Chapter 13
Surveys and Comparative Findings

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Researchers at New Philadelphia use a variety of techniques to discover and assess the potential of archaeological deposits. Geophysical survey has been a key technique for identifying likely areas for intensive excavation, as have shovel test pit surveys and soil coring. These strategies have been as follows:

1. Apply electrical resistivity and magnetic gradiometry to Block 12, the first geophysical surveys of this portion of the site.
2. The agricultural terraces west of the center of the town site were tested using a larger-gauge (2 in.) AMS core sampler.
3. A portion of Block 13 was surveyed using ground penetrating radar and electrical resistivity.
4. Excavators used a one-inch diameter soil corer to test geophysical anomalies on Blocks 4 and 13. One of these areas was selected for follow-up excavation.
5. Electrical resistivity was applied to grids on Block 11. Follow-up work took the form of shovel test pits.
6. With a grant from the University of Illinois, the research team obtained a LiDAR survey of an area of 4.25 square miles that includes the town site.

Additional surveys, with an emphasis on geoarchaeology, are dealt with in Chapter 12, "Status of Geoarchaeological Investigations at New Philadelphia Historical Landmark," which focuses on these results specifically.

Geophysical surveys

Major geophysical surveys of the New Philadelphia town site took place from 2004 to 2006, with some additional data collected in 2008 (Hargrave 2006). In 2010, Carl Carlson-Drexler from the U.S. Army Engineer Research and Development Center, Construction Engineering Research Laboratory, Champaign, came to do additional data collection and provide instruction for the students participating in the NSF-REU program. All of the information reported here refers to personal communication with Carlson-Drexler (2010).

Carlson-Drexler supervised the use of electrical resistivity in four 20 x 20 m. data collection grids and conducted a magnetic gradiometry survey of three 20 x 20 m. grids. Ground penetrating radar was used on two 20 x 20 m. grids.

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Electrical resistivity

Electrical resistivity works by passing an electrical current through the soil and measuring the resistance offered by the soil to that current (Figure 13.1). Differences in resistivity readings may indicate distinct soil conditions such as buried archaeological features.

Extremely wet soil conditions on Block 11 and a wiring fault in the resistivity meter made interpreting the data collected a challenge. Nevertheless, preliminary analysis of the readings suggested an area of high resistance in the northern portion of the Block 11 survey grids. Recommendations for follow-up included the application of ground penetrating radar to the same grids, and possibly re-sampling the grids with the resistivity meter. Results for Block 13 likewise pointed toward an area of higher resistivity in the northern portion of those two grids.

Figure 13.1. *NSF-REU students Margaret Wolf (center) and Tyquin Washington (right) assist Carl Carlson-Drexler with the resistivity survey (Photograph by Anna Agbe-Davies).*

Magnetic gradiometry

Magnetic gradiometry captures changes in the magnetic field across the site, and can indicate the presence of such cultural evidence as iron and burned soil. During the 2010 field season, magnetic gradiometry of the three grids that overlap with the northern portion of Block 12 picked up traces of the eastward continuation of Main Street (now a dirt track).

This technique also revealed several large dipoles, or readings with both a high and a low signature—typical of small iron artifacts—in the eastern grid. Two "significant" dipoles appeared in the northernmost of the grids (Carlson-Drexler, personal communication 2010) indicating a probable anomaly on Block 9. No anomalies appeared in the areas of interest (Lots 4 and 3) as determined by prior shovel test pit surveys (Fennell 2006).

Ground penetrating radar

Ground penetrating radar works by sending pulses of electromagnetic energy into the ground and measuring the varying rates at which the waves are reflected back to the surface. The ground penetrating radar data collected from Block 13 was heavily impacted by the plow furrows still apparent on the ground surface. This is true even for data collected at 1.5 meters below the surface. Recommendations for future use include running the machine parallel to the furrows, as opposed to across them, and testing the method elsewhere at the site (Carlson-Drexler, pers. comm. 2010). The 2010 season marked the first use of ground penetrating radar on the town site. As a result of these, and earlier geophysical findings, excavators collected core samples across several anomalies on Block 13 leading to full-scale excavation as described in detail in Chapter 8.

Core Sampling of Terraces West of Broad Way

Archaeologists investigating the New Philadelphia town site primarily utilized one-inch diameter soil core sampling tools for the initial systematic testing of anomalies identified through geophysical surveys. Those smaller-scale core sampling tools typically obtain core samples of three feet in depth below the ground surface. Starting in the 2008 field season, we also began utilizing a two-inch diameter soil core sampler that can obtain core samples of up to six feet in depth below the ground surface. Figure 13.2 depicts this type of heavier-gauge soil core sampling device, which is driven into the ground with a thirty-pound slide hammer assembly on the upper portion of the device, and which is withdrawn from the ground with a custom lever jack assembly.

Figure 13.2. *Example of a slide hammer driven, two-inch diameter core sampling device.*

This core sampling device, which is referred to as an "AMS core sampler," is part of our ongoing program to conduct systematic testing of anomalies identified through remote sensing methods employed at the town site. Such core sample surveys can be used to test the anomalies identified both in ongoing ground-based geophysical surveys, and the anomalies identified in the low-altitude thermal imaging survey conducted in May, 2008 (see, e.g., 2009 update report).

During the 2008 archaeological field school at New Philadelphia, we utilized the AMS core sampler to test a series of earthen terraces on the west side of the New Philadelphia town site. These terraces were constructed in the early 1990s by private landowners of portions of the town site as part of a federal program that promoted the creation of such ridges to control soil erosion on the landscape. One can readily observe the contours of these terraces by comparing a 1939 aerial photograph of the town site (Figure 13.3) with one taken in 1998 (Figure 13.4).

Figure 13.3. *1939 aerial photograph of New Philadelphia town site (Photograph from U.S.D.A. Aerial Photographs Collection).*

Figure 13.4. *A 1998 high-altitude aerial photograph of the New Philadelphia town site, with town boundaries outlined and three earthen terraces labeled (U.S. Geological Survey, Aerial Photographs Collection).*

The west side of the town site in the 1939 aerial photograph consisted of relatively even topography (Figure 13.3). That part of the landscape was modified in the early 1990s to create a series of curving terraces and a new catchment pond, as shown in the 1998 photograph (Figure 13.4). A systematic walk-over survey of the town site conducted in late 2002 and early 2003 recovered relatively few artifacts from the surface area of those terraces, in contrast to a high frequency of artifacts located on the surface of the north central part of the town site (Gwaltney 2004). We are still in the process of exploring the area of these terraces with ground-based geophysical surveys, and we have questioned whether this area of the town site was dramatically disturbed by the creation of those terraces.

During the 2008 field school, we undertook AMS soil core sample surveys along the ridges of the terraces labeled as 1, 2, and 3 in Figure 13.4. One general scenario for the method in which such terraces are created involves a bulldozer digging into the ground surface on either side of a terrace ridge and pushing soil and sediment layers up into that ridge in a way the significantly disturbs both the surrounding depressions, called swales, and the resulting ridges. If such a method was employed, one expects a soil core sample in a swale to show the absence of a thick top soil layer (which would have been scraped away onto the neighboring ridge) and one expects to find a soil core sample of the ridge top that exhibits significant mixing and disturbance of soil layers that were carved out of swales and pushed up to create that higher contour point.

Figure 13.5. *Paul Shackel and Chris Fennell obtain AMS soil core samples on terrace 1 in the New Philadelphia town site (Photograph by J. Eric Deetz).*

We placed several soil core sample points at approximately every 100 ft. from the north edge of the town site running southerly down the extent of terraces 1 and 2 and on part of terrace 3. The AMS soil core sampling device obtained sample profiles that went four-feet in depth and were two-inches in diameter. Core samples were later recorded in profile regarding soil and sediment colors, textures, and types, and any inclusions of cultural materials. We also took adjacent samples from points in the swale immediately east of terrace 1 (Figures 13.4 and 13.5). These soil core samples indicate that the strata underlying terrace 1 remain undisturbed, whereas the strata on the ridges of terraces 2 and 3 appear to be significantly disturbed from the creation of the terraces. Similarly, the swale immediately east of terrace 1 appears to lack the typical upper stratum of top soil found on other parts of the town site. It appears that terrace 1 was created by digging out adjacent swales without bulldozing soils and sediments in a jumble onto the ridge-top. Based on these results, we may target portions of terrace 1 for further archaeological investigation in future field seasons.

Coring Anomalies

Archaeologists selected several anomalies that had been identified by geophysics surveys conducted 2004-2008 for further testing. These anomalies were tested with transects across them at one-foot intervals using a one-inch diameter probe (Figure 13.6). The areas tested include:

Anomaly A57 on Block 4, Lot 8; Anomaly A58, on Block 4, Lot 7; and Anomaly A21, on Block 13, Lot 3.

Figure 13.6. *Members of Team X assess the sediments recovered when using an Oakfield probe to survey Block 8 (Photograph by Anna Agbe-Davies).*

Anomaly A57

Located on Block 4, Lot 8, Anomaly A57 is a resistivity anomaly that was identified by Michael Hargrave during a geophysical survey conducted in 2008. Excavators investigated this anomaly using a one-inch diameter Oakfield probe, testing the soil at one-foot intervals in one 50 ft. transect running north-south through the anomaly (Figure 13.7).

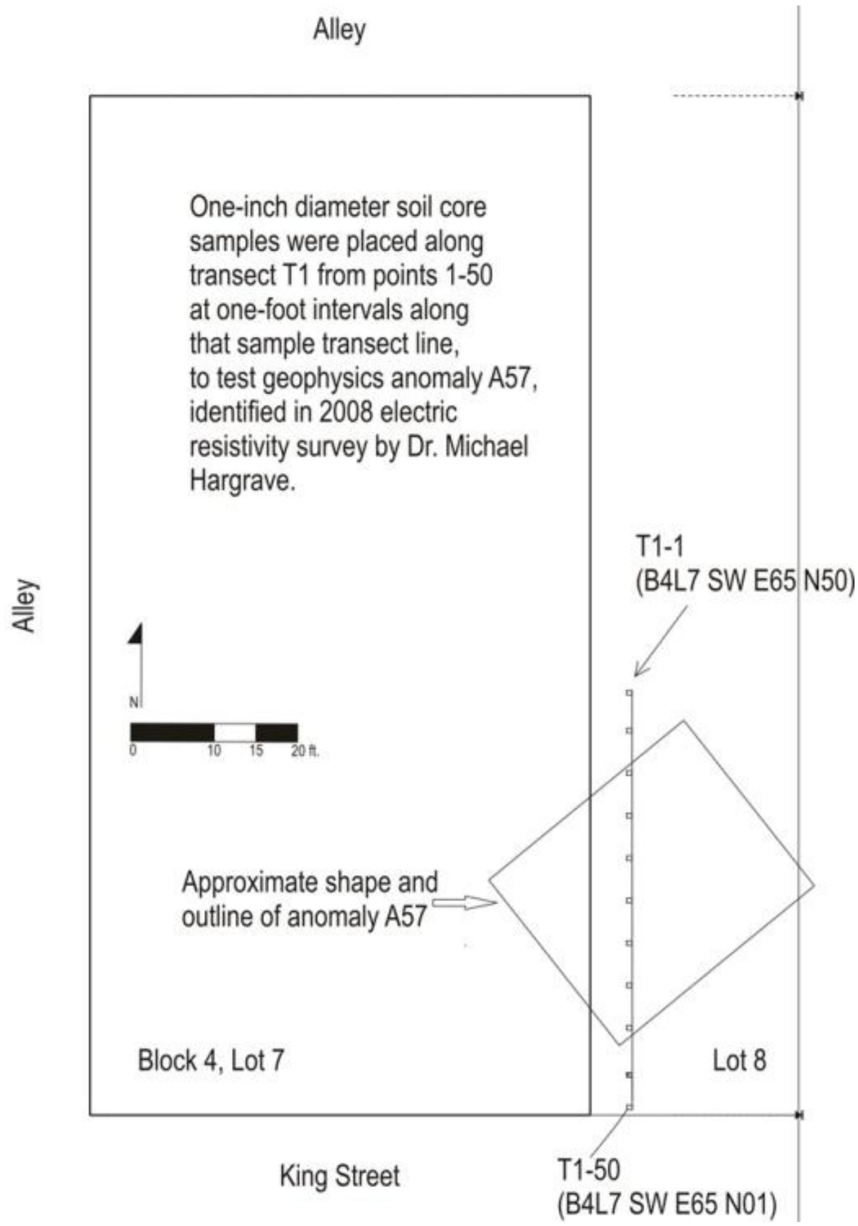

Figure 13.7. *Anomaly 57 was tested with a single line of 50 one-inch probes (Illustration by Christopher Fennell).*

Below the sod, the plow zone was predominantly a 10YR 3/2 (very dark grayish brown) loam. In the majority of probes, excavators identified the transition to subsoil between 0.5 ft. and 1.5 ft. below surface level (bsl). The average depth of the transition was 1.19 ft. bsl. Subsoil was more variable in color, but tended to be recorded as 10YR 6/6 (brownish yellow) to 10YR 5/4 (yellowish brown) clay loams or loamy clays (precise details about each core can be found in Chapter 8 of the 2010 report, "Unit/Feature Summaries").

A notable exception to the above pattern was found at the approximate center of the survey area. Probes 21, 22, and 23 all indicate darker loams and sandy loams at much greater depths than the rest of the transect. Each of the probes sampled a depth greater than 2.5 ft. and none of them recovered the yellowish clayey soils typical of sterile subsoil at the town site. Instead, excavators reported darker brown sediments, sometimes intermixed with the more yellow clays. The grid coordinates are:

- Probe 21: B4L7 SW E65 N30
- Probe 22: B4L7 SW E65 N29
- Probe 23: B4L7 SW E65 N28

The average depth of the transition to subsoil excluding these anomalous probes is 1.09 ft. bsl.

Future testing should focus on this portion of Block 4, Lot 7, to determine if the unusual soil profiles in Probes 21-23 indicate a cultural, rather than natural, feature and to ascertain the relationship between that disturbance and the anomaly detected by resistivity in 2008.

Anomaly A58

Anomaly A58 is a resistivity anomaly that was identified by Hargrave in a geophysical survey conducted in 2008. Excavators placed a single transect north to south through the center of the anomaly using a one-inch diameter Oakfield probe. The transect line is 30 ft. east of the western edge of Block 4, Lot 7. It runs from a point 65 ft. north of the southwest corner of the lot, to a point 47 ft. north of the corner (Figure 13.8).

The cores in this location indicated a much thinner plow zone than the survey area further to the west around Anomaly A57. The plow zone may be characterized as a 10YR 3/2 to 10YR 4/2 (very dark to dark grayish brown) silt loam. The subsoil is a 10YR 4/6 to 10YR 5/6 (dark to yellowish brown) clay loam. The average depth of the transition between plow zone and subsoil is 0.69 ft. bsl. However, notable exceptions occurred in Probes 1, 2, 10, and 17, with depths in excess of one ft. Excluding these probes, the average depth was more like 0.51 ft. bsl.

In addition to revealing darker soils at unusual depths, Probes 1 and 2 both show interspersed dark grayish brown loams and yellowish brown clays. This disruption of the natural stratigraphic progression in this portion of the site may merit further investigation. Undisturbed subsoil does not appear until 2.11 ft. bsl in Probe 1.

Another important distinction to note is the unusually loose sediments in Probes 14, 16, and 17. Field notes also indicate that the darker sediments continue to a noticeably greater depth in Probes 16 (0.67 ft.) and 17 (1.15 ft.). Excavators tested to either side (east and west) of Probes 14 and 16 and found similarly lightly-packed sediments. All of these indicators suggest that additional excavation to explore Anomaly A58 should focus on the following areas:

- Probe 14: B4L7 SW E30 N52
- Probe 16: B4L7 SW E30 N50
- Probe 17: B4L7 SW E30 N49

As well as possibly exploring:

- Probe 1: B4L7 SW E30 N65

- Probe 2: B4L7 SW E30 N64

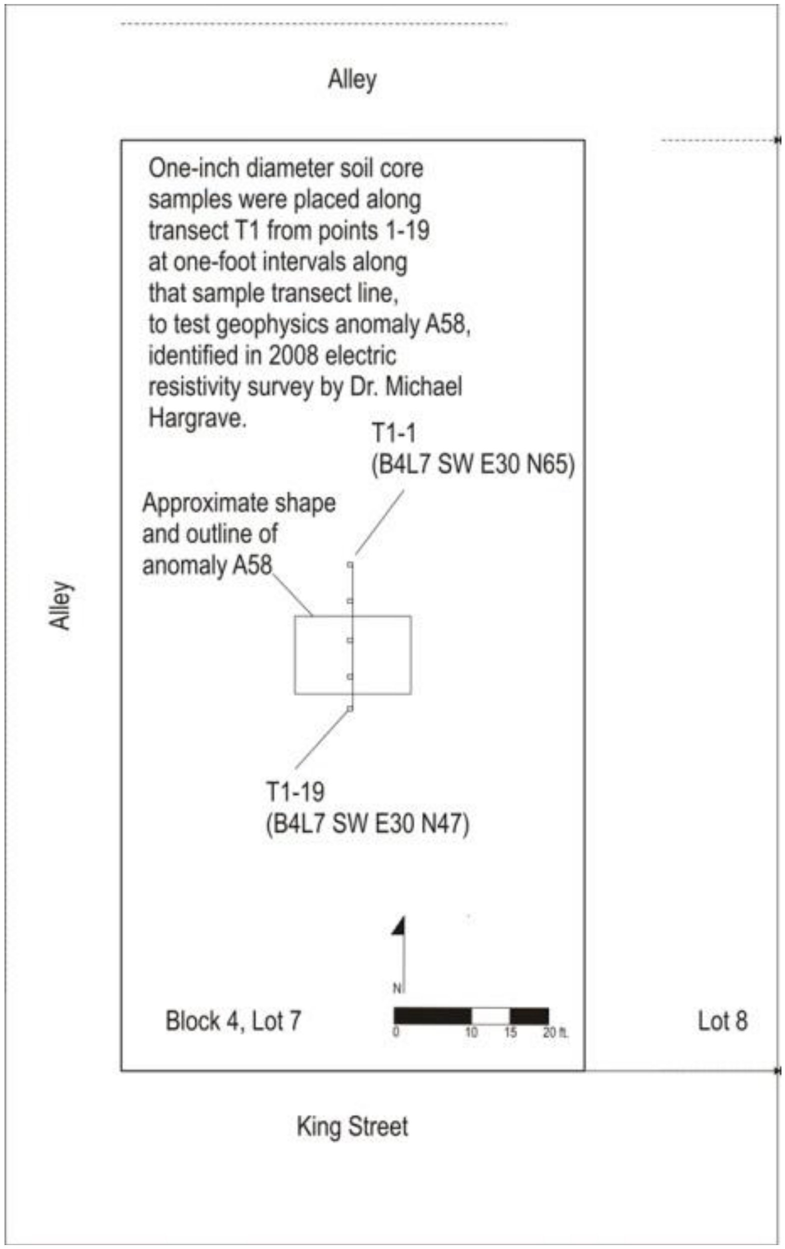

Figure 13.8. *Anomaly 58 was tested with a single line of 19 one-inch probes (Illustration by Christopher Fennell).*

Both A57 and A58 were considered low probability anomalies, because they were identified only with resistivity, and had no accompanying magnetic signature (Hargrave, pers. comm. 2008). However, both seem to be identifiable archaeologically. The question remains whether the anomalies are cultural, and whether they date to a period of interest.

Anomaly A21

Geophysicist Michael Hargrave identified Anomaly A21 on Block 13, Lot 3, during a resistivity survey conducted in 2004. In his report, he characterizes it as a "trench-like high resistance

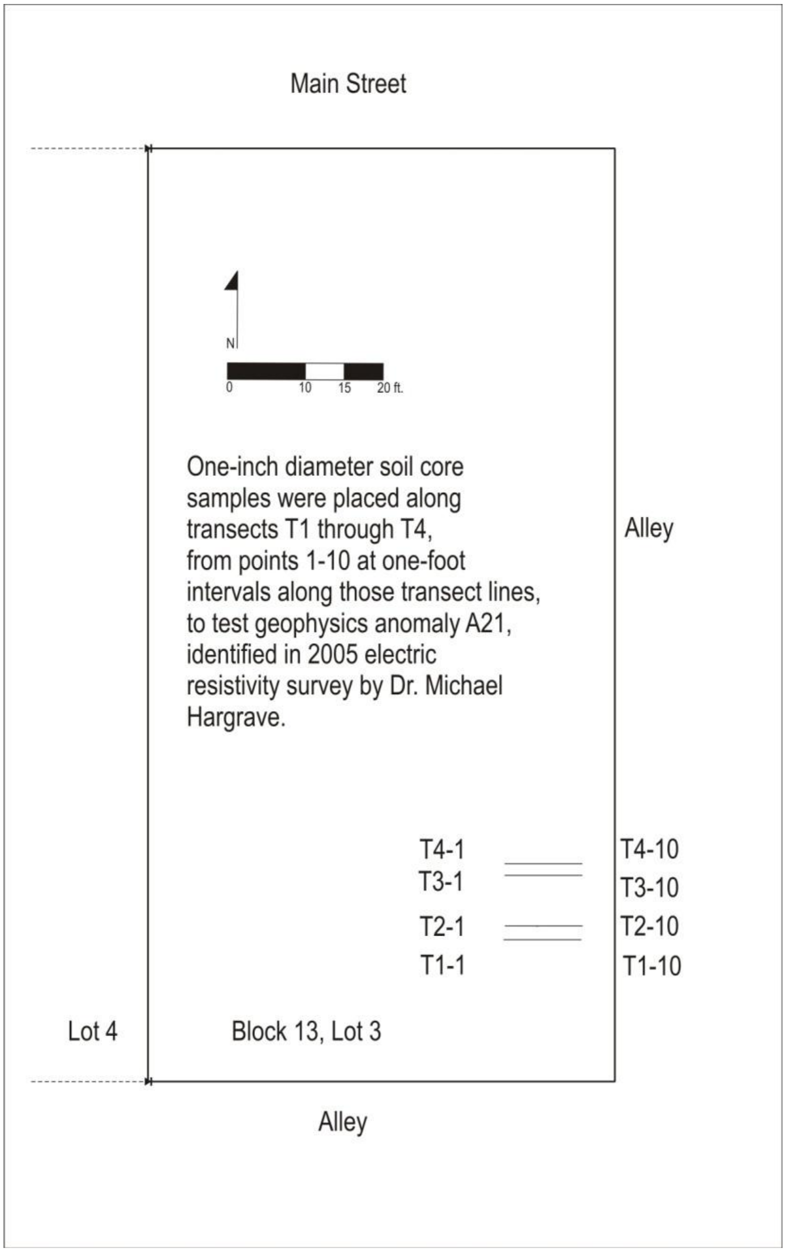

Figure 13.9. *Anomaly 21 was tested with four lines of 10 1-inch probes (Illustration by Christopher Fennell).*

anomaly" with a north south orientation that would be consistent with a structure (Hargrave 2006). In 2010, a team of excavators ran four transects across the anomaly, with 10 probes in each transect, for a total of 40 probes. Each of the transects ran east to west from a point 47 ft. east of the western edge of Block 13, Lot 3, to a point 56 ft. east of the edge of the lot (Figure 13.9). Transect T-1 is 19 ft. north of the southern boundary of the lot; T-2 is 20 ft. north; T-3 is 26 ft. north; and T-4 is 27 ft. north.

Plow zone in this portion of the town site may be characterized as a 7.5 YR 3/2 (dark brown) clay loam. Transition to subsoil is typically 1.6 ft. bsl. The subsoil ranges from a 7.5YR 3/3 to a 7.5YR 4/4 (dark brown to brown) clay.

The most promising probes for pinpointing the likely source of Anomaly A21 are:

- Probe T1-6: B13L3 SW N19 E52
- Probe T1-7: B13L3 SW N19 E53

Probe T1-6 was blocked by a solid obstruction at 0.9 ft. bsl, while T1-7 contained darker brown loamy soils to a depth of 2 ft. bsl. Further excavation attempting to establish the nature of Anomaly A21 should focus on this area.

Anomaly A25

Excavators also initiated a probe survey in the vicinity of Anomaly A25. This effort was successful in identifying the source of the anomaly and was excavated during the 2010 season. Results are reported in Chapter 8 of the 2010 report.

Shovel test pit surveys

Block 11, Lot 1

Following the geophysical survey described at the outset of this chapter, a select area of Block 11 was investigated using shovel test pits (STPs). These STPs were excavated by volunteers from the Illinois Natural Resources Conservation Service, led by NRCS archaeologist Sharron Santure.

Eight STPs were placed in the northeast corner of Block 11, Lot 1. Two transects ran north-south 15 ft. apart, with STPs at 10 ft. intervals (Figure 13.10).

Each STP was one ft. in diameter. Excavators removed the sediment in arbitrary levels of 0.5 ft. each, while still noting color and texture distinctions as visible in the side walls of the STPs. Sediments were excavated with shovels and hand trowels and screened through quarter-inch hardware mesh to recover cultural material. The summaries for these STPs may be found in Chapter 8 of the 2010 report, "Unit/Feature Summaries."

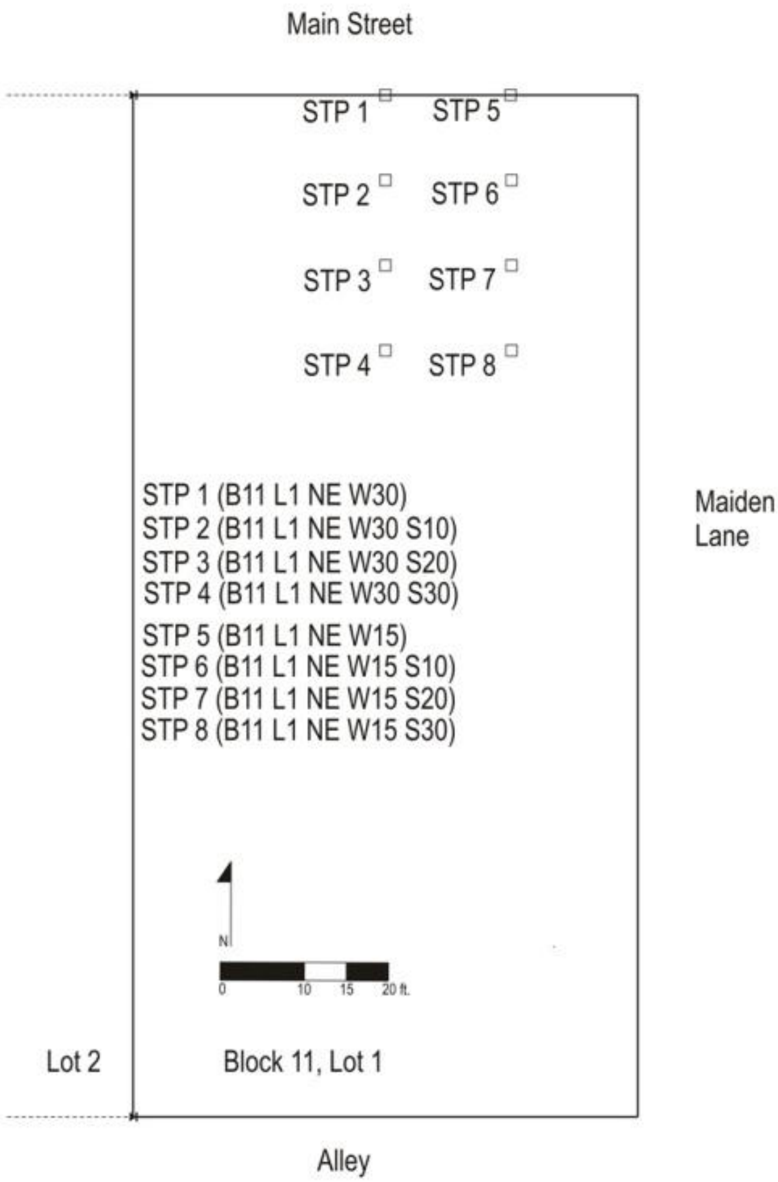

Figure 13.10. *Excavators placed eight shovel test pits on Block 11, Lot 1 (Illustration by Christopher Fennell).*

Immediately below the sod, excavators encountered a 10 YR 3/2 (very dark grayish brown) silty loam that ranged in depth from 0.5 to 1.0 ft. below the surface. In most of the STPs, the transition to subsoil was approximately 0.8 ft. below the surface. The subsoil was described as a 10 YR 4/3 (brown) silty clay loam.

All of the STPs except STP 1 contained cultural material. Pits at the southern end of the survey area tended to have more artifacts. Furthermore, artifacts were identified at greater depths (between 0.5 and 1.0 ft.) in this area. The artifacts include datable items such as transfer printed white ware (STPs 3 and 5) and nails, both machine-cut (STPs 7 and 8) and wire (STP 4). These finds are consistent with an occupation from the middle of the nineteenth century. Artifacts associated with building construction (mortar, nails) are more broadly scattered across the study area (STPs 2, 3, 4, 7, and 8), while household artifacts cluster in the southern portion of the study area (STPs 3, 4, 5, and 8).

These preliminary results suggest that further shovel testing on Block 11, Lot 1 may be productive and could help pinpoint the location of archaeological features related to the lot's nineteenth-century owners and occupants.

Block 11, Lot 1 History

Block 11, Lot 1 was only a part of the town of New Philadelphia for a short while, but had a variety of owners in the years between its initial sale by Frank McWorter and his wife (1842), and its eventual removal from the town proper (1885). Several of these individuals are fairly well documented, both in town records, and in other histories of the region.

Frank McWorter sold Lot 1, along with the adjoining Lot 2, to William Bennett in 1842. Bennett in turn sold the two lots to an "Ebinezer" Franklin in 1844. The 1845 Tax Assessor's Book for Pike County valued the lots at $10.00 each, which is more than unimproved lots ($1.00-$2.00), but nevertheless not as high as the other improved lots in town ($25.00). Neither Bennett[2] nor Franklin appeared in the census records for Hadley Township. *The History of Pike County, Illinois* credits Ebenezer Franklin as the "first settler" of Pike County (Charles Chapman and Co. 2006 [1880]). Recent estimates put New Philadelphia's population at that point to be approximately 18 people (Martin 2010), so it is unsurprising that neither Bennett nor Franklin appeared to be in residence on the lot at that time.

Franklin and his wife conveyed Lot 2 to Elijah Thomas in a year that remains unrecorded, but clearly sometime after 1844. By 1849, Thomas and his wife had sold both Lots 1 and 2 to Erastus Clark. The surname Clark is one of long standing in New Philadelphia, though they do not appear to be related to the Erastus Clarks ("white" New Yorkers), who lived and farmed in a different part of the township. Most of the New Philadelphia Clarks are identified as "black" or "mulatto" and are descended from migrants from Kentucky (Martin 2010a).

In February of 1851, the lots were sold by Erastus Clark and his wife to James E. Wilson, who in August of that same year sold them to Peleg Hadsell. The Hadsell family was also central to the development of New Philadelphia. In the 1850 census, we find the household of Adam Hadsell. The 1860 census listed Peleg Hadsell as head of a household in the township, though probably not in New Philadelphia proper.

At some point between 1851 and 1853, the lots passed from Hadsell to Spaulding Burdick, as he was assessed for them in 1853 and 1854, by the Pike County Tax Collector. The lots appear to have retained minor improvements, as they were each valued at $20.00, in a year when unimproved lots were valued between $2.00 and $5.00. The Burdicks were yet another key New Philadelphia family. "Spalder Berdick" (Spaulding Burdick) and his wife Ann (63 and 55,

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[2] Though in the 1860 federal census, a Bennett household, headed by 42-year-old Francis does appear.

respectively) lived in the town in 1850, along with two minor children, John (14) and Benjamin (9). The elder Burdicks had been born in Rhode Island and Massachusetts, while the boys were born in New York. The only occupation listed was for Spaulding, who was a shoemaker. The entire family was classified as "white." The value of their real estate holdings was $150.00.

That household was reduced to two members by the time of the Illinois census of 1855. The value of their livestock was $35.00. Spaulding and Ann Burdick sold Lots 1 and 2 to Josephus Turpin in 1855, in time for him to be assessed for them by the Pike County Tax Collector in that year. Lot 1 is valued at $8.00, which was typical for unimproved lots.

The Illinois census of 1855 also included the Turpin household, with three members, and livestock valued at $15.00. It was one of four "black" households in town. Marriage records indicate that Josephus Turpin had married a woman named Eliza Brown in 1848. It is likely that the other two members of the household were Eliza, and perhaps their child. Their family does not appear in any U.S. Census from 1850 to 1900 (Martin 2010b), but Turpin's military records allow us to estimate that he was around 36 at the time he purchased the lots on Block 11. Turpin was assessed in 1856 and 1857 at rates that suggests the lots were unimproved. By 1859, Turpin was no longer the owner.

Something is known of Turpin's life after he left New Philadelphia. He enlisted with Company A of the 29th U.S. Colored Infantry (Connecticut) and was mustered in April of 1864. He gave his place of residence as Quincy, Illinois, a city about 35 miles northwest of New Philadelphia. He gave his civilian occupation as an engineer, and rose to the rank of sergeant by 1865. His service ended when he failed to return to duty following a furlough, shortly after the end of the Civil War. This act was classified as a desertion, and rendered him ineligible for a pension (Miller 1998:19, 150-151). He died in 1891, and was buried in Muscatine, Iowa.

In 1859, Block 11, Lot 1 was assessed to J. Kellum, who likely lived elsewhere in town. He appeared in the 1855 Illinois census as the "white" head of a household of three, with livestock worth $320.00. He was not in the 1860 U.S. Census.

The Pike County Tax Collector's Book for 1862 lists Solomon McWorter as the man responsible for the assessments for all of the lots on Block 11. However, the notations for Lots 3-8 indicate that he was acting in his capacity as administrator for his father's estate, whereas he appears to have owned Lots 1 and 2 outright. In 1863, Lot 1 was assessed to "Lewis" McWorter.[3] But in 1864, the lots were again attributed to Solomon McWorter. In all of these cases, the lots appear by their value to be unimproved, as was true of the 1867, 1868, and 1869 Hadley Township Tax Assessor's Book. Solomon McWorter was never in residence on this lot.

Ownership of Block 11, Lot 1 is murky for the years 1868 to 1870. As early as 1868, R. M. Atkinson, a lawyer residing in Pittsfield, was associated with the lot, having been granted Lots 1 and 2 by the Sheriff in December of that year. Nevertheless, it appears that Solomon McWorter paid the taxes in 1869. McWorter was identified as the official owner in the Pike County Tax Collector's Book for 1870, but Atkinson paid the taxes in that year. It may be that Atkinson was acting as an agent for McWorter, or that he temporarily held the title pending payment of taxes

[3] Perhaps this is an error that should read "Louisa" McWorter.

by McWorter. Another confounding entry in the deed index shows McWorter acquiring the lots from Peleg Hadsell in 1870. Throughout this period, the lots appear to be unimproved.

By 1875, Solomon McWorter was again in control of all of Block 11, according to the Hadley Township Tax Assessor's Book. The value of Lots 1 and 2, combined, $20.00, suggests that they remained unimproved. The 1878 Book values the two lots at a combined $10.00, again suggesting that they were unimproved. The 1880 Pike County Tax Collector's Book assessed "S. McWater" for Block 11 in its entirety, though McWorter had died the previous year, and it was really his estate that owed the tax.

The Hadley Township Tax Assessor's Book for 1883 assessed Ansel Vond for all of Block 11. Vond was the husband of Solomon's sister Lucy Ann, and it is likely that she was in fact the true owner of the lots (Martin 2010b). In the 1870 census, he appeared as "Anson" Vond, and was not a town resident. They and all of their children were classified as "white." In the 1880 census, Ansel "Vaun" was listed as a 51 year old farmer, Lucy (55) was keeping house. Their children included 19-year-old daughter Lucy, son George E. (17), and daughter Francis N. (12). All of the family members were classified as "mulatto." George had attended school that year, and described as a laborer. Lucy and Francis were "at home." The elder Lucy had been born in Kentucky, after the emancipation of her mother. Ansel was born in New York, as was his son. The girls were born in Illinois. They lived in the township, but not in New Philadelphia, and certainly not on Lot 1 of Block 11.

In 1885 all of Block 11 was vacated on the tax rolls, effectively removing it from the town of New Philadelphia. This process also applied to Blocks 1, 10, and 20, as well as the eastern halves of blocks 2, 9, 12, and 19.

In summary, Lot 1 of Block 11 was at the edge of town in New Philadelphia. It passed through the hands of some of the key families in the town's development and growth. It appears to have had improvements of some kind during its early years in the town, but from about 1862 onward, was unimproved land that was by 1885 excluded from the town proper.

Table 13.1. Deed index for Block 11, Lot 1

DATE of transaction	DATE recorded	SELLER LAST	FIRST	PURCHASER LAST	FIRST
1842	1845	McWorter	Frank	Bennett	William
1844	1845	Bennett	William	Franklin	Ebinezer
1849	1851	Thomas	Elijah	Clark	Erastus
1851	1851	Clark	Erastus	Wilson	James
1851	1851	Wilson	James	Hadsell	Peleg
1855	1855	Burdick	Spaulding	Turpin	Josephus
1870	1870	Hadsell	Peleg	McWorter	Solomon
1868	1868	Sheriff		Atkinson	Richard

Table 13.2. Tax records for Block 11, Lot 1

Agency	Year	Name Assessed	Owner	Lot(s)	Unimproved	Improved	Value of Lot 1
Pike Co. Tax Collector	1845	-	-	1, 2	-	$20.00	$10.00
Pike Co. Tax Collector	1853	Spaulding Burdick	-	1, 2	-	$40.00	$20.00
Pike Co. Tax Collector	1854	Spaulding Burdick	-	1, 2	-	$40.00	$20.00
Pike Co. Tax Collector	1855	Josephus Turpin	-	1	-	$8.00	$8.00
Pike Co. Tax Collector	1856	Josephus Turpin	-	1	-	$8.00	$8.00
Pike Co. Tax Collector	1857	Josephus Turpin	-	1, 2	$10.00	-	$5.00
Pike Co. Tax Collector	1859	J. Kellum	-	1, 2	$8.00	-	$4.00
Pike Co. Tax Collector	1861	Solomon McWorter, Administrator	-	1, 2	$6.00	-	$3.00
Pike Co. Tax Collector	1862	Solomon McWorter	-	1, 2	$6.00	-	$3.00
Pike Co. Tax Collector	1863	Lewis McWorter	-	1, 2	$6.00	-	$3.00
Pike Co. Tax Collector	1864	Solomon McWorter	-	1, 2 + Block 10	$34.00		$3.40
Hadley Twp. Tax Assessor	1867	[Solomon McWorter?]	-	1, 2	$4.00		$2.00
Hadley Twp. Tax Assessor	1868	[Solomon McWorter?]	-	1, 2	$10.00		$5.00
Hadley Twp. Tax Assessor	1869	[S. McWorter?]	-	1, 2	$10.00		$5.00
Pike Co. Tax Collector	1870	R.M. Atkinson	Solomon McWorter	1, 2	$3.00		$1.50
Hadley Twp. Tax Assessor	1870	R.M. Atkinson	-	1, 2	$5.00		$2.50
Pike Co. Tax Collector	1872	R.M. Atkinson	-	1, 2	$5.00		$2.50
Hadley Twp. Tax	1872	R.M. Atkinson	-	1, 2	$5.00		$2.50

Assessor							
Hadley Twp. Tax Assessor	1875	Solomon McWorter	-	1, 2	$20.00		$10.00
Hadley Twp. Tax Assessor	1878	S. McWorter	-	1, 2	$10.00		$5.00
Pike Co. Tax Collector	1880	S. McWater	-	Block 11	$40.00		$5.00
Hadley Twp. Tax Assessor	1883	Ansel Vond	-	Block 11	$75.00		$9.38

Tables 13.3-13.7. Census data for owners of Block 11, Lot 1, 1850-1880.

1850 United States

Name	First	Age	Sex	Color	Occupation	Real Estate	Place of Birth	School
Berdick	Spaulder	63	M	W	shoemaker	150	RI	
Berdick	Ann	55	F	W		0	MA	
Berdick	John	14	M	W		0	NY	yes
Berdick	Benjamin	9	M	W		0	NY	yes

1855 Illinois

Name	First	Color	Number in House	Value of Livestock
Burdick	Spaulding	W	2	55
Turpin	Josephus	N/M	3	15

1860 United States

Name	First	Age	Sex	Color	Occupation	Real Estate	Personal Property	Place of Birth	School
Hadsell	Peleg	38	M	W	farmer	600	250	NY	
Hadsell	Margaret	38	F	W	housework	0	0	NY	
Hadsell	Almon	15	M	W		0	0	NY	yes
Hadsell	Alberto	13	M	W		0	0	IL	yes

1870 United States

Name	First	Age	Sex	Color	Occupation	Real Estate Value	Personal Property Value	Place of Birth	School
Hadsell	Peleg*	52	M	W	farmer	1000	150	NY	
Hadsell	Margaret	48	F	W	keeps house	0	0	NY	
Hadsell	Almond	25	M	W	farm hand	0	0	IL	
Hadsell	Nathan	23	M	W	farm hand	0	0	NY	
Vond	Anson	40	M	W	farmer	4000	600	NY	
Vond	Lucy	44	F	W	keeping house	0	0	IL [sic]	
Vond	Mary	11	F	W		0	0	IL	yes
Vond	Lucy	9	F	W		0	0	IL	yes
Vond	George	7	M	W		0	0	NY	yes
Vond	Lucretia	5	F	W		0	0	IL	yes
Vond	Francis	3	M	W		0	0	IL	

* There is an error in the 1870 census, wherein Peleg Hadsell and P.G. Hadsell's households are confused. The family members presented in this table were listed under P.G.'s Hadsell's name.

1880 United States

Name	First	Color	Sex	Age	Relation	Marital	Occupation	Origin	School
Vaun	Ansel	M	M	51	-	M	farmer	NY	
Vaun	Lucy	M	F	55	wife	M	keeping house	KY	
Vaun	Lucy	M	F	19	daughter	M	at home	IL	
Vaun	George E.	M	M	17	son	M	laborer	NY	yes
Vaun	Francis N.	M	F	12	daughter	M	at home	IL	

LiDAR Survey and Analysis in 2010-2011

A surveyor's plat and town plan filed in 1836 set out an intended grid of blocks, lots, alleys, and streets for New Philadelphia. Geophysical, aerial infra-red, and archaeological investigations to date have located fragments of the town's remains now buried beneath agricultural fields and prairie. In May 2010, Christopher Fennell received an award of grant support from the University of Illinois to conduct a low-altitude aerial survey using Light Detection and Ranging (LiDAR) technology. This LiDAR survey will be employed to obtain new data on the actual spatial extent and contours of New Philadelphia's lots, streets, activity areas, and occupation sites.

The New Philadelphia archaeology project presents an exceptional research opportunity to compare and contrast disparate survey methodologies, data sets, and analytic frameworks. This new LiDAR data set will be combined and analyzed comparatively with the data from a low-altitude aerial survey conducted in 2008 that utilized high-resolution infra-red sensors with grant support from the National Center for Preservation Technology and Training. Ground-based geophysical surveys, including methods using electric resistivity and magnetic gradient sensors, have also been conducted at the site with long-term support from the National Science Foundation. Professor Art Bettis and doctoral student Mary Kathryn Rocheford of the University of Iowa are using geoscience methods to analyze changes in the New Philadelphia landscape over time (see Chapter 12). These comparisons will both advance the research goals of this multi-year project and produce new methodological insights for the benefit of archaeological and geoscience techniques and investigations nation-wide.

Low altitude aerial surveys with high-resolution LiDAR imaging have been used successfully at prehistoric and historic-period sites in the United States (Harmon, et al. 2006; Petzold, et al. 1999; Riley 2009). At New Philadelphia, the project applied the technique to detect the grid pattern of the historic period town site buried beneath one-two feet of agricultural fields and prairie grass. The LiDAR survey will produce a micro-topographic analysis of the likely locations of past roadbeds, pathways, structural remains, and activity zone impacts embedded within and shaping the current landscape surface.

The 42-acre New Philadelphia town site presents a unique opportunity to test the full applicability of this surveying technique. The intended spatial extent of blocks, lots, and streets reflected on a town plan filed with an Illinois court in 1836 can be mapped onto the existing landscape. To date, it is not known whether the planned extent and configuration of streets and blocks were actually built on the ground in the way they were depicted on the town plan.

Aerial LiDAR Survey Methods

LiDAR technology transmits a stream of high-resolution laser light to the ground surface and records the differential time with which each pulse is reflected back to a receiving device (Figure 13.11). This high-resolution survey method records a three-dimensional elevation map of the "micro-topography" of the ground surface, accurate to mere centimeters of spatial resolution. Importantly, the stream of laser pulses penetrate beneath any vegetation coverage to measure the underlying undulations of the ground surface itself, producing a high-resolution, micro-topographic map of features impacting the ground surface contours.

LiDAR surveys have been used successfully on other sites to detect historic-period roads, pathways, and site contours not readily visible on the surface. LiDAR surveys can also detect the surface manifestations of buried archaeological remains of structures and activity areas that were otherwise obscured from visibility by vegetation cover, giving a "bare earth" view of the site (Ackermann 1999; Harmon, et al. 2006; Petzold, et al. 1999).

Employment of such LiDAR surveys from low-altitude aerial platforms is particularly valuable when the resulting data are incorporated into a Geographic Information Systems (GIS) database and compared and contrasted with other types of archaeological and remote sensing data (Ackermann 1999; Harmon, et al. 2006). At New Philadelphia, the LiDAR data will be incorporated into a GIS database and evaluated in comparison with visible-spectrum aerial photographs, high-resolution infra-red images of the 42-acre town site, and geophysical surveys of over seven acres within the town.

Limited portions of the New Philadelphia town site have been investigated using electrical resistance and magnetic field gradiometry technologies (see Hargrave 2006). These geophysical techniques have detected archaeological features and the subsurface remains of part of a secondary street on the northern edge of the town site that matches the location reflected on the intended town plan. Yet, it is impractical to survey all 42 acres of the town site using ground-based technologies. A low-altitude aerial survey can be conducted efficiently and cost-effectively, and offers exceptionally valuable data results. The results of an aerial LiDAR survey can be matched against data from those portions surveyed previously and against the 1836 spatial plan for the town. In this way, researchers will be able to determine if the actual history of construction and settlement in the town matched the vision set forth in the founder's 1836 prospective town plan.

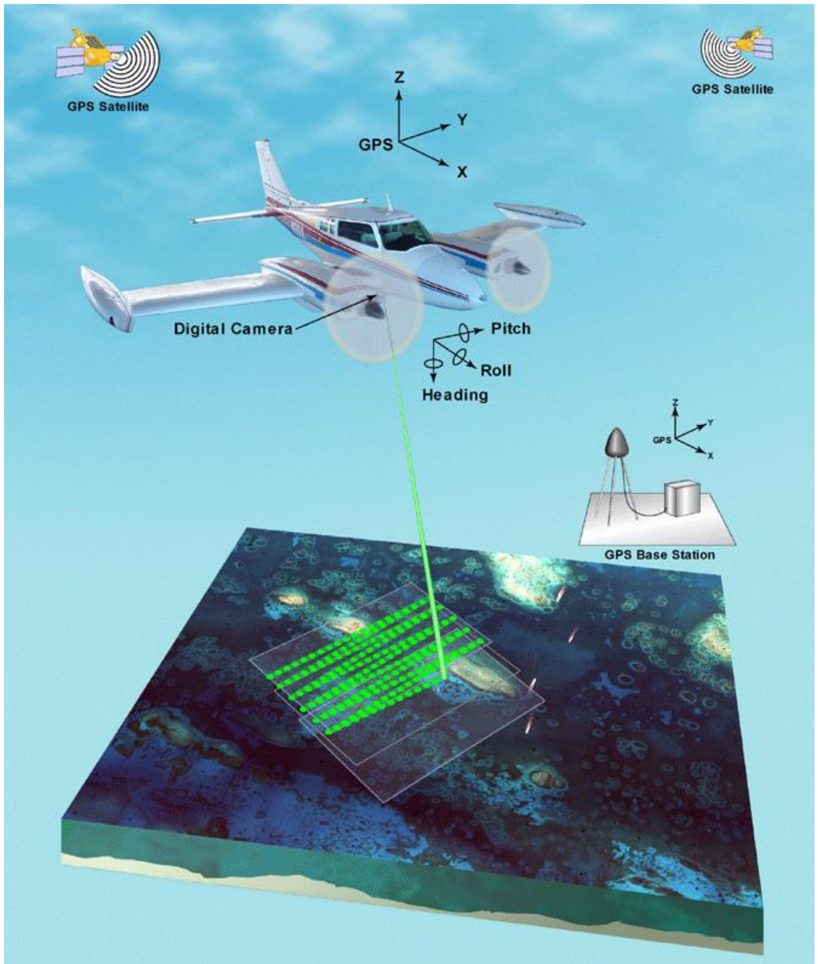

Figure 13.11. *This illustration from the U.S. Geological Survey web site details the main components and process for collecting LiDAR aerial survey data (Image courtesy U.S.G.S. http://gulfsci.usgs.gov/tampabay/data/1_bathymetry_lidar/index.html).*

One of the most cost-effective approaches to obtaining LiDAR data is to employ the services of a firm that specializes in conducting such surveys. M. J. Harden Co. was selected to perform these services at New Philadelphia. Through Harden's survey work, LiDAR data will be collected across the New Philadelphia town site and adjacent surrounding landscape with multiple points per square meter and elevation resolution with an error factor of no more than 15 centimeters for each data point. Harden's aircraft was equipped with an Optech Gemini Airborne Laser Terrain Mapper (ALTM) sensor array (Figure 13.12). This system utilizes variable pulse and scan rates that enable the sensors to adapt immediately to varying topography and ground cover. As Harden's (2010) service statement describes, the "increased pulse rate of the Gemini greatly improves the efficiency of the ALTM by providing greater geographic area coverage while maintaining high point density." This Gemini multipulse technology thus provides the data acquisition benefits of acquiring maximum point density in the most cost-effective manner.

Figure 13.12. *Optech Gemini Airborne Laser Terrain Mapper sensor array utilized by M.J. Harden, a Geo-eye Company (Image courtesy M. J. Harden).*

Harden acquired LiDAR data for an area of 4.25 square miles, including the New Philadelphia town site and the adjacent surrounding landscape of related cultural features, such as a nearby community cemetery and contiguous 19th century farmstead parcels (see Figures 13.13 and 13.14). By including this slightly larger area of surrounding landscape the research team hopes to obtain valuable contextual data related to the town site and its transport pathways without a significant impact on the overall survey costs.

The LiDAR data sets will be integrated with our pre-existing data from ground-based mapping, aerial infra-red surveys, and geophysical surveys, utilizing GIS relational databases. Such GIS datasets allow researchers to georeference multiple sources of evidence and overlay them with one another in a computerized mapping display. This analysis will be undertaken by our NSF-REU management team with the assistance of Robert Marcom, Cultural Resources Mapping, who is a specialist in GIS, mapping, and remote sensing survey analysis. Marcom will assist us in creating an integrated Digital Elevation Model (DEM) with GIS applications that will integrate these multiple data sets and provide a robust means for comparisons, contrasts, and additional analysis.

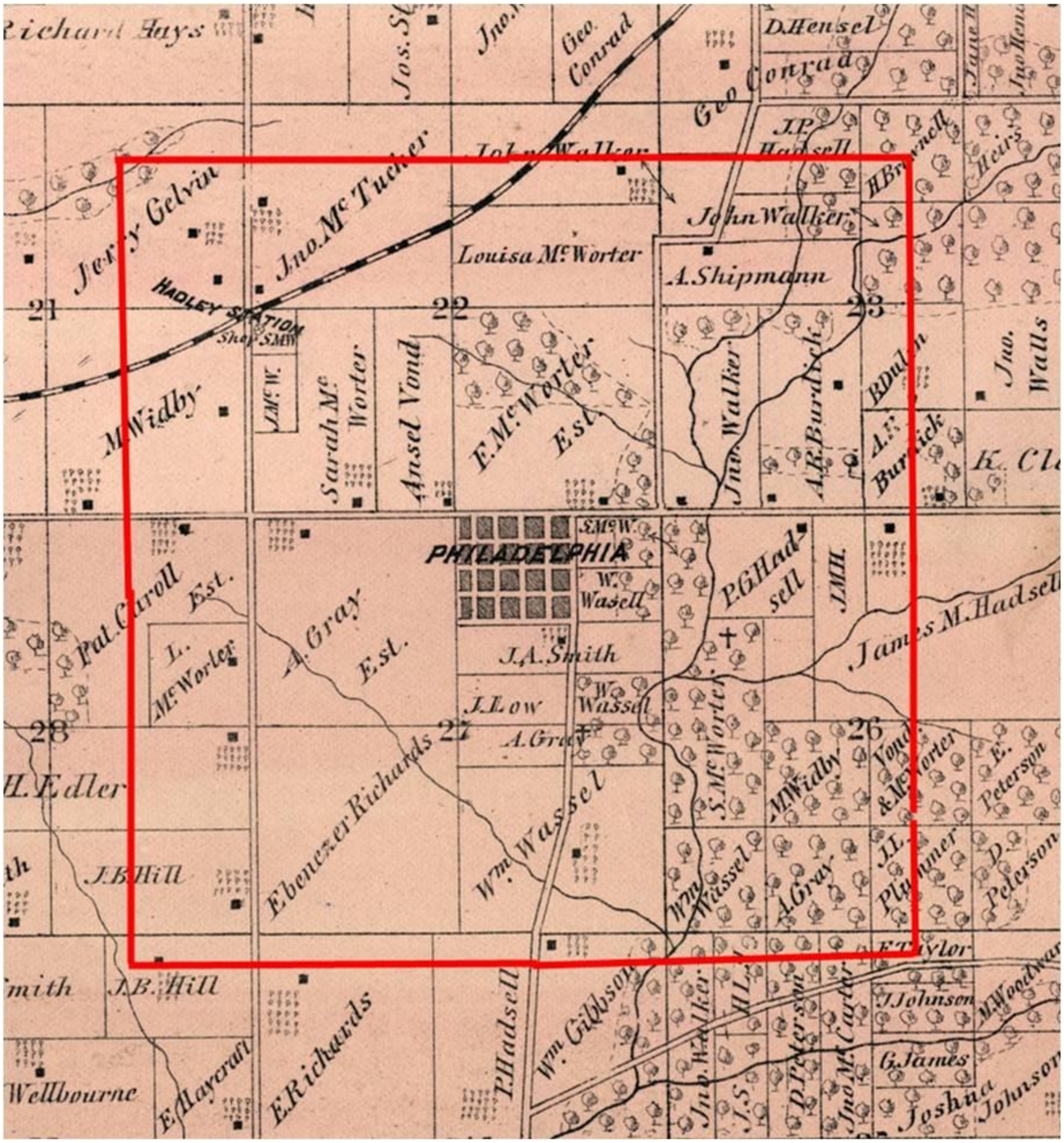

Figure 13.13. *Area of planned LiDAR survey by M. J. Harden. Overlay by Tyquin Washington, 2010 NSF-REU student, on 1872 map of Hadley Township (Ensign 1872:100).*

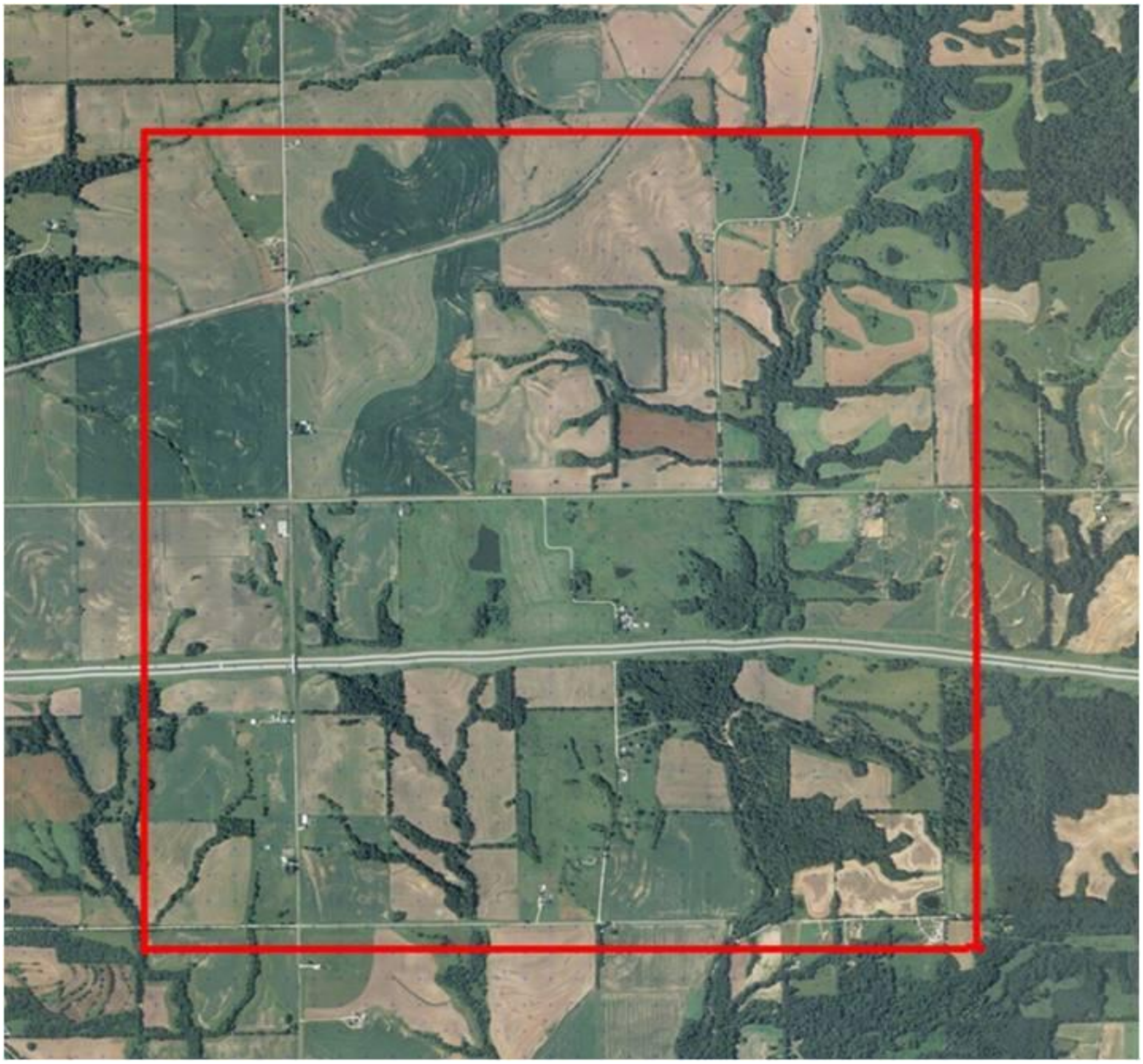

Figure 13.14. *Area of planned LiDAR survey by M. J. Harden. Overlay by Tyquin Washington, 2010 NSF-REU student, on 2010 satellite image of landscape surrounding the New Philadelphia National Historic Landmark.*

Results and Significance

The results of the LiDAR survey will be compared and contrasted with the data from ground-based geophysics and low-altitude aerial thermal imaging of the town site. All of these data sets will be geo-referenced and integrated using spatial mapping programs such as GIS. Researchers will use these data to create extremely accurate photo-mosaics of the entire town site. These will depict, compare, and contrast LiDAR, thermal, visible spectrum imagery, and geophysical data.

The results of this LiDAR survey will also provide a template for planning future ground-based excavations at New Philadelphia. We intend to continue excavations at the New Philadelphia town site in future years, either through archaeological field schools sponsored by participating universities, or through field schools sponsored by grant agencies such as the NSF. Excavations within such a large-scale site as the 42-acre town of New Philadelphia must be conducted in an efficient and cost-effective manner by choosing locations with utmost care from available remote sensing survey data. The excavations completed by our archaeologists in six years of summer field schools have yielded highly valuable data while uncovering less than one percent of the spatial extent of the town site. It is impractical to excavate the remains of an entire 42-acre site; data from methods such as the aerial LiDAR survey will provide invaluable resources for undertaking efficient and effective research in the future.

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