) is situated in the center to north and east edge of Block 13 Lot 2 (Figure 3). Testing began 10 feet inside of the northern lot line; this location is outside of anomaly CA2 in an attempt to distinguish sterile soil from disturbed soil in the area. T2-1 through T2-9 were taken at 10 foot intervals in a southerly direction. T2-9 is located outside of the anomaly in an attempt to locate sterile soil.

Sample T2-1 following soils: 7.5YR 3/3 Loam to a depth of .65ft. BSL, 10YR 4/4 Loamy Clay mottled with 10YR 4/6 Clay to 2ft. BSL, 10YR 4/6 Clay with inclusions of 10YR 2/1 and 10YR 6/1 Clay to the termination depth of 3ft. BSL. Sample T2-2 contained 10YR 3/3 Loam to a depth of .7ft. BSL, 10YR 4/6 Loamy Clay at 2ft. BSL, 10YR 4/6 with inclusions of 10YR 2/1 and 10YR 6/1 Clay to the termination depth of 3ft. BSL. Sample T2-3 contained 10YR 4/4 Loam to a depth of .55ft. BSL, 10YR 4/6 Loamy Clay to 1.15ft. BSL, 10YR 4/4 Clay and inclusions of 10YR 2/1 Clay to 2ft. BSL, and 10YR 5/6 Clay to the depth of 3ft. BSL. Sample T2-4 contained 10YR 3/4 Loam to a depth of .75ft. BSL, 10YR 4/6 Loamy Clay with inclusions of 10YR 2/1 Clay to a depth of 2ft. BSL, 10YR 5/6 Clay to 3ft. BSL and inclusions of 10YR 2/1 Clay from 2.8-3ft. BSL. Sample T2-5 contained 10YR 4/4 Loam to a depth of .7ft. BSL, 10YR 4/6 Loamy Clay to 1ft. BSL, 10YR 4/4 Loamy Clay to 1.55ft. BSL, and 10YR 5/6 Clay to the depth of 3ft. BSL. Sample T2-6 contained 10YR 4/4 Loam to a depth of .8ft. BSL with a 10YR 4/4 inclusion (mortar) at .65ft. BSL, 10YR 4/6 Loamy Clay to 1ft. BSL, 10YR 6/8 Clay with 10YR 5/8 and 7/2 Clay inclusions to a depth of 2ft. BSL, and 10YR 5/6 Clay to the depth of 3ft. BSL. Sample T2-7 contained 10YR 3/3 Loam to a depth of .75ft. BSL, 10YR 4/6 Loamy Clay to 2ft. BSL, and 10YR 5/8 Clay to the depth of 3ft. BSL. Sample T2-8 contained 10YR 3/6 Loam to a depth of .55ft. BSL, 10YR 4/6 Loamy Clay to 1.ft. BSL, 10YR 3/3 Loamy Clay, and 10YR 4/6 Clay to the depth of 3ft. BSL. Core T2-8 contained a fragment of solarized vessel glass which was discovered at .45ft. BSL. Sample T2-9 contained 10YR 3/4 Loam to a depth of

.65ft. BSL, 10YR 4/6 Loamy Clay to 1ft. BSL, 10YR 5/6 Loamy Clay to a depth of 2ft. BSL, and 10YR 6/8 Clay to the depth of 3ft. BSL.

Cold thermal anomaly 3 (CA3) is situated in the center to east edge of Block 13 Lot 2 (Figure 3). Testing began 40 feet inside of the northern lot line; this location is outside of anomaly CA3 in an attempt to distinguish soil differences in the area. T2-1 through T2-10 were taken at 10 foot intervals in a southern direction. The final core sampled is located outside of the anomaly in an attempt to regain sterile soil.

Sample T3-1 following soils: 10YR 3/4 Loam to a depth of 1ft. BSL, 10YR 4/6 Loamy Clay mottled with 10YR 4/2 Loamy Clay to 2ft. BSL, 10YR 5/6 Clay mottled with 10YR 3/2 to the termination depth of 3ft. BSL. Sample T3-2 contained 10YR 3/2 Loam to a depth of 1ft. BSL, 10YR 4/4 Loamy Clay at 2ft. BSL, and 10YR 5/6 Clay to the termination depth of 3ft. BSL. Sample T3-3 contained 10YR 4/3 Loam to a depth of .8ft. BSL, 10YR 3/6 Loamy Clay to 1ft. BSL, 10YR 4/6 Loamy Clay to a depth of 2ft. BSL, and 10YR 5/6 Clay mottled with 10YR 4/2 Clay to the depth of 3ft. BSL. Sample T3-4 contained 10YR 3/6 Loam to a depth of .75ft. BSL, 10YR 3/4 Loam to a depth of 1.1ft. BSL, 10YR 4/6 Loamy Clay to 2ft. BSL, and 10YR 5/6 Clay to 3ft. BSL. Sample T3-5 contained 10YR 3/3 Loam to a depth of 1.35ft. BSL, 10YR 4/4 Clay to 2ft. BSL, and 10YR 4/6 to the depth of 3ft. BSL. Sample T3-6 contained 10YR 3/3 Loam to a depth of .9ft. BSL with a 10YR 4/6 Loamy Clay to 2ft. BSL, and 10YR 5/6 Clay to the depth of 3ft. BSL. Sample T3-7 contained 10YR 3/3 Loam to a depth of 1ft. BSL, 10YR 4/4 Loamy Clay to 2ft. BSL, and 10YR 5/6 Clay to the depth of 3ft. BSL. Sample T3-8 contained 10YR 3/3 Loam to a depth of 1ft. BSL, 10YR 4/4 Loamy Clay to 2.ft. BSL, and 10YR 4/6 Clay to the depth of 3ft. BSL. Sample T3-9 contained 10YR 3/3 Loam to a depth of 1ft. BSL, 10YR 3/6 Loamy Clay to 2ft. BSL, and 10YR 5/6 Clay with inclusions of 10YR 7/2 Clay to the depth of 3ft. BSL. Sample T3-10 contained 10YR 3/3 Loam to a depth of 1ft. BSL, 10YR 4/3 Loamy Clay to 2ft. BSL, and 10YR 4/6 Clay to the depth of 3ft. BSL.

Hot thermal anomaly 1 (HA1) is located in the northeastern section of Block 14 Lot 8 (Figure 4). Testing began near the northern lot line; this location is outside of anomaly HA1. T1-1 through T1-4 were taken at 10 foot intervals in a southern direction. The final core sampled is located outside of the anomaly so to regain sterile soil.

Sample T1-1 following soils: 10YR 3/3 Loam Clay to a depth of .7ft. BSL, 10YR 4/6 Loamy Clay which contained 10YR 7/2 Sand inclusions to 2ft. BSL, 10YR 5/6 Clay extremely mottled with 10YR 2/1 and 10YR 7/2 Sand inclusions to the termination depth of 3ft. BSL. Sample T1-2 contained 10YR 3/3 Loam to a depth of .45ft. BSL, 10YR 4/6 Loamy Clay to 1ft. BSL, 10YR 3/3 Loamy Clay to 1.3ft. BSL, 10YR 4/6 mottled with 10YR 2/1 and 7/2 Loamy Clay to 2ft. BSL, and 10YR 5/6 Clay with wood inclusions to the termination depth of 3ft. BSL. Sample T1-3 contained 10YR 3/6 Loamy Clay to a depth of 1ft. BSL, 10YR 4/4 Clay to 2ft. BSL, and 10YR 5/6 Clay with inclusions of 10YR ½ and 7/2 Sand to the depth of 3ft. BSL. Sample T1-4 contained 10YR 3/3 Loam to a depth of .6ft. BSL, 10YR 3/3 Loam to a depth of 1ft. BSL, 10YR 4/6 Loamy Clay mottled with 10YR 3/3 Clay to 2.3ft. BSL, and 10YR 5/6 Clay to 3ft. BSL.

Hot thermal anomaly 2 (HA2) is situated in the northeastern section of Block 14 Lot 1 Figure 4). Testing began near the northern lot line; this location is outside of anomaly HA2 in an attempt to distinguish sterile soil from disturbed soil in the area. T2-1 through T2-3 were taken at 10 foot intervals in a southern direction. The final core sampled is located outside of the anomaly so to regain sterile soil.

Sample T2-1 following soils: 10YR 3/3 Loam to a depth of 1.3ft. BSL, 10YR 4/6 Loamy Clay 2ft. BSL, and 10YR 4/6 Clay mottled with 10YR 3/3 and 7/2 Clay to the termination depth of 3ft. BSL. Sample T2-2 contained 10YR 3/3 Loam to a depth of .8ft. BSL, 10YR 4/6 Loamy Clay mottled with 10YR 3/3 Clay to 1.35 ft. BSL, 10YR 5/6 Clay at 2ft. BSL, and 10YR 5/6 Clay with 10YR 7/2 Sand inclusion to the termination depth of 3ft. BSL. Sample T2-3 contained 10YR 3/3 Loam to a depth of .6ft. BSL and 10YR 5/6 Loamy Clay to the termination depth of 3ft. BSL.

After the compilation of the core samples collected it is recommended that the following areas be examined further. CA1 near the vicinity of T1-5 was less compressed than all of the other samples collected by using the AMS sampler; the other samples were compacted at a rate of 2:1. The lack of soil being compressed indicates that the area has been disturbed since the soils have a lighter compaction within this section. CA2 displayed inclusions of sedimentary soils as well as a historic artifact. HA1 and HA2 both contained mottling and inclusions within the anomalies. CA2, HA1, and HA2 should be further tested with ground-based geophysics and additional soil core sampling to determine a more specific location in which excavation units can be placed.

Report by George Calfas and Christopher Fennell
University of Illinois, Urbana-Champaign
September 8, 2009.