AEP OHIO TRANSMISSION COMPANY'S RESPONSE TO
OHIO POWER SITING BOARD STAFF'S
DISCOVERY REQUEST
OPSB CASE 22-0856-EL-BTX
THIRD SET

INTERROGATORY

DR-03-001 What types of equipment are anticipated to be used for the installation of the direct embedded poles?

RESPONSE

It is anticipated that a Digger Derrick and crane will be used in the installation of direct embedded poles.

AEP OHIO TRANSMISSION COMPANY'S RESPONSE TO
OHIO POWER SITING BOARD STAFF'S
DISCOVERY REQUEST
OPSB CASE 22-0856-EL-BTX
THIRD SET

INTERROGATORY

DR-03-002 What types of equipment are anticipated to be used for the installation of the pier foundation poles?

RESPONSE

It is anticipated that a Digger Derrick and crane will be used in the installation of pier foundation poles.

AEP OHIO TRANSMISSION COMPANY'S RESPONSE TO
OHIO POWER SITING BOARD STAFF'S
DISCOVERY REQUEST
OPSB CASE 22-0856-EL-BTX
THIRD SET

INTERROGATORY

DR-03-003 How many acres of agricultural land would be temporarily impacted by the construction of the project?

RESPONSE

It is anticipated that 131 acres of agricultural land will be temporarily impacted by the Preferred Route and 130.5 acres by the Alternate Route.

AEP OHIO TRANSMISSION COMPANY'S RESPONSE TO
OHIO POWER SITING BOARD STAFF'S
DISCOVERY REQUEST
OPSB CASE 22-0856-EL-BTX
THIRD SET

INTERROGATORY

DR-03-004 How many acres of agricultural land would be permanently impacted by the construction of the project?

RESPONSE

It is anticipated that 0.04 acres of agricultural land will be permanently impacted by the Project.

AEP OHIO TRANSMISSION COMPANY'S RESPONSE TO
OHIO POWER SITING BOARD STAFF'S
DISCOVERY REQUEST
OPSB CASE 22-0856-EL-BTX
THIRD SET

INTERROGATORY

DR-03-005 How many acres of agricultural district land would be temporarily impacted by the construction of the project?

RESPONSE

It is anticipated that 21.2 acres of agricultural district land will be temporarily impacted by the Preferred Route and 17.6 acres by the Alternate Route.

AEP OHIO TRANSMISSION COMPANY'S RESPONSE TO
OHIO POWER SITING BOARD STAFF'S
DISCOVERY REQUEST
OPSB CASE 22-0856-EL-BTX
THIRD SET

INTERROGATORY

DR-03-006 How many acres of agricultural district land would be permanently impacted by the construction of the project?

RESPONSE

It is anticipated that 0.006 acres of agricultural district land will be permanently impacted by the Project.

AEP OHIO TRANSMISSION COMPANY'S RESPONSE TO
OHIO POWER SITING BOARD STAFF'S
DISCOVERY REQUEST
OPSB CASE 22-0856-EL-BTX
THIRD SET

INTERROGATORY

DR-03-007 Please submit to Staff the archaeological and historic/architectural cultural resource reports.

RESPONSE

Please see the attached archaeological and historic/architectural cultural resource reports.

AEP OHIO TRANSMISSION COMPANY'S RESPONSE TO
OHIO POWER SITING BOARD STAFF'S
DISCOVERY REQUEST
OPSB CASE 22-0856-EL-BTX
THIRD SET

INTERROGATORY

DR-03-008 Have the archaeological and historic/architectural cultural resource reports been submitted to OHPO? If so, do you have a response from OHPO?

RESPONSE

Please see the attached OHPO review letters.

AEP OHIO TRANSMISSION COMPANY'S RESPONSE TO
OHIO POWER SITING BOARD STAFF'S
DISCOVERY REQUEST
OPSB CASE 22-0856-EL-BTX
THIRD SET

INTERROGATORY

DR-03-009 As used in page 7-17 of the application, what is the difference between the 1,000-foot buffer was used to identify previously known cultural resources and the study corridor?

RESPONSE

A 1,000 foot buffer was placed around both the Preferred and the Alternate Routes, respectively, to identify adjacent cultural resources. Each 1,000 foot buffer constitutes a Preferred Route "study corridor" and an Alternate Route "study corridor". The Area of Potential Effects (APE) is 100 feet wide (50 feet on either side of the Preferred and Alternate Route) and the study corridor or study area was the 1,000 foot buffer.

AEP OHIO TRANSMISSION COMPANY'S RESPONSE TO
OHIO POWER SITING BOARD STAFF'S
DISCOVERY REQUEST
OPSB CASE 22-0856-EL-BTX
THIRD SET

INTERROGATORY

DR-03-010 Page 2-1 of the Application mentions "the existing McComb Substation .. .. ", Would the name 'Substation' imply the existence of transformers at McComb and the presence of voltages in addition to the 34.5 kV?

RESPONSE

McComb Station is a non-jurisdictional distribution station with equipment operating at 34.5 and 12kV. The station has two 34.5/12kV transformers.

AEP OHIO TRANSMISSION COMPANY'S RESPONSE TO
OHIO POWER SITING BOARD STAFF'S
DISCOVERY REQUEST
OPSB CASE 22-0856-EL-BTX
THIRD SET

INTERROGATORY

DR-03-011

Staff's second data request asked the Applicant to provide Staff with the boring data including an assessment of the conditions found and how those conditions demonstrate soil and geologic suitability with the proposed project. The Applicant committed to providing that report in late March. On April 11, 2023, the Applicant provided Staff with 37 boring logs which included Atterberg testing and grain size/distribution data. The Applicant did not provide an assessment of the conditions, a suitability determination, or any recommendations all of which are typically components of a complete geotechnical assessment report.

a. The boring logs provided indicate the borings were performed from April 18 to May 5, 2022 with the exception of Boring #11 which has a July 18, 2022 date. Please include discussion of the need to acquire a single boring separate of the 36 other borings schedule in the geotechnical report requested above.
b. The boring logs indicate rock cores were extracted from some of the borings. Please include core discussion/photographs/testing results in the geotechnical report.

RESPONSE

Please see the attached soil boring data reports. The Company engineer performed an assessment of the conditions and suitability determination as part of the internal engineering design and judgement. The Company has internal engineering standards to verify the soil boring parameters and consider geotechnical risk during design. During the scoping process the Company engineer determined through previous experience and publicly available information that there is relatively low geohazard risk for the alignment, therefore a supplemental written assessment was not completed for the proposed line routes.

11a: The Company provided a scope of work to complete the requested soil boring at each location and lab testing. The contractor works with Right-of-Way and property owners to complete the soil borings in the proposed schedule with permission. The Company has reached out to the contractor to provide reason for the additional mobilization to complete boring #11.

11b: The Company has reached out to the contractor to provide additional rock core information to supplement the report.

Phase I Archaeological Investigations for the 11.3 km (7.0 mi) Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio

Ryan J. Weller

April 13, 2022

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Phase I Archaeological Investigations for the 11.3 km (7.0 mi) Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio

By

Ryan J. Weller

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Ryan J. Weller, P.I.

April 12, 2022

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W-3071

Abstract

In April 2022, Weller & Associates, Inc. conducted Phase I Archaeological Investigations for the 11.3 km (7.0 mi) Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio. The work was conducted under contract with American Electric Power (AEP) for submission to the Ohio Power Siting Board and the Ohio History Connection. These investigations were conducted for a proposed electric transmission line easement. The majority of this project corridor is located in a rural, agricultural landscape. The field investigations involved visual inspection, surface collection, and subsurface testing. The fieldwork resulted in the identification of six previously unrecorded archaeological sites including 33HK1042-1047.

The corridor extends through what is largely very flat, upland lake plain conditions with little to know relief/topography. The corridor is mostly located in farm field situations and occasionally along various road rights-of-way. The project corridor extends in a basically northwest to southeast manner from the Rader Road Station to the New Liberty Station in northwestern Hancock County. The corridor does not cross through any densely populated communities and is mostly situated in rural, upland agricultural settings. The northern part of the corridor is within flat, lake plain conditions while the remainder and majority is positioned on the Defiance end moraine. The north part of the corridor extends around the Village of McComb. The purpose of the project is to upgrade the extant 69kV transmission line to a 138kV transmission line.

A literature review conducted prior to the field investigations determined that no aspects of the corridor had been the subject of any prior professional surveys. There are no previously recorded sites located within or immediately abutting the project corridor. There are no National Register of Historic Places or Determination of Eligibility sites recorded in the project or its study area.

There were six previously unrecorded archaeological sites including 33HK1042-1047 recorded during these investigations. These sites are not considered to be significant resources; they are not eligible for the NRHP and they are not landmarks. The planned activity will not involve or affect any historic properties or landmarks. No further archaeological work is deemed necessary for this project.

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Introduction

In April 2022, Weller & Associates, Inc. conducted Phase I Archaeological Investigations for the 11.3 km (7.0 mi) Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio (Figures 1-3). The work was conducted under contract with American Electric Power (AEP) for submittal to the Ohio Power Siting Board (OPSB) and will be coordinated for Ohio History Connection (OHC) review. These investigations were conducted in a manner subject to the survey and report format established in *Archaeology Guidelines* (Ohio Historic Preservation Office 1994). The work efforts were designed in a manner that is consistent for cultural resource surveys regarding the National Register of Historic Places (NRHP) pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 [36 CFR 800]). This report summarizes the results of the archaeological fieldwork and literature review. The work includes a literature review/background documentation, archaeological field investigations, and visual inspection of the Area of Potential Effects (APE).

Alex Thomas completed the literature review in March 2022. The archaeological reconnaissance investigations for this project were conducted in early April 2022. Ryan Weller and Seth Cooper served as the Principal Investigators and Ryan Weller was the Principal Project Manager. The archaeological field crew included Justin Fryer, Ryan Weller, Seth Cooper, Daniel Ross, Lincoln Caldwell, John Yochum, Daniel Duboe, and Jesse Heinrich.

Project Description

The corridor extends through what is largely very flat, upland lake plain conditions with little to know relief/topography. The corridor is mostly located in farm field situations and occasionally along various road rights-of-way. The project corridor extends in a basically northwest to southeast manner from the Rader Road Station to the New Liberty Station in northwestern Hancock County. The corridor does not cross through any densely populated communities and is mostly situated in rural, upland agricultural settings. The northern part of the corridor is within flat, lake plain conditions while the remainder and majority are positioned on the Defiance end moraine. The north part of the corridor extends around the Village of McComb. The purpose of the project is to upgrade the extant 69kV transmission line to a 138kV transmission line.

Environmental Setting

Climate

Hancock County, like all of Ohio, has a continental climate with hot and humid summers and cold winters. Most of precipitation falls in June, and the smallest amount falls in February. The average annual temperature in the county is 11°C. Precipitation is favorably distributed for the production of crops (United States Department of Agriculture, Soil Conservation Service [USDA, SCS] 1965(2022).

Physiography, Relief, and Drainage

The project area is located in the Maumee Lake Plains Physiographic Province, an area that includes 'wave-planed ground moraine' from the Wisconsinan glaciation and 'Ridge Moraine' (i.e., lateral end moraine). The former region is "Flat-lying Ice -Age lake basin with beach ridges, bars, dunes, deltas, and clay flats; contained the former Black Swamp; slightly dissected by modern streams; elevation 570'-800', very low relief" (Brockman 1998). These are areas that typically lack relief and topography as they were once covered by an ancient glacial lake. The terrain is nearly level with occasional elevations relative to beach ridges, fens, and sandy deposits (Forsythe 1959). The latter is simply reflective of a glacial end moraine setting which typically persist as relatively elevated bands or landforms, linear ridges that are in this region. The project area is largely positioned on the Defiance Moraine and is on a portion of this linear landform that was once inundated by glacial lakes. It is noticeably less topographically diverse than other moraines as a result. The western part of the project corridor is drained by the Middle Branch Portage River and its tributaries including Needles Creek and Rader Creek along with unnamed tributaries. The southeastern part of the corridor and on the south side of the end moraine enter into the Blanchard River watershed (Auglaize to Maumee) and is drained by unnamed associated tributaries.

Geology

Brockman (1998) describes this area as a flattened and nearly level setting caused by ice-age lakes and glaciers. The underlying bedrock is from the Silurian era, including dolomite, anhydrite, gypsum, salt, and shale (Brockman 1998).

Soils

The project area is in northwestern Hancock County. The project corridor is located within an upland lake plains interfluvial zone setting in the northern part with the central and southern part being on an end moraine. There are flat lake plain soils noted in the area that is north of McComb with the remainder being reflective of till plain conditions. There are no intact soils with slopes greater than six percent indicated in the area (USDA, SCS 1974 (2022) (Table 1). None of these soils are indicative of deep, alluvial situations. About 3.6 percent of the area is noted as being located in disturbed contexts.

Table 1. Soils in the Project.

Soil Name	Slope %	% in Project	Location
Aurand loam	0-2	1.5	Slight rises, uplands
Cygnet loam	0-2	.7	Slight rises, lake plains
Del Rey-Blount complex	0-3	1.9	Slight rises, uplands
Fox loam	2-6	.9	Slight rises, uplands
Glynwood-Blount-Houcktown complex	1-4	15.2	Slight rises, uplands
Glynwood clay loam	6-12	.2	Slight rises, uplands
Glynwood silt loam, end moraine	2-6	8.6	Slight rises, uplands
Hoytville silty clay loam	0-1	2.8	Upland flats, lake plains
Haskins loam	0-2	2.5	Ancient Beach deposits
Hoytville clay loam	0-1	6.3	Upland flats, lake plains

Table 1. Soils in the Project.			
Soil Name	**Slope %**	**% in Project**	**Location**
Houcktown loam	2-6	.5	Slight rises, uplands
Houcktown-Glynwood-Jenera complex	1-4	13.9	Slight rises, uplands
Jenera-Shinrock, till substratum complex	1-4	5.3	Slight rises, uplands
Mermill clay loam	0-1	.4	Low areas along drainages
Mortimer silt loam	2-6	1.2	Slight rises, uplands
Nappanee loam	0-2	.9	Slight rises, lake plains
Nappanee silty clay loam	0-2	.6	Slight rises, lake plains
Pewamo sity clay loam	0-1	22.5	Low areas on till plains
Shinrock, till substratum-Glynwood Comp.	1-4	9.1	Slight rises, uplands
Sloan loam	0-1	1.1	Upland floodplains
Sloan silty clay loam	0-1	.6	Upland floodplains
Udorthents, loamy	0-2	2.5	Disturbed/made land
Udorthents, loamy	2-25	1.1	Disturbed/made land

Flora

There was, and continues to be, great floral diversity in Ohio. This diversity is relative to the soils and the terrain that generally includes the till plain, lake plain, terminal glacial margins, and unglaciated plateau (Forsyth 1970). Three major glacial advances, including the Kansan, Illinoisan, and Wisconsinan, have affected the landscape of Ohio. The effects of the Wisconsin glaciation are most pronounced and have affected more than half of the state (Pavey et al. 1999). The following is to provide comparison of the different floral regions of Ohio relative to this project.

The least diverse part of Ohio extends in a belt from the northeast below the lake-affected areas through most of western Ohio (Gordon 1966). These areas are part of the late Wisconsin ground moraine and lateral end moraines. It is positioned between the lake plains region and the terminal glacial moraines. This area included broad forested areas of beech maple forests interspersed with mixed oak forests in elevated terrain or where relief is greater (Forsyth 1970; Gordon 1966). Prairie environments such as those in Wyandot and Marion County areas would contain islands of forests, but were mostly expansive open terrain dominated by grasses.

The northwestern Ohio terrain is nearly flat because of ancient glacial lakes and glaciation, which affected the flora. However, the vegetation was more diverse than the till plain to the south and east because of the variety of factors that contributed to its terrain. Forests within the Black Swamp were generally comprised of elm/ash stands; however, dissected areas along drainages and drier, elevated areas from beach deposits would contain mixed forests of oak and hickory (Gordon 1966, 1969). There was little upland floral diversity in the lake plains (Black Swamp region) except for the occasional patches of oak and hickory. Floral variety was most evident in narrow sleeves along larger stream valleys where there is relief.

The most biological diversity in Ohio is contained within the Allegheny Plateau, which encompasses the southeastern two-thirds of the state (Sheaffer and Rose 1998). Because this area is higher and has drier conditions, it is dominated by mixed oak forests.

Some locations within the central part of this area contain beech and mixed mesophytic forests. There are large patches of oak and sugar maple forests to the south of the terminal moraine from Richland to Mahoning County (Gordon 1966).

Southwestern Ohio from about Cincinnati to Bellefontaine east to the Scioto River historically contained a very diverse floral landscape. This is an area where moraines from three glacial episodes are prevalent (Pavey et al. 1999). Forests in this area include elm-ash swamp, beech, oak-sugar maple, mixed mesophytic, prairie grasslands, mixed oak, and bottomland hardwoods (Core 1966; Gordon 1966, 1969). These forests types are intermingled with prairies being limited to the northern limits of this area mostly in Clark and Madison Counties.

Generally, beech forests are the most common variety through Ohio and could be found in all regions. Oak and hickory forests dominated the southeastern Ohio terrain and were found with patchy frequency across most of northern Ohio. Areas that were formerly open prairies and grasslands are in glacial areas, but are still patchy. These are in the west central part of the state. Oak and sugar maple forests occur predominantly along the glacial terminal moraine. Elm-ash swamp forests are prevalent in glaciated areas including the northern and western parts of Ohio (Gordon 1966; Pavey et al. 1999). The project corridor is generally within what is considered to be a beech and elm-ash swamp forest area (Gordon 1966).

Fauna

The upland forest zone offered a diversity of mammals to the prehistoric diet. This food source consisted of white-tailed deer, black bear, Eastern cottontail rabbit, opossum, a variety of squirrels, as well as other less economically important mammals. Several avian species were a part of the upland prehistoric diet as well (i.e. wild turkey, quail, ruffed grouse, passenger pigeon, etc.). The lowland zone offered significant species as well. Raccoon, beaver, and muskrat were a few of the mammals, while wood duck and wild goose were the economically important birds. Fishes and shellfish were also an integral part of the prehistoric diet. Ohio muskellunge, yellow perch, white crappie, long nose gar, channel catfish, pike, and sturgeon were several of the fish, whereas, the Ohio naiad mollusc, butterfly's shell, long solid, common bullhead, knob rockshell, and cod shell were the major varieties of shellfish. Reptiles and amphibians, such as several varieties of snakes, frogs, and turtles, were also part of the prehistoric diet (Trautman 1981; Lafferty 1979; Mahr 1949).

Cultural Setting

The first inhabitants of Ohio were probably unable to enter this land until the ice sheets of the Wisconsin glacier melted around 14,000 B.C. Paleoindian sites are considered rare due to the age of the sites and the effects of land altering activities such as erosion. Such sites were mostly used temporarily and thus lack the accumulation of human occupational deposits that would have been created by frequent visitation. Paleoindian artifact assemblages are characteristic of transient hunter-gatherer foraging activity and subsistence patterns. In Ohio, major Paleoindian sites have been documented

along large river systems and near flint outcrops in the Unglaciated Plateau (Cunningham 1973). Otherwise, Paleoindian sites in the glaciated portions of Ohio are encountered infrequently and are usually represented by isolated finds or open air scatters.

The Paleoindian period is characterized by tool kits and gear utilized in hunting Late Pleistocene megafauna and other herding animals including but not limited to short-faced bear, barren ground caribou, flat-headed peccary, bison, mastodon, giant beaver (Bamforth 1988; Brose 1994; McDonald 1994). Groups have been depicted as being mobile and nomadic (Tankersley 1989); artifacts include projectile points, multi-purpose unifacial tools, burins, gravers, and spokeshaves (Tankersley 1994). The most diagnostic artifacts associated with this period are fluted points that exhibit a groove or channel positioned at the base to facilitate hafting. The projectiles dating from the late Paleoindian period generally lack this trait; however, the lance form of the blade is retained and is often distinctive from the following Early Archaic period (Justice 1987).

The Archaic period has been broken down into three sub-categories, including the Early, Middle, and Late Archaic. During the Early Archaic period (ca. 10,000-8000 B.P.), the environment was becoming increasingly arid as indicated by the canopy (Shane 1987). This period of dryness allowed for the exploitation of areas that were previously inaccessible or undesirable. The Early Archaic period does not diverge greatly from the Paleoindian regarding the type of settlement. Societies still appear to be largely mobile with reliance on herding animals (Fitting 1963). For these reasons, Early Archaic artifacts can be encountered in nearly all settings throughout Ohio. Tool diversity increased at this time including hafted knives that are often re-sharpened by the process of beveling the utilized blade edge and intense basal grinding (Justice 1987). There is a basic transition from lance-shaped points to those with blades that are triangular. Notching becomes a common hafting trait. Another characteristic trait occurring almost exclusively in the Early and Middle Archaic periods is basal bifurcation and large blade serrations. Tool forms begin to vary more and may be a reflection of differential resource exploitation. Finished tools from this period can include bifacial knives, points, drills/perforators, utilized flakes, and scrapers.

The Middle Archaic period (8000-6000 B.P.) is poorly known or understood in archaeological contexts within Ohio. Some (e.g., Justice 1987) regard small bifurcate points as being indicative of this period. Ground stone artifacts become more prevalent at this time. Other hafted bifaces exhibit large side notches with squared bases, but this same trait can extend back to the Paleoindian period. The climate at this time is much like that of the modern era. Middle Archaic period subsistence tended to be associated with small patch foraging that involved a consistent need for mobility with a shift towards stream valleys (Stafford 1994). Sites encountered from this time period throughout most of Ohio tend to be lithic scatters or isolated finds. The initial appearance of regional traits may be apparent at this time.

The Late Archaic period in Ohio (ca 6000-3000 B.P.) diverges from the previous periods in many ways. Preferred locations within a regional setting appear to have been repeatedly occupied. The more intensive and repeated occupations often resulted in the

creation of greater social and material culture complexity. The environment at this time is warmer and drier. Most elevated landforms in northeastern Ohio have yielded Archaic artifacts (Prufer and Long 1986: 7), and the same can be stated for the remainder of Ohio.

Various artifacts are diagnostic of the Late Archaic period. Often, burial goods provide evidence that there was some long-distance movement of materials, while lithic materials used in utilitarian assemblages are often from a local chert outcrop. There is increased variation in projectile point styles that may reflect regionalism. Slate was often used in the production of ornamental artifacts. Ground and polished stone artifacts reached a high level of development. This is evident in such artifacts as grooved axes, celts, bannerstones, and other slate artifacts.

It is during the Terminal Archaic period (ca 3500-2500 B.P.) that extensive and deep burials are encountered. Cultural regionalism within Ohio is evident in the presence of Crab Orchard (southwest), Glacial Kame (northern), and Meadowood (central to Northeastern). Along the Ohio River, intensive occupations have been placed within the Riverton phase. Pottery makes its first appearance during the Terminal Late Archaic.

The Early Woodland period (ca 3000-2100 B.P.) in Ohio is often associated with the Adena culture and the early mound builders (Dragoo 1976). Early and comparably simple geometric earthworks first appear with mounds more spread across the landscape. Pottery at this time is thick and tempered with grit, grog, or limestone; however, it becomes noticeably thinner towards the end of the period. There is increased emphasis on gathered plant resources, including maygrass, chenopodium, sunflower, and squash. Habitation sites have been documented that include structural evidence. Houses that were constructed during this period were circular, having a diameter of up to 18.3 m (Webb and Baby 1963) and often with paired posts (Cramer 1989). Artifacts dating from this period include leaf-shaped blades with parallel to lobate hafting elements, drilled slate pieces, ground stone, thick pottery, and increased use of copper. Early Woodland artifacts can be recovered from every region of Ohio.

In northwest and north-central Ohio, there are not very many mounds or village sites that indicate an Early Woodland occupation. Artifacts from these areas often are reflective of seasonal hunting excursions. Adena-like bifaces and tools are commonly found in river and stream valleys that drain into Lake Erie as well as in the uplands. It is assumed that Early Woodland inhabitants used these areas for little more than a transient hunting-collecting subsistence. One of the best-known Early Woodland sites is the Leimbach site. This site is located where the Huron River empties into Lake Erie (Shane 1975). Early Woodland ceramics and lugged vessels have been recovered from this site. Evidence of Early Woodland activity, such as ceramics, has been encountered infrequently at locations across north-central and northwestern Ohio.

The Middle Woodland period (ca 2200-1600 B.P.) is often considered to be equivalent with the Hopewell culture. The largest earthworks in Ohio date from this period. There is dramatic increase in the appearance of exotic materials that appear most often in association with earthworks and burials. Artifacts representative of this period

include thinner, grit-tempered pottery, dart-sized projectile points (Lowe Flared, Steuben, Snyders, and Chesser) [Justice 1987], exotic materials (mica, obsidian, and marine shell, etc.). The points are often thin, bifacially beveled, and have flat cross sections. There seems to have been a marked increase in the population as well as increased levels of social organization. Middle Woodland sites seem to reflect a seasonal exploitation of the environment. There is a notable increase in the amount of Eastern Agricultural Complex plant cultigens, including chenopodium, knotweed, sumpweed, and little barley. This seasonal exploitation may have followed a scheduled resource extraction year in which the populations moved camp several times per year, stopping at known resource extraction loci. Middle Woodland land use appears to center on the regions surrounding earthworks (Dancey 1992; Pacheco 1996); however, there is evidence of repeated occupation away from earthworks (Weller 2005). Household structures at this time vary with many of them being squares with rounded corners (Weller 2005). Exotic goods are often attributed to funerary activities associated with mounds and earthworks. Utilitarian items are more frequently encountered outside of funerary/ritual contexts. The artifact most diagnostic of this period is the bladelet, a prismatic and thin razor-like tool, and bladelet cores. Middle Woodland remains are more commonly recovered from central Ohio south and lacking from most areas in the northern and southeastern part of the state.

Little information is known about the Middle Woodland period of western and northwestern Ohio. This may be due to a poor representation of artifacts from this period or because the area is not directly associated with the Hopewell culture. The loosely associated patterns of earthworks to habitation sites that have been identified in central and southern Ohio areas are not present in this region. Sites associated with this period have been identified along the south and western shores of Lake Erie, but they are not common (Stothers et al. 1979; Stothers 1986).

The Late Woodland period (ca A.D. 400-900) is distinct from the previous period in several ways. There appears to be a population increase and a more noticeable aggregation of groups into formative villages. The villages are often positioned along large streams, on terraces, and were likely seasonally occupied (Cowan 1987). This increased sedentism was due in part to a greater reliance on horticultural garden plots, much more so than in the preceding Middle Woodland period. The early Late Woodland groups were growing a wide variety of crop plants that are collectively referred to as the Eastern Agricultural Complex. These crops included maygrass, sunflower, and domesticated forms of goosefoot and sumpweed. This starch and protein diet was supplemented with wild plants and animals. Circa A.D. 800 to 1000, populations adopted maize agriculture, and around this same time, shell-tempered ceramics appear. Other technological innovations and changes during this time period included the bow and arrow and changes in ceramic vessel forms.

Evidence suggests that the Late Woodland occupations in northern Ohio developed from the Western Basin Middle Woodland tradition. The Late Woodland period in northern Ohio is best defined by ceramic traditions. Western Basin Late Woodland sites have been identified in most of the river valleys in northwestern Ohio such as the Maumee, Auglaize, and the Sandusky Rivers. Radiocarbon dating establishes

this Late Woodland occupation at the first century B.C. to A.D. 500 (Pratt and Bush 1981: 88). The Western Basin tradition consists of three primary phases, which include the Riviere au Vase, the Younge (Fitting 1965), and the Springwells phase. Influence from the Cole complex may extend into the area from the south, but this remains theoretical and not well researched.

The Late Prehistoric period in northwest and northern Ohio is often associated with an intensification of the use of plant resources, the presence of large villages, and a steady population increase. Permanent villages were associated with a heavy dependence on farming. These villages were often located on the meander belt zones of river valleys (Stothers et al. 1984: 6). Subsistence of these farming communities relied upon maize, beans, and squash as the major cultigens. Villages were often strategically located on bluff tops. There is a change in social structure to a chiefdom-based society. The Late Prehistoric period in northwest Ohio has been segregated into the Sandusky tradition and smaller phases based largely on age and ceramic assemblage traits.

The Sandusky tradition has been broken up into four phases. These phases are identified (in chronological order) as Eiden, Wolf, Fort Meigs, and Indian Hills. These are often associated with a style of ceramic referred to as Mixter Tool Impressed, Mixter Dentate, Mixter Cordmarked, and Parker Festooned. The Eiden and Wolf phases show a dependence upon fishing, and villages are usually associated with large cemeteries (Schneider 2000; Shane 1967).

The Fort Meigs and Indian Hills phases occur late in the Late Prehistoric period. The Fort Meigs phase may be related to the Wolf phase in that the pottery is similar. Fort Meigs phase occupations are identified by specific rim and neck motifs that are applied to their pottery. The Indian Hills phase is associated with shell-tempered pottery. Some villages show evidence of defensive features such as stockade lines, ditches, or earthen walls (Pratt and Bush 1981: 155). There is little evidence to support inter-village relationships, such as trade; this lack may have been due to competition for localized resources.

Protohistoric to Settlement

By the mid-1600s, French explorers traveled through the Ohio country as trappers, traders, and missionaries. They kept journals about their encounters and details of their travels. These journals are often the only resource historians have regarding the early occupants of seventeenth century Ohio. The earliest village encountered by the explorers in 1652 was a Tionontati village located along the banks of Lake Erie and the Maumee River. Around 1670, it is known that three Shawnee villages were located along the confluence of the Ohio River and. the Little Miami River. Because of the Iroquois Wars, which continued from 1641-1701, explorers did not spend much time in the Ohio region, and little else is known about the natives of Ohio during the 1600s. Although the Native American tribes of Ohio may have been affected by the outcome of the Iroquois Wars, no battles occurred in Ohio (Tanner 1987).

French explorers traveled extensively through the Ohio region from 1720-1761. During these expeditions, the locations of many Native American villages were documented. In 1751, a Delaware village known as Maguck existed near present-day Chillicothe. In 1758, a Shawnee town known as 'Lower Shawnee 2' existed at the same location. The French also documented the locations of trading posts and forts, which were typically established along the banks of Lake Erie or the Ohio River (Tanner 1987).

While the French were establishing a claim to the Ohio country, many Native Americans were also entering new claims to the region. The Shawnee were being forced out of Pennsylvania because of English settlement along the eastern coast. The Shawnee created a new headquarters at Shawnee Town, which was located at the mouth of the Scioto River. This headquarters served as a way to pull together many of the tribes which had been dispersed because of the Iroquois Wars (Tanner 1987).

Warfare was bound to break out as the British also began to stake claims in the Ohio region by the mid-1700s. The French and Indian War (1754-1760) affected many Ohio Native Americans; however, no battles were recorded in Ohio (Tanner 1987). Although the French and Indian War ended in 1760, the Native Americans continued to fight against the British explorers. In 1764, Colonel Henry Bouquet led a British troop from Fort Pitt, Pennsylvania to near Zanesville, Ohio.

In 1763, the Seven Years' War fought between France and Britain, also known as the French and Indian War ended with The Treaty of Paris. In this Peace of Paris, the French ceded their claims in the entire Ohio region to the British. When the American Revolution ended with the Second Treaty of Paris in 1783, the Americans gained the entire Ohio region from the British; however, they designated Ohio as Indian Territory. Native Americans were not to move south of the Ohio River but Americans were encouraged to head west into the newly acquired land to occupy and govern it (Tanner 1987).

By 1783, Native Americans had established fairly distinct boundaries throughout Ohio. The Shawnee tribes generally occupied southwest Ohio, while the Delaware tribes stayed in the eastern half of the state. Wyandot tribes were located in north-central Ohio, and Ottawa tribes were restricted to northeast Ohio. There was also a small band of Mingo tribes in eastern Ohio along the Ohio River, and there was a band of Mississauga tribes in northeastern Ohio along Lake Erie. The Shawnee people had several villages within Ross County along the Scioto River (Tanner 1987). Although warfare between tribes continued, it was not as intense as it had been in previous years. Conflicts were contained because boundaries and provisions had been created by earlier treaties.

In 1795, the Treaty of Greenville was signed as a result of the American forces defeat of the Native American forces at the Battle of Fallen Timbers. This allocated the northern portion of Ohio to the Native Americans, while the southern portion was opened for Euro-American settlement. Although most of the battles which led up to this treaty did not occur in Ohio, the outcome resulted in dramatic fluctuations in the Ohio region.

The Greenville Treaty line was established, confining all Ohio Native Americans to northern Ohio, west of the Tuscarawas River (Tanner 1987).

Ohio Native Americans were again involved with the Americans and the British in the War of 1812. Unlike the previous wars, many battles were fought in the Ohio country during the War of 1812. By 1815, peace treaties began to be established between the Americans, British, and Native Americans. The Native Americans lost more and more of their territory in Ohio. By 1830, the Shawnee, Ottawa, Wyandot, and Seneca were the only tribes remaining in Ohio. These tribes were contained on reservations in northwest Ohio. By the middle 1800s, the last of the Ohio Native Americans signed treaties and were removed from the Ohio region.

Hancock County History

Hancock County was originally part of the Northwestern Territory ceded by Virginia to the United States Government and was organized in 1828. Its namesake is John Hancock, signer of the Declaration of Independence and person of political significance during the Revolutionary War. The county is located in northwestern Ohio and includes comparably diverse terrain. The Defiance Moraine is the dominant landform that bisects the county from east to west and through its central part. The southern part of the county is Till Plain while the northern part is in the Lake Plain (Brockman 1998). The Blanchard River and its tributaries drain the southern majority of the county. This drainage runs along the Defiance Moraine and is the source of occasional inundations. The northern part of the county is drained by streams that flow to Lake Erie, including Middle Branch Portage River. Immigrants to the county were primarily arriving to till the soil.

Early inhabitants of the county were generally focused along the drainages and particularly the Blanchard River. Initially, settlement was at Fort Findlay, a War of 1812 stockade. Native American groups were occupying the area at this time as well including those from the Wyandot Tribe and Ottawa further down river. Shawnee were known to the area as well. One of the first inhabitants of the county and the region was that of Jean Jacques Blanchard who immigrated to the area in 1769. He was a Frenchman that originated from New Orleans and settled along the river of his namesake after marrying a Native American woman (Beardsley 1881; Brown 1886; Spaythe 1903).

Some of the early activity in the county was during the War of 1812. It was in that year that General Hull's campaign passed through the county leaving a path referred to as "Hull's Trail". Hull ordered the construction of Fort Findlay and it was located on the Blanchard River. It was constructed and named for Colonel James Findlay. This would become the site of the first Euro-American occupant of the county by a soldier named Thorp or Tharp who resided in Fort Findlay in the War of 1812 and remained there after its evacuation (Beardsley 1881). The first family to settle was the Benjamin Cox family.

The influx of settlers to the county was happening just after the War of 1812 and into the 1820s. These settlers inhabited the area around Findlay and the river and were primarily focused on agriculture. Log cabins would often have double functions as taverns or for trades such as blacksmith or farrier. Grist and sawmills soon followed to serve the growing agricultural community.

The transportation of good and travel routes in the county was originally via pirogues that navigated the Blanchard to the Auglaize and eventually to the Maumee. Cross country trade was usually made by travel to Sandusky City to access markets such as New York. The early road systems were tethered to the various ridges and elevations in the county, which served as natural corridors. The growth of the county was furthered by the construction of various railroads starting in 1839 with the Bellefontaine & Perrysburg. Numerous other railroads would spring up and continue to be constructed to about 1900. Many of these were local lines but were significant in the economic development and prosperity of the county. The connection to the eastern market economies for the sale and transport of the agricultural products is typically what the smaller communities relied upon. Still, the communities of Findlay and Bluffton tended to be the center of attention and activity. Findlay, being centrally located was an easy choice for the county seat (Beardsley 1881; Brown 1886; Spaythe 1903).

The exploitation of mineral resources in the county happened amidst the Industrial Revolution. It was in the 1880s that oil and gas were discovered, and it has been valuable to the local economy ever since. Agriculture remains a vital source of the local economy to the area. There has been an increase in the development of industrial and business economy throughout the central part of the county and extending to Bluffton due to the accessibility to I-75. This is particularly pronounced around Findlay, Bluffton, and increasingly more to the north. According to the most recent census, the county has over 74,000 inhabitants. There are two primary colleges in the county including Bluffton and Findlay, which contribute to the demographics.

Pleasant Township History

Pleasant Township, originally part of Blanchard Township, was organized on March 2nd, 1835. Located in the northwest corner of Hancock County, the township borders Putnam County to the west, Portage Township, Hancock County, to the east, Blanchard Township, Hancock County, to the south, Liberty Township, Hancock County, to the southeast, Wood County to the north, and Henry County to the northwest (U.S. Census Bureau 2010). Pleasant Township's first Euro-American settlers were men from Fairfield, Hardin, and Franklin Counties, and Washington County (Pennsylvania), all of whom arrived in 1833 (Beardsley 1881).

The township's abundant timber and rich, loamy soil fostered economic incentive, thus further migration. Like most industries of the era, the first and largest establishments were mills: the first was a sawmill on Algire's Run, 1841; a grist mill on Picken's Run, 1845; the first steam-powered sawmill, 1850; and the first steam-powered grist mill, 1857. Pleasant Township was among Hancock County's most prosperous and

populated townships thanks to the combination of lucrative farming and timber harvesting. Shortly after organization, Pleasant Township's first religious organization (Methodists) was founded; services were held in private homes and the schoolhouse (built in 1838) until 1850 with the construction of a church (Beardsley 1881).

Pleasant Township contains two villages: McComb and Shawtown. McComb, platted in 1847 by Franklin County native Benjamin Todd as "Pleasantville," is located approximately 10 miles from Findlay and was renamed in 1858 upon incorporation. The community benefitted from two railroads, the McComb and Deshler Branch of the Dayton and Michigan Railroad, and the New York, Chicago & St. Louis Railroad, previously the Continental Railway. McComb was a bustling economic center comprised of numerous stores, shops, and churches (Beardsley 1881). Shawtown, much smaller than McComb, was platted in 1882 by E.T. Cummins along the abovementioned railroad, preceded a year earlier by a post office. The community's economy was limited to two general stores, a wagon shop, a blacksmith shop, a hoop factory, and a sawmill (Warner, Beers & Co. 1886). Olney was platted by Isaac Fairchild in 1857, however it did not advance beyond this stage (Beardsley 1881).

Portage Township History

Portage Township is located in the northern part of Hancock County. Originally a part of Findlay Township, Portage was officially organized in April of 1833. It was named after Portage River, which flows through the southwest portion of the township. In 1840, its population was 675; 1850, 614; 1860, 835; 1879, 899; and 1880, 914 (Warner, Beers, & Co. 1886).

John Thompson is thought to be the first European settler of Portage, with July 24, 1832, listed as the date he arrived (Warner, Beers, & Co. 1886). A man named Robert Walters shortly followed in the fall of 1833. Before these two men arrived, it is documented that the land was not heavily populated, even as it resided as part of Findlay Township. However, after its organization, Portage saw a swift increase in residence. In 1837, Jacob Andre laid out a village, which he named Lafayette, but according to its history, never grew into a standard village with mills, grocers, and shops. In fact, there is no mention of any of those businesses existing in Portage or if anyone in the township owned and operated such things. In general, it seems that Portage relied on farming and personal trade for sustenance and traveled to nearby townships for other necessities. It is documented that the first school was taught in Benoni Culp's wagon shop. As of 1886, Portage contained six proper school buildings and no other personal shops were mentioned as makeshift gathering centers. Interestingly, it is noted that many of the property-owning men within the township served in positions of power through county government seats (Warner, Beers, & Co. 1886) and in 1857, Portage Centre Post Office was established. As for denominations, there were the Regular Baptists Society; Pleasant Hill Society, for Presbyterians; Ebenezer Society, which blended together with Pleasant Hill Society and became West Union Church of van Buren; United Brethren; and Central Methodist Episcopal Chapel (Warner, Beers, & Co. 1886).

There is little information regarding Portage post-nineteenth century. As of 2010, the population was 692, which was up from 604 in 2000 (U.S. Census Bureau).

Liberty Township History

Liberty Township was established in the year 1823. It is located in the north-central portion of Hancock County. Neighboring townships include Portage to the north, Marion to the east, Eagle to the south and Blanchard to the west. The terrain of Liberty Township is flat. The soil is very fertile and produces an excellent crop. Corn, wheat, pork and oats were the common products (Brown 1886).

Before the arrival of European influence Liberty was populated by dense forests. These were later removed by early pioneers for agricultural and construction purposes. Timber was used to build homes, schools, churches and other various works. The Blanchard River which courses east and west across the township was of great importance. It was a vital resource for not only water but for trade and transportation as well. It wasn't until the year 1830 when a large people immigrated to Liberty Township and populated the area (Brown 1886).

Findlay, the county seat was at the center of progress in Liberty Township. Named after Colonel James Findlay who previously occupied a fort in the area. It celebrated economic success due to its location alongside the Blanchard River, its multitude of professions and fertile soils. Residents found work on farms, mills, a general store and a foundry (Howe 1854).

Religion played an important role in Liberty. The primary form of practice was Presbyterian. Gatherings in the churches allowed for residents to organize community events, discuss local politics and seek spiritual solace. These gatherings were typically held in the homes of residents prior to 1831. The teachings of the church were integrated into school curriculum of the day and public policy (Brown 1886).

Research Design

The purpose of this Phase I survey is to locate and identify cultural resources that will be affected by the planned construction activities. This includes archaeological deposits as well as architectural properties that are older than 50 years regarded as being in the APE. Once these resources are identified, they are evaluated for their eligibility to the NRHP. The literature review aspect of these investigations is to answer or address the following questions:

1) Did the literature review reveal anything that suggests the project area had been previously surveyed, and what is the relationship of previously recorded properties to the project area?
2) Are cultural resources likely to be identified in the project area?
3)

Archaeological Field Methods

The survey conducted for this project was anticipated to use several methods of sampling/testing to identify and evaluate cultural resources. These included shovel test units, surface collection, and visual inspection. The following describes the survey methods:

Shovel test unit excavation. Shovel test units were placed at 15-m intervals where adequate surface visibility was lacking. These measure 50 cm on a side and are excavated to 5 cm below the topsoil/subsoil interface. Individual shovel test units are documented regarding their depth, content and color (Munsell). Wherever sites are encountered, Munsell color readings are taken per shovel test unit. All of the undisturbed soil matrices from shovel test units are screened using .6 cm hardware mesh. When sites are identified, additional shovel test units will be excavated at 7.5 m intervals extending on grid and in the four cardinal directions from the positive locations.

Surface Collection. The majority of the project corridor is suitable for surface collection strategies. The bare ground visibility in these areas is greater than 50 percent. Pedestrian transects are spaced at 5-7.5 m intervals through these applicable areas. If artifacts are identified during this survey, they are flagged and plotted using a Trimble GeoXT global positioning system for the purposes of demonstrating distribution and for GIS layering.

Visual inspection. This method is conducted to document the nature of the project area and its flat conditions, any disturbed settings, and general nature of the area. This method is used to verify the absence or likelihood of any cultural resources within and around the project area to assist in defining the APE.

Shovel probe excavation. The excavation of shovel probes is reserved for locations where severe disturbance is prevalent, but not obvious on the surface. These will be initially excavated in a manner similar to a shovel test unit and to a depth that was usually to the subsoil or about 20 cm below the ground surface. This will be accomplished to better understand the nature of the disturbance and verify that intact deposits were lacking. These are spaced no further than 30 m intervals. If intact soils are identified, the shovel probe will be treated as a shovel test unit.

The application of the resulting field survey methods was documented in field notes, field maps, and project plan maps.

Prehistoric Artifact Analysis

An artifact inventory was accomplished upon completion of the fieldwork. This involved identifying the functional attributes of individual artifacts, as well as the artifact

cluster(s) or site assemblage collectively. The prehistoric artifact types and material were identified during the inventory process. The lithic artifact categories are modeled after Flenniken and Garrison (1975) and include the following:

Biface. A biface is defined as an artifact that has been culturally modified on two faces (ventral and dorsal). Complete and fragmentary preforms, manufacturing rejects, projectiles, or knives are included in this category.

Blocky Irregular. These are chunks and amorphous chert fragments that are produced during core reduction. These frequently occur during the creation of a striking platform or by accident. They represent a transitional core reduction stage similar to that of primary thinning.

Broken Flake. This flake type is common. Flakes for this investigation are considered broken when diagnostic attributes (e.g., flake scarring or platform) are absent from the artifact. Therefore, a flake that is broken in half and retains the platform is considered complete because the function can be ascertained regardless of its obvious fragmentary nature.

Celt. These artifacts are typically polished/ground stone pieces that are likely to have been used for cutting/dismembering/hammering. It is common for these to have a bit and poll end to serve as a duel function. They were often hafted and used like a modern hatchet.

Core. A core represents the initial stage of chert procurement and reduction. A core has evidence of flake removal or checking present to delineate that the object has been culturally modified. Cores can be recovered from bedded outcrops or gathered from alluvial and glacial deposits.

Potlid. These artifact types are reflective of accidental overheating of chert (Luedtke 1992). Small semi-circular fragments of chert pop off a flake or artifact during firing or through fortuitous deposition in a hearth. Potlids lack a striking platform but are indicative of thermal activity at a site. One should use caution when using these artifacts to interpret or recreate site formation processes because they can occur during post-depositional activities.

Pottery. This is typically recovered as fired clay sherds that are tempered with various materials. It is used for cooking vessels, storage, transport, or for serving. However, sherds are generally fragile and decompose with exposure and plowing.

Primary Decortication Flake. This flake type represents the initial reduction of a core. Generally, these flakes have a natural patina or cortex over most of the dorsal side and are void of other flake scars. Artifact assemblages with chert

resources obtained from bedded resources usually do not have decortication flakes of any kind because there is no patina/cortex formation.

Primary Thinning Flake. This flake type represents a transitional mode of chert reduction. The intent of this reduction activity is to reduce a core to a crude biface. Flakes have a steep platform angle (i.e., >65°) and lack cortex. However, occasional small remnants of cortex are prevalent at this point, especially on the striking platform.

Secondary Decortication Flake. These flakes occur as a by-product of patina/cortex removal of a core. They are differentiated from the previous flake type by a lesser amount of cortex evident on the dorsal side and at least one or part of one previous flake scar. These flakes have steep flake platform angles (>75°).

Secondary Thinning Flake. These flake types represent a reduction mode that is a direct result of the previous reduction activities (i.e., primary thinning). Soft, antler billet percussion and pressure flaking are used for this mode of reduction. At this point, the chert artifact being reduced or thinned is a biface rather than a core. The striking platform for this flake type is commonly represented by the edge of the biface. The platform angle is typically acute but can range from 30° to 65°. Previously removed flake scars are common on the dorsal side.

Sharpening Flake. These flake types are created during pressure flaking of a tool edge. The flakes are often very small with a tiny platform and are often conical. They are also created from reworking a tool edge after it has been dulled from use.

Shatter or Angular Shatter. These artifacts most frequently occur during percussion flake reduction of cores. These artifacts lack striking platforms, are thin, narrow, and triangular. They cannot be definitively associated with a specific functional category of chert reduction due to their ubiquity.

Uniface. A uniface only has evidence of use-wear on one side of the artifact. Unifacial artifacts include utilized flakes, end and side scrapers, and bladelets. However, bladelets are typically categorized as blades or lamellar flakes and are diagnostic of the Middle Woodland period.

Identification of the material type of individual artifacts is based on several attributes, including color, inclusions, and luster. Several resources were used to aid in the inventory of the material types, including Converse (1994), DeRegnaucourt and Georgiady (1998), and Stout and Schoenlaub (1945).

Curation

There were archaeological materials identified and collected during these investigations. The respective landowners will be contacted to determine the disposition of these materials, curated at the Ohio History Connection Warehouse Facility or returned. Notes and maps affiliated with this project will be maintained at Weller & Associates, Inc. files.

Literature Review

The literature review study area is defined as a 305 m (1,000 ft) area extending from the centerline of the project area (Figures 2-4). In conducting the literature review, the following resources were consulted at the Ohio State Historic Preservation Office (SHPO) and the State Library of Ohio:

1) *Archeological Atlas of Ohio* (Mills 1914);
2) SHPO United States Geological Survey (USGS) 7.5' series topographic maps;
3) Ohio Archaeological Inventory (OAI) files;
4) Ohio Historic Inventory (OHI) files;
5) National Register of Historic Places (NRHP) files;
6) SHPO consensus Determinations of Eligibility (DOE) files;
7) SHPO CRM/contract archaeology files;
8) County atlases, histories, historic USGS 15'series topographic map(s), and current USGS 7.5' series topographic map(s); and
9) Online and genealogical cemetery resource data.

A review of the *Atlas* (Mills 1914) was conducted and there are no relative resources indicated within the project area.

There are few recorded archaeological sites in this part of the state. There is one previously recorded site, 33HK0790 that is located in the study area and is to the east of the project. This is a historic period component that was not regarded as being significant (Weller 2016).

The OHI files did not indicate that there were any recorded architectural resources in the study area.

A review of the NRHP files and SHPO consensus DOE files was conducted; there are no relative resources within the study area.

A review of the CRM/contract files indicates that there have not been any prior professional surveys completed within the project area. There has been one survey listed on file that was conducted for the New Liberty Station that is to the east of the southern terminus of this corridor (Weller 2016). This survey recorded site 33HK0790, the only previously recorded resource in the study area.

Historical atlases/cartographic maps were reviewed for this project (Figure 4). Review of atlas resources did not indicate any buildings within or near the project's corridor (Hardesty 1875); there are residences indicated near the project corridor according to this resource. Strangely, there are no 15-Minute series maps (i.e., Deshler, Oh.) available for this area. Inspection of the *USGS 1980 Findlay and the 1974 McComb, Ohio 7.5 Minute Series (Topographic)* maps indicates that much of the central part of this corridor is situated along or on an "old railroad grade" (Figure 2). There are buildings indicated near the project area during the latter part of the twentieth century and into the modern era (Figure 2 and 3); however, these are sparsely located within an agricultural setting. There are no cemeteries indicated in the study area for this project.

Evaluation of Research Questions 1 and 2

There were two questions presented in the research design that will be addressed at this point. These are:

1) Did the literature review reveal anything that suggests the project area had been previously surveyed?
2) Are cultural resources likely to be identified in the project area?

The literature review for this project identified one archaeological site (33PU0168) within the study area, a historic period component. The project corridor includes the northern part that is within a flat and lake plain setting and the remainder that traverses a comparably elevated end moraine. It would be expected that most, if any sites, that are identified that they would be on the elevated end moraine setting. However, dense deposits of materials are not expected as the terrain is still relatively ubiquitous with only subtle differences or changes. Historic period materials are possible as there are a couple buildings or former building location that appear to be near the project corridor. Dense prehistoric period deposits would not be expected from this setting.

Archaeological Fieldwork Results

The Phase I field investigations for this project were conducted from April 1-7, 2022 (Figures 5-55) though sporadically and relative to the weather conditions. There was a bout of snowfall that covered the ground for a couple days that inhibited the ability to complete surface collection efforts. Otherwise, the temperatures during survey ranged from 45-65 degrees Fahrenheit. The field investigations mostly utilized surface collection to address and identify any archaeological deposits. Visual inspection was conducted to verify the conditions and surface visibility and the nature and extent of disturbed conditions. Subsurface testing was limited to a few areas where surface visibility was hampered. The project corridor is located in upland and rural farm conditions and survey was conducted in various agricultural field conditions, most of which were suitable for surface collection methods of investigation. The field investigations resulted in the identification of six previously unrecorded archaeological sites including 33HK1042-1047.

These investigations were conducted in an upland and glaciated/lake plains setting that is flat and poorly drained. The project corridor extends in a basically northwest-southeast manner through rural upland agricultural settings that are between the Village of McComb (Rader Road Station) and the New Liberty Station. The survey corridor is considered to be 30.5 m (100 ft) wide and is 11.3 km (7 mi) long. The project corridor is partially positioned immediately adjacent to road right-of-way and/or a former railroad line that has since been removed. The majority of the corridor was suitable for surface collection methods of archaeological sampling.

Surface collection methods of investigation accounted for the majority of the archaeological sampling efforts for this project (Figures 5-19). Surface collection efforts were conducted through about 90 percent of the project corridor. The conditions that were experienced at the time of survey where this method was conducted included winter wheat, soybean stubble, corn stubble, wheat stubble, and tilled situations. Pedestrian transects were spaced at 5-7.5 m intervals throughout the project's corridor and where this method of sampling was suitable, when the bare ground surface visibility was 50 percent or greater. There was one area where a sandy rise was encountered and transect intervals were reduced to 2.5 m intervals to address this noted landform, this is where site 33HK1047 was identified (Figure 8). All of the sites identified during these investigations were identified during surface collection survey.

There were a couple areas where surface visibility was lacking, and shovel test unit excavation was necessary to effectively sample the area (Figures 5, 6, and 10). Shovel testing accounted for a small part of the project and there were 41 shovel test units excavated over the course of these investigations and 17 shovel probes. Probes were excavated in areas where disturbed soils were identified upon excavation, and these continued to document the nature and extent of these disturbances; these were mostly excavated in urban or manicured lawn settings relative to McComb and near the New Liberty Station. The testing typically encountered very clayey topsoil deposits that were consistently documented as a plowzone but there were areas that were slightly elevated that were loamier. The topsoil in the more elevated areas was brown (10YR4/3) silt loam and the subsoil was dark yellowish brown (10YR4/4) silty clay loam (Figure 55). The subsoils appeared to be indicative of former lacustrine deposition. There were no archaeological sites identified during the subsurface testing for this project.

Severely disturbed conditions account for the majority of the areas where archaeological investigations were precluded (Figures 5-19). There were some areas where the project corridor extended immediately along road rights-of-way where underground utility easements, transportation-related grading, and/or landscaping were prevalent. Extant modern construction activities affiliated with the Rader Road and New Liberty Stations were encountered at the ends of the project corridor. Just east of the Village of McComb there is an athletic field compound that had been graded and there were graveled drives extending through parts of the corridor. In the same vicinity there is some overlap with the transmission line easement with a railroad corridor. Urban and residential development in some areas encountered disturbed, urban land complex types

of soils that evidenced grading activities. The central part of the project corridor extends along a former railroad grade (Figure 2) and this is still somewhat evidenced via inspection of aerial imagery (Figure 3). This does not appear to have been a railway line that lasted for a long period and is noted as extending along the northeast side of the New Liberty Station and beyond. Though it was evident from cartographic inspection, it was not always recognized in the field as it was effectively razed in many areas. It was more recognized where the line extended through wooded areas and where water tended to pond along where it was once located.

There were six archaeological sites identified during these investigations, 33HK1042-1047. These sites are all affiliated with prehistoric period components. The following are descriptions of these sites.

Archaeological Site Descriptions

33HK1042

This site is a prehistoric period isolated find that was identified during surface collection of a tilled soybean stubble field (Figure 6). The surface visibility within the field at the time of survey was at 75 percent and pedestrian transects were spaced at 7.5 m intervals and reduced to 2 m intervals upon identification of the artifact; no additional materials were identified. The site is located just northeast of the Village of McComb and is east of State Route 235. It was identified from a slight rise that is within a flat, lake plain setting. This site is drained by Rader Creek, which is a tributary of Middle Branch Portage River and flows northeasterly to the Portage River, Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a nearly complete triangular point preform that was manufactured from Columbus-Delaware chert (Figure 56). This is an isosceles triangle and would be reflective of a Madison point type. The base is slightly convex and the cross-section is plano-convex. The distal part is not complete as it evidences attempts to further reduce/finish the form. The blade edges are slightly irregular and occasionally ground. It does not have the appropriate symmetry, form, or use to be characterized as a completed tool. Madison points date from the Late Woodland to Late Prehistoric period from about 800 AD to the historic period (Justice 1987:224).

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of the region. The site has a numerically and functionally limited, diffuse artifact assemblage, and the materials are only known from surface contexts. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

Table 2. Artifact Inventory for Sites 33HK1042-1047.					
Site 33HK…	**Provenience**	**Bag**	**Artifact**	**Material**	**Count**
1042	FS 1	1	Triangular point preform	Columbus-Delaware	1
1043	FS 2	2	Unifacial knife/scraper fragment	Flint Ridge	1
1044	FS 3	3	Ovoid unifacial knife	Liston	1
1045	FS L1	4	Secondary thinning flake	Upper Mercer	1
1046	FS L2	5	Secondary thinning flake	Pipe Creek	1
1047	FS 4-1	6	Primary thinning flake	Cedarville-Guelph	1
	4-2	7	Biface midsection (knife)	Cedarville-Guelph	1
	4-3	8	Blocky irregular	Flint Ridge	1

33HK1043

This site is a prehistoric period isolated find that was identified during surface collection of a tilled soybean stubble field (Figure 6). The surface visibility within the field at the time of survey was at 75 percent and pedestrian transects were spaced at 7.5 m intervals and reduced to 2 m intervals upon identification of the artifact; no additional materials were identified. The site is located to the east of the Village of McComb and is in the Southwest Quarter of Section 18, Portage Township. It was identified from a slight rise that is on the northern edged of an end moraine. This site is drained by Rader Creek, which is a tributary of Middle Branch Portage River and flows northeasterly to the Portage River, Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a fragment of a unifacial tool that was made from Flint Ridge chert (Table 2). This has steep edges and is fractured at a crystalline inclusion. The remaining fragment of this former tool would have been used for cutting, scraping, and graving (there is a graver spur present). This artifact is not considered to be temporally diagnostic.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of the region. The site has a numerically and functionally limited, diffuse artifact assemblage, lacks diagnostics, and the materials are only known from surface contexts. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33HK1044

This site is a prehistoric period isolated find that was identified during surface collection of a tilled soybean stubble field (Figure 6). The surface visibility within the field at the time of survey was at 75 percent and pedestrian transects were spaced at 7.5 m intervals and reduced to 2 m intervals upon identification of the artifact; no additional

materials were identified. The site is located to the east of the Village of McComb and is in the Southwest Quarter of Section 18, Portage Township. It was identified from a slight rise that is within a flat, lake plain setting. This site is drained by Rader Creek, which is a tributary of Middle Branch Portage River and flows northeasterly to the Portage River, Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is an ovoid-shaped basically unifacial knife that was made from Liston chert (Table 2). There are slight retouches to the ventral side, otherwise it is unifacial. There is a bulb of percussion at the proximal end that is its thickest part and it was reduced slightly as this was made from a flake. The edges are straight and finely reworked. This would have functioned as a knife and scraper. This is not a temporally diagnostic artifact.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of the region. The site has a numerically and functionally limited, diffuse artifact assemblage, lacks diagnostics, and the materials are only known from surface contexts. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33HK1045

This site is a prehistoric period isolated find that was identified during surface collection of a corn stubble field (Figure 12). The surface visibility within the field at the time of survey was at 70-90 percent and pedestrian transects were spaced at 7.5 m intervals and reduced to 2 m intervals upon identification of the artifact; no additional materials were identified. The site is located in the Northeast Quarter of Section 32, Portage Township and is east of TR 135. It was identified from a slight rise that is within a that is on an end moraine. This site is drained by an unnamed tributary Rocky Fork, which is a tributary of the Middle Branch Portage River River and flows into Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a flake of Upper Mercer chert (Table 2). This is functionally indicative of biface reduction. This is not regarded as being temporally diagnostic.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of the region. The site has a numerically and functionally limited, diffuse artifact assemblage, lacks diagnostics, and the materials are only known from surface contexts. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33HK1046

This site is a prehistoric period isolated find that was identified during surface collection of a corn stubble field (Figure 14). The surface visibility within the field at the time of survey was at 70-90 percent and pedestrian transects were spaced at 7.5 m intervals and reduced to 2 m intervals upon identification of the artifact; no additional materials were identified. The site is located on a slight rise that is on an end moraine setting and is to the west of TR 136. This site is drained by an unnamed tributary of the Blanchard River, which is a tributary of the Auglaize River and flows into the Maumee to Lake Erie. The site size is considered to be 1 sq m.

The artifact that was identified from this site is a flake of Pipe Creek chert (Table 2). This is functionally indicative of biface reduction. This is not regarded as being temporally diagnostic.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of the region. The site has a numerically and functionally limited, diffuse artifact assemblage, lacks diagnostics, and the materials are only known from surface contexts. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33HK1047

This site is a low-density prehistoric period lithic scatter that was identified during surface collection of a winter wheat field (Figure 8). Pedestrian transects were intensified to 2.5 m intervals on the landform as it is a sandy elevation that is near an upland ponded area; the survey was considerate of the landform and its setting on this end moraine. The site is located to the west of County Road 131 and is just north of a small, wooded lot. This is in the Northeast Quarter of Section 25 of Portage Township. This site/landform drains to an upland depression on the end moraine; it is within the Rader Creek drainage and flows to the Middle Branch Portage River, which empties into the Portage River and Lake Erie. The dimensions of the site are 58 m northwest-southeast by 21 m southwest-northeast and the site size is considered to be 989 sq m.

There were three artifacts that were identified from this site (Table 2). The material assemblage includes Cedarville-Guelph (n=2) and Flint Ridge (n=1). There are two artifacts (primary thinning and block irregular) that are indicative of general core reduction. One of the Cedarville-Guelph artifacts is the central part/midsection of a bifacial knife. The cross-section is plano-biconvex and the edges are reworked and somewhat irregular regarding its symmetry. None of these artifacts are considered to be temporally diagnostic.

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI,

NPS] 1997:44-45) and the ability to yield further and important information regarding the prehistory of the region. The site has a numerically and functionally limited, diffuse artifact assemblage, lacks diagnostics, and the materials are only known from surface contexts. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

APE Definition and NRHP Determination

The APE is a term that must be applied on an individual project basis. The nature of the project or undertaking is considered in determining the APE. This may include areas that are off the property or outside of the actual project's boundaries to account for possible visual impacts. When construction is limited to underground activity, the APE may be contained within the footprint of the project. The APE includes the transmission lines easement, which is 30.5 m (100 ft) wide and 11.3 km (7.0 mi) long. These investigations resulted in the identification of six previously unrecorded archaeological sites including 33HN1042-1047 and these are not considered to be significant. They include five isolated finds and one low-density scatter. There are no significant archaeological recorded resources involved with this project.

Recommendations

In April 2022, Weller & Associates, Inc. conducted Phase I Archaeological Investigations for the 11.3 km (7.0 mi) Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio. The archaeological fieldwork largely consisted of surface collection methods and visual inspection with lesser areas that were subject to subsurface testing. These investigations resulted in the identification of six previously unrecorded archaeological sites, 33HK1042-1047. These sites are not considered to be significant, and they are not eligible for the National Register of Historic Places, they are not landmarks. It is considered that this will not affect any historic properties or landmarks. No further archaeological work is deemed necessary.

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Figures

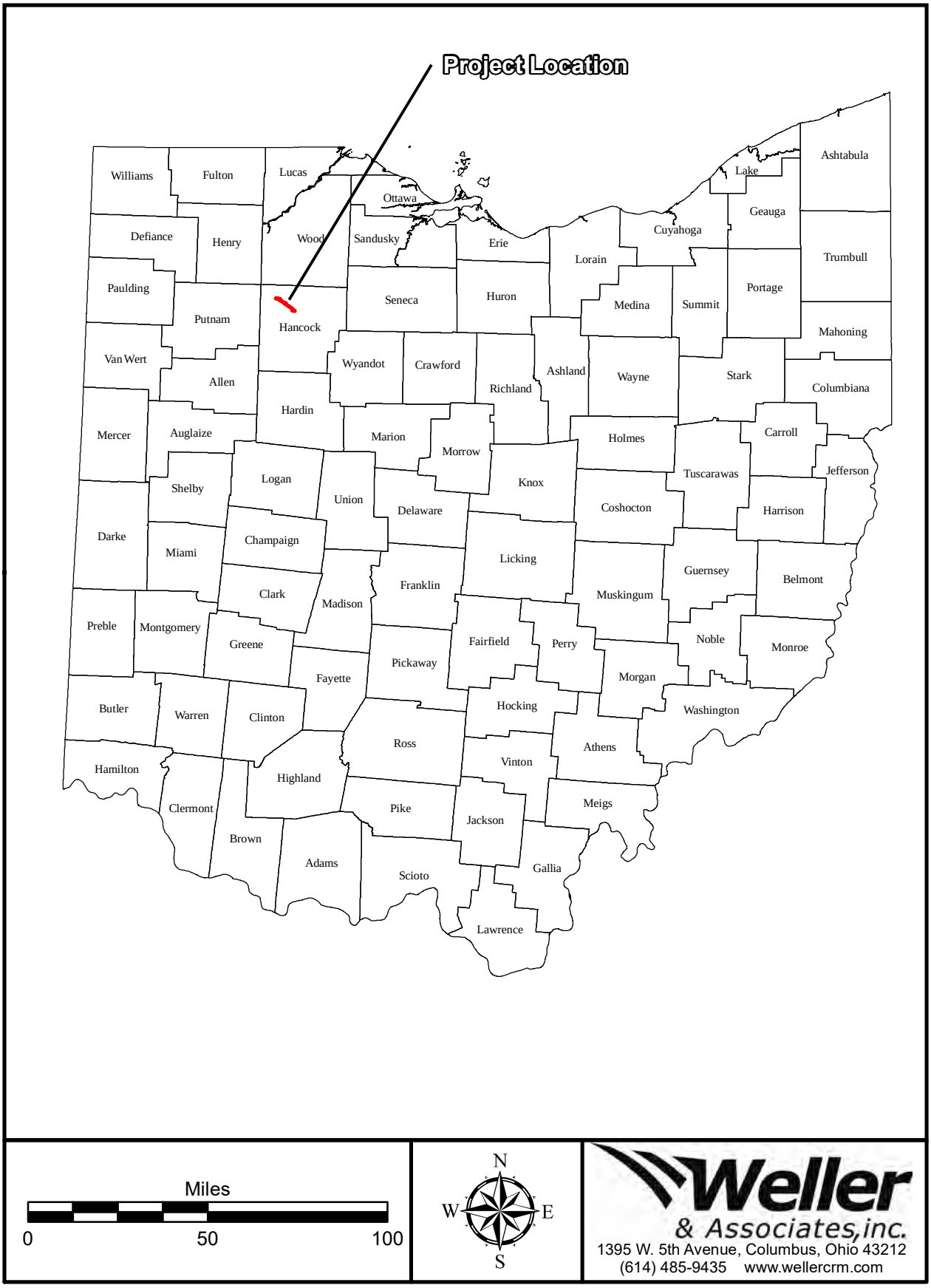


Figure 1. Political map of Ohio showing the approximate location of the project.

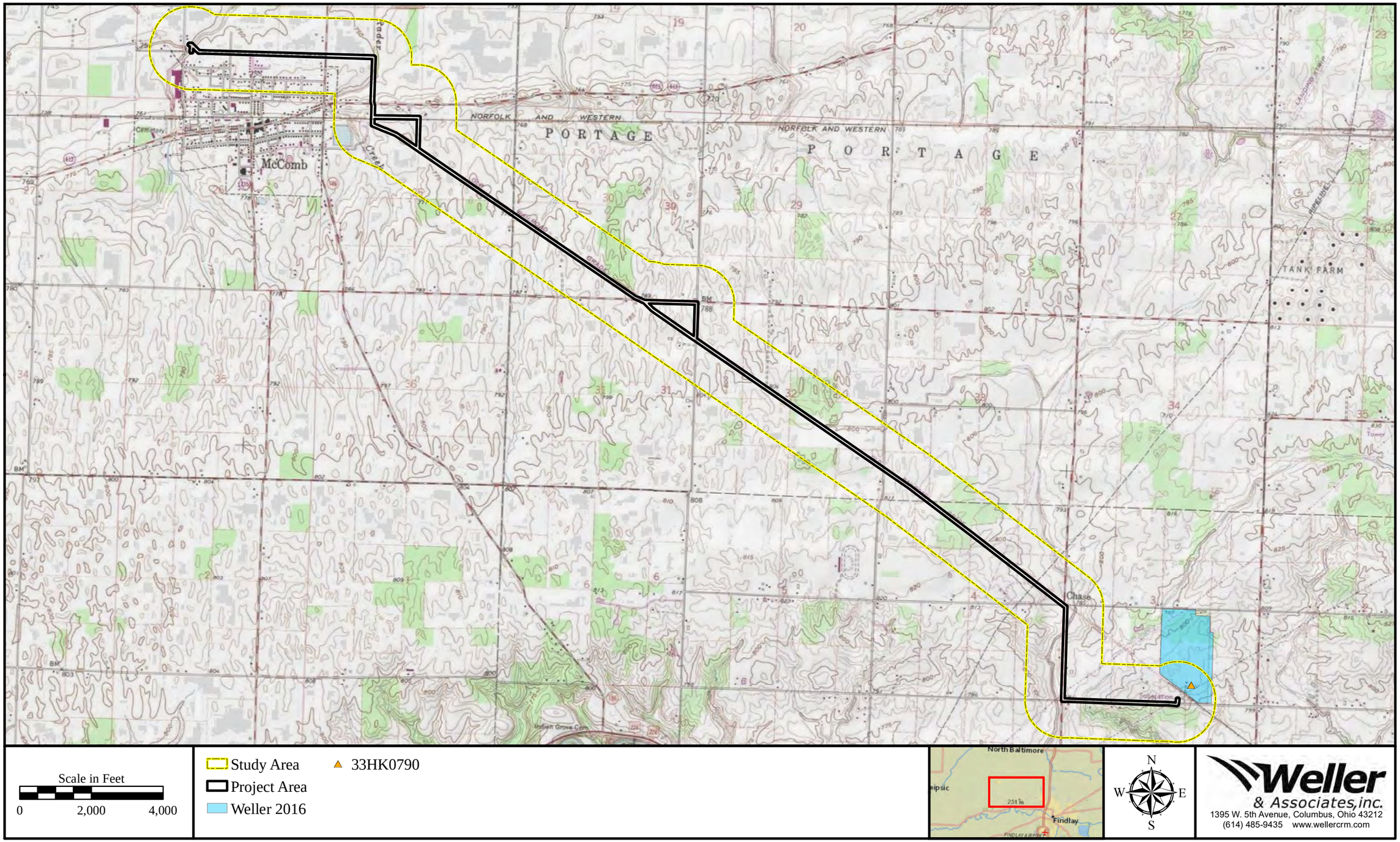


Figure 2. Portion of the USGS *1974 McComb, and 1980 Findlay, Ohio 7.5 Minute Series (Topographic)* maps indicating the location of the project and recorded resources within the project area.

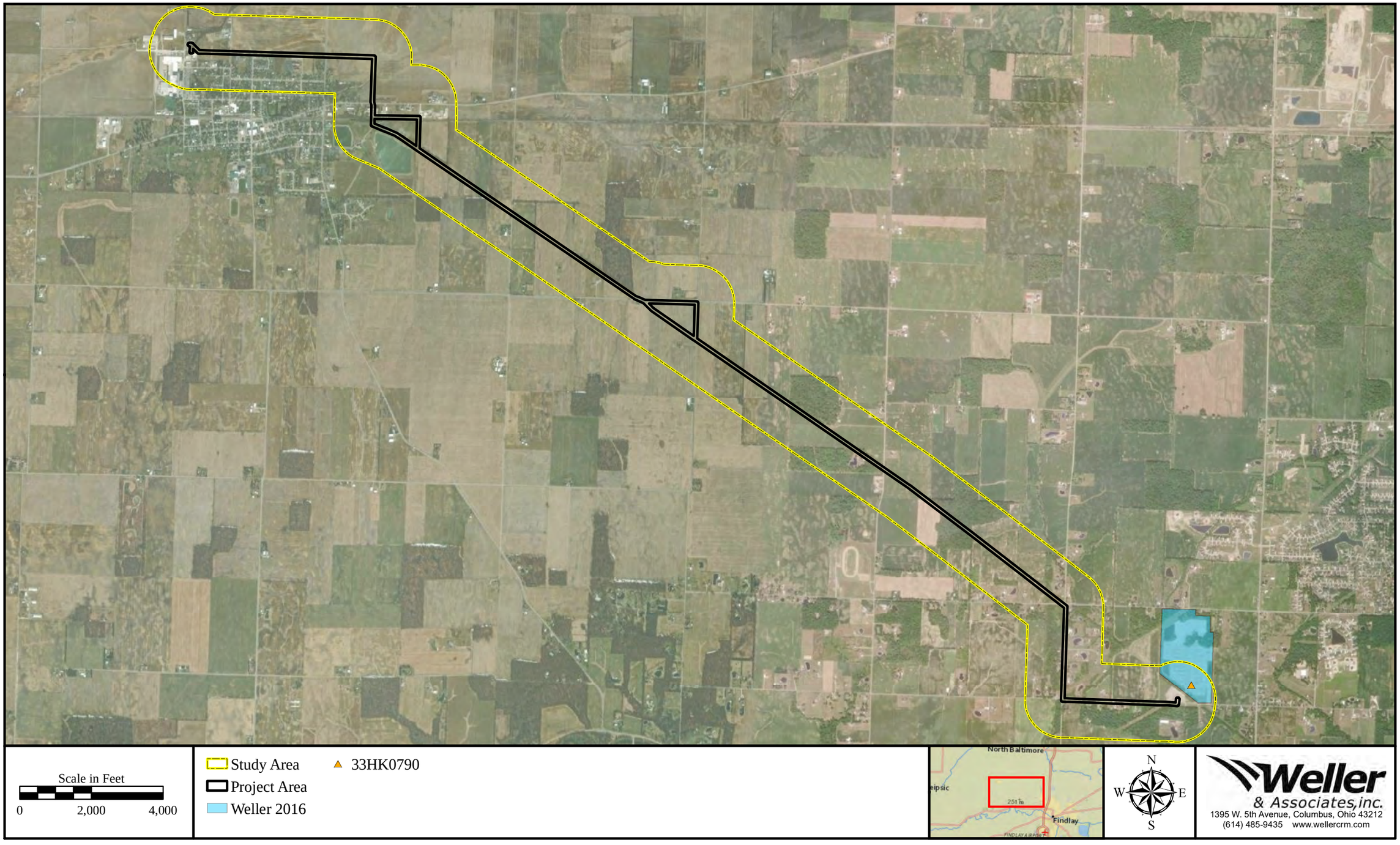


Figure 3. Aerial map indicating the location of the project area and recorded resources within the study area.

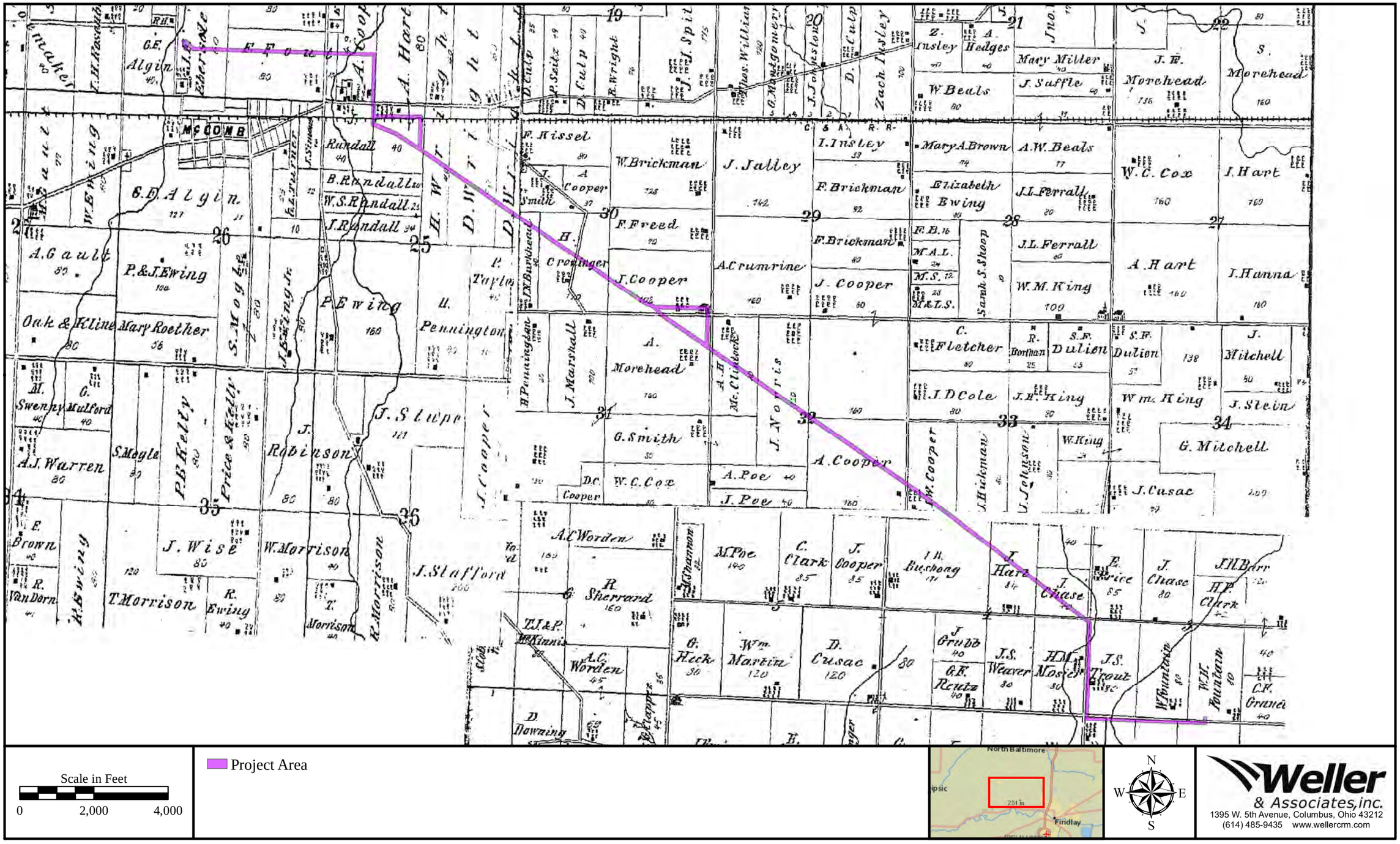


Figure 4. Portion of the *Atlas of Hancock County, Ohio* (Hardesty 1875) indicating the approximate location of the project.

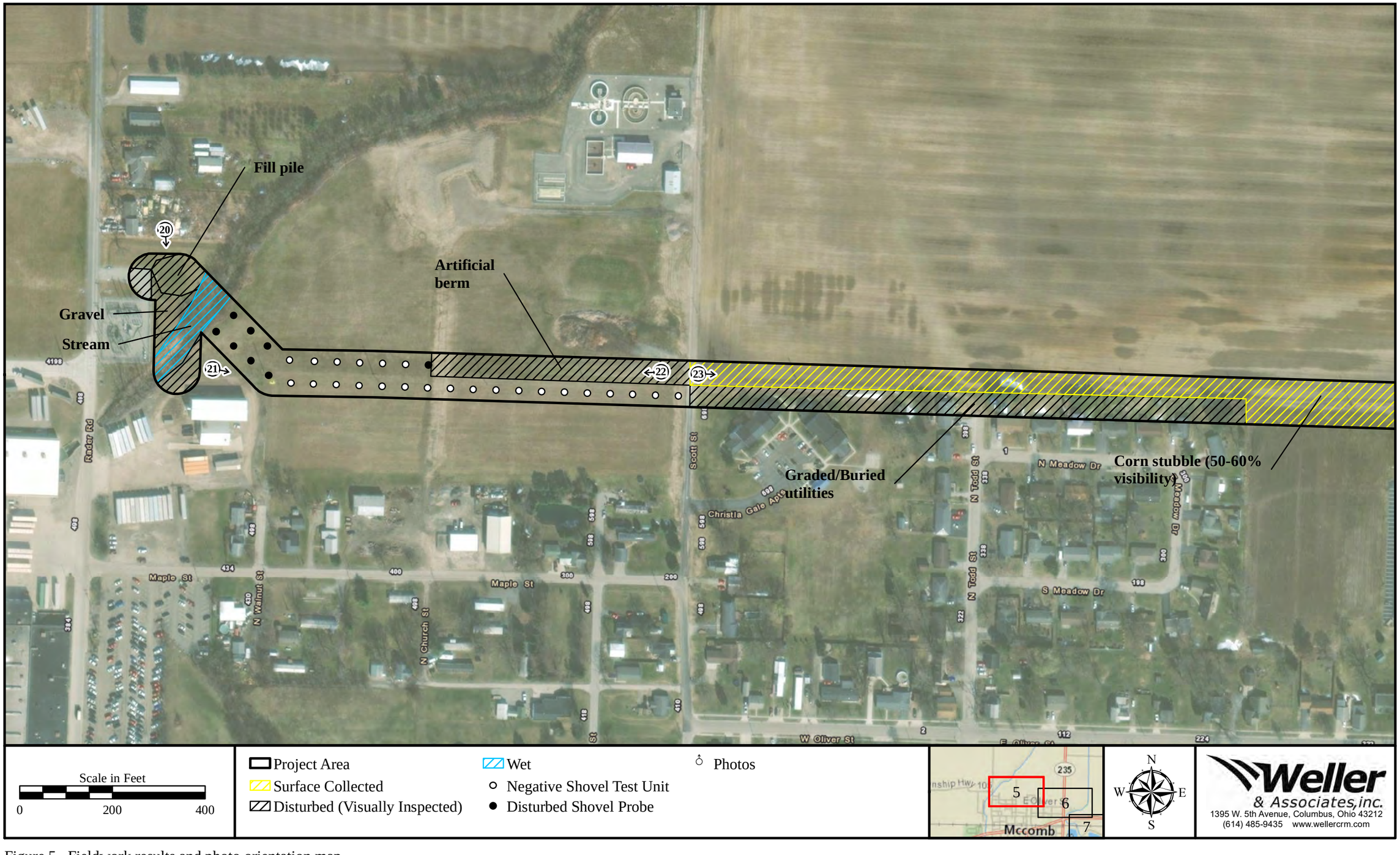


Figure 5. Fieldwork results and photo orientation map.

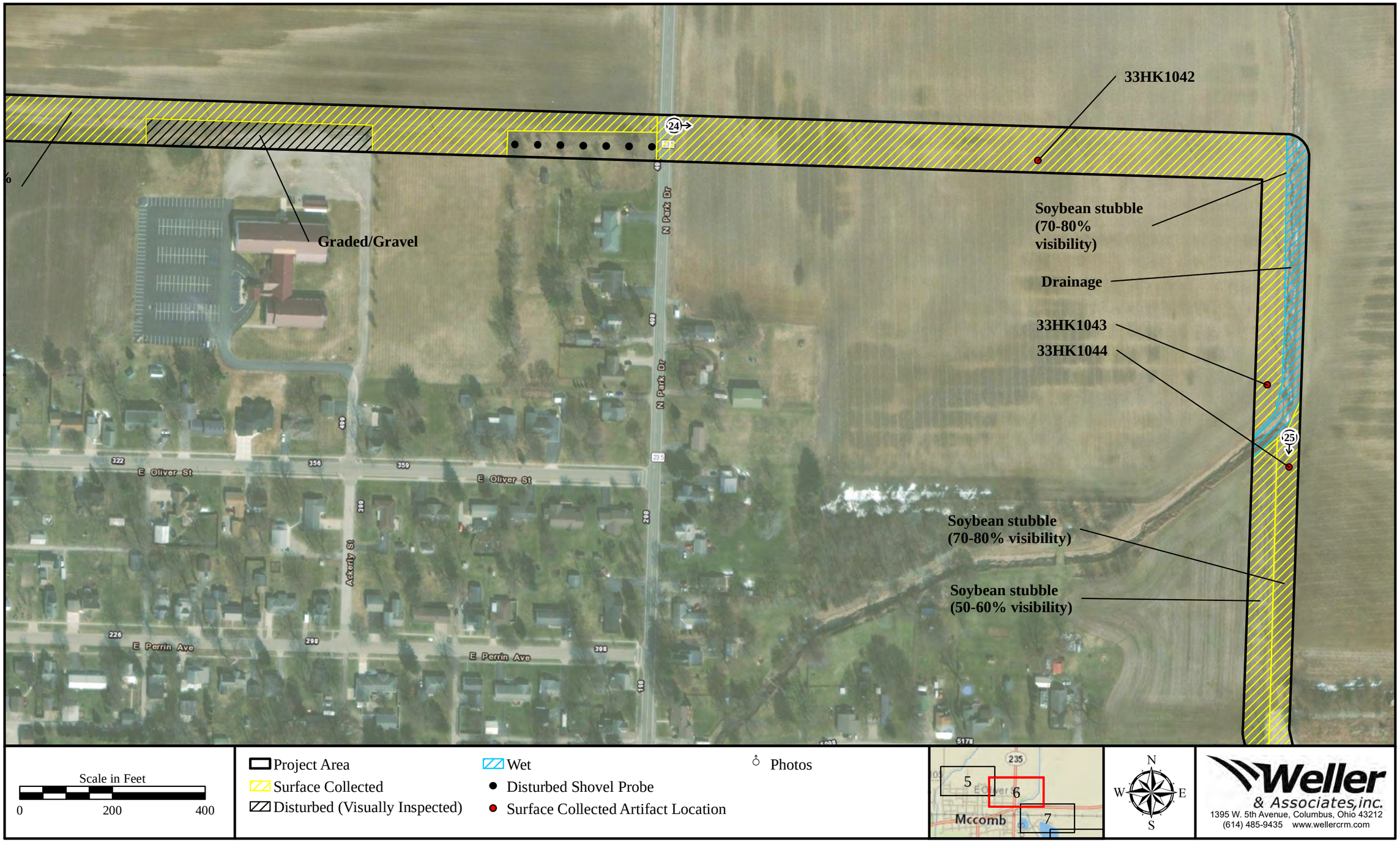


Figure 6. Fieldwork results and photo orientation map.

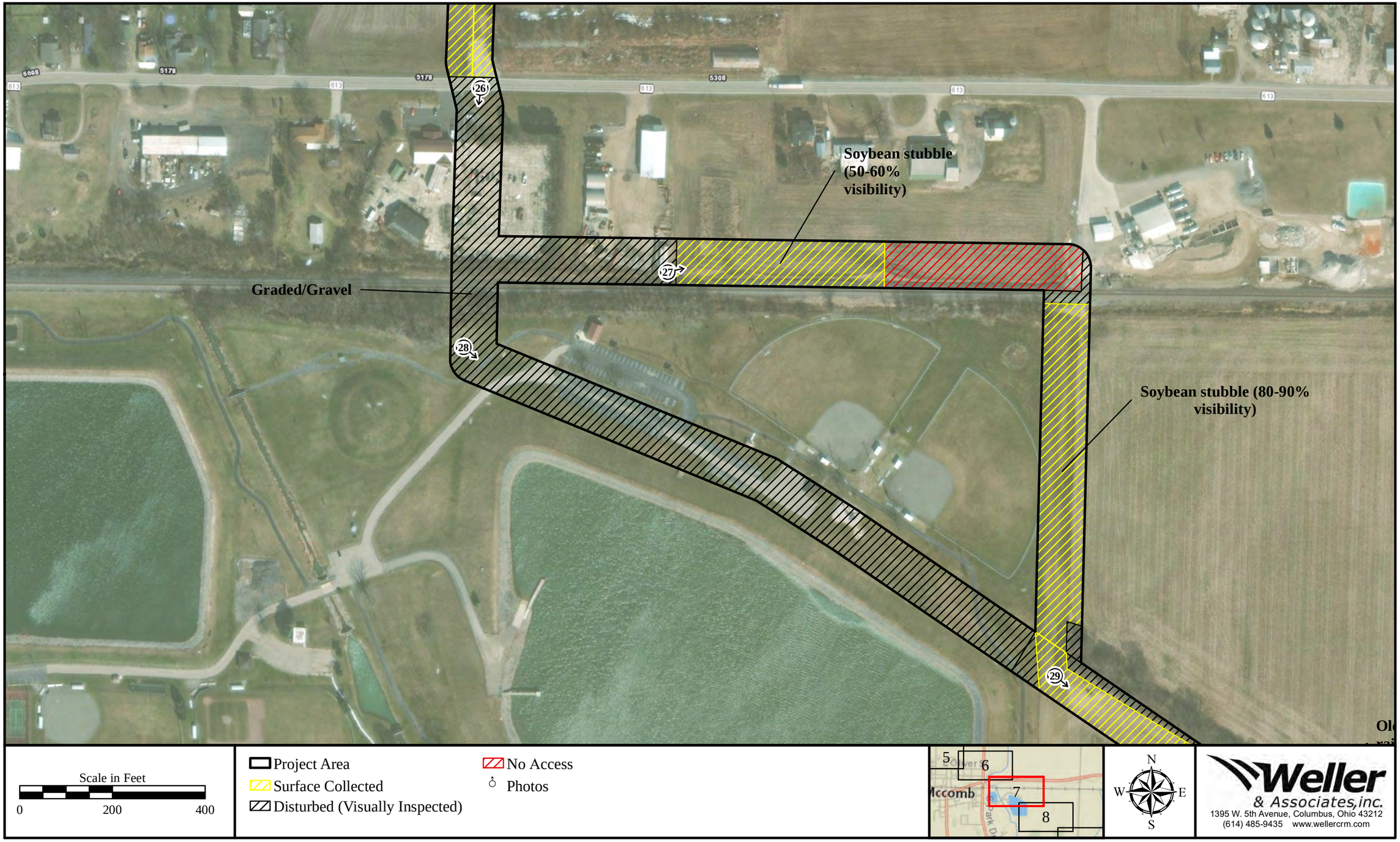
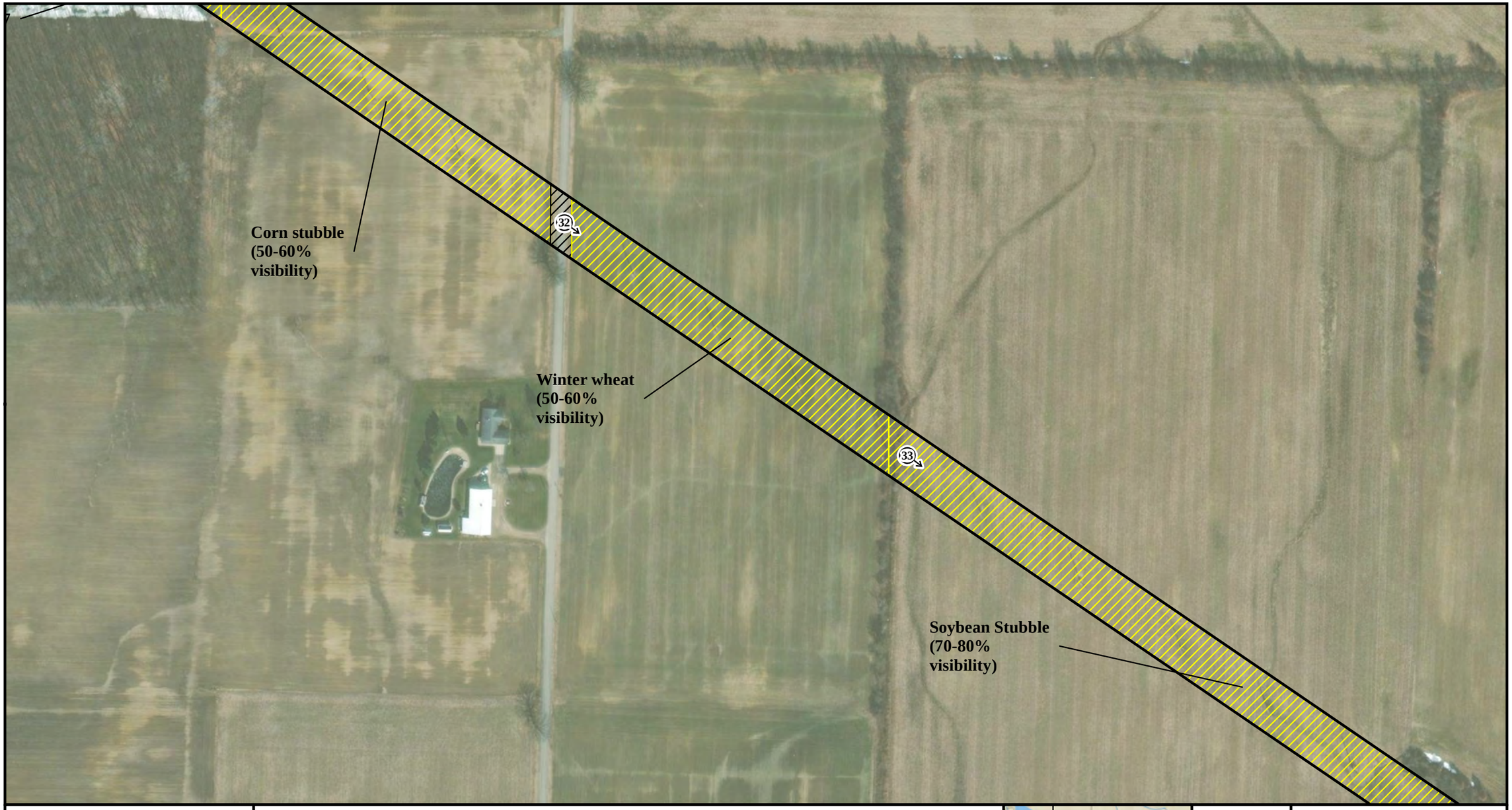


Figure 7. Fieldwork results and photo orientation map.

Figure 8. Fieldwork results and photo orientation map.



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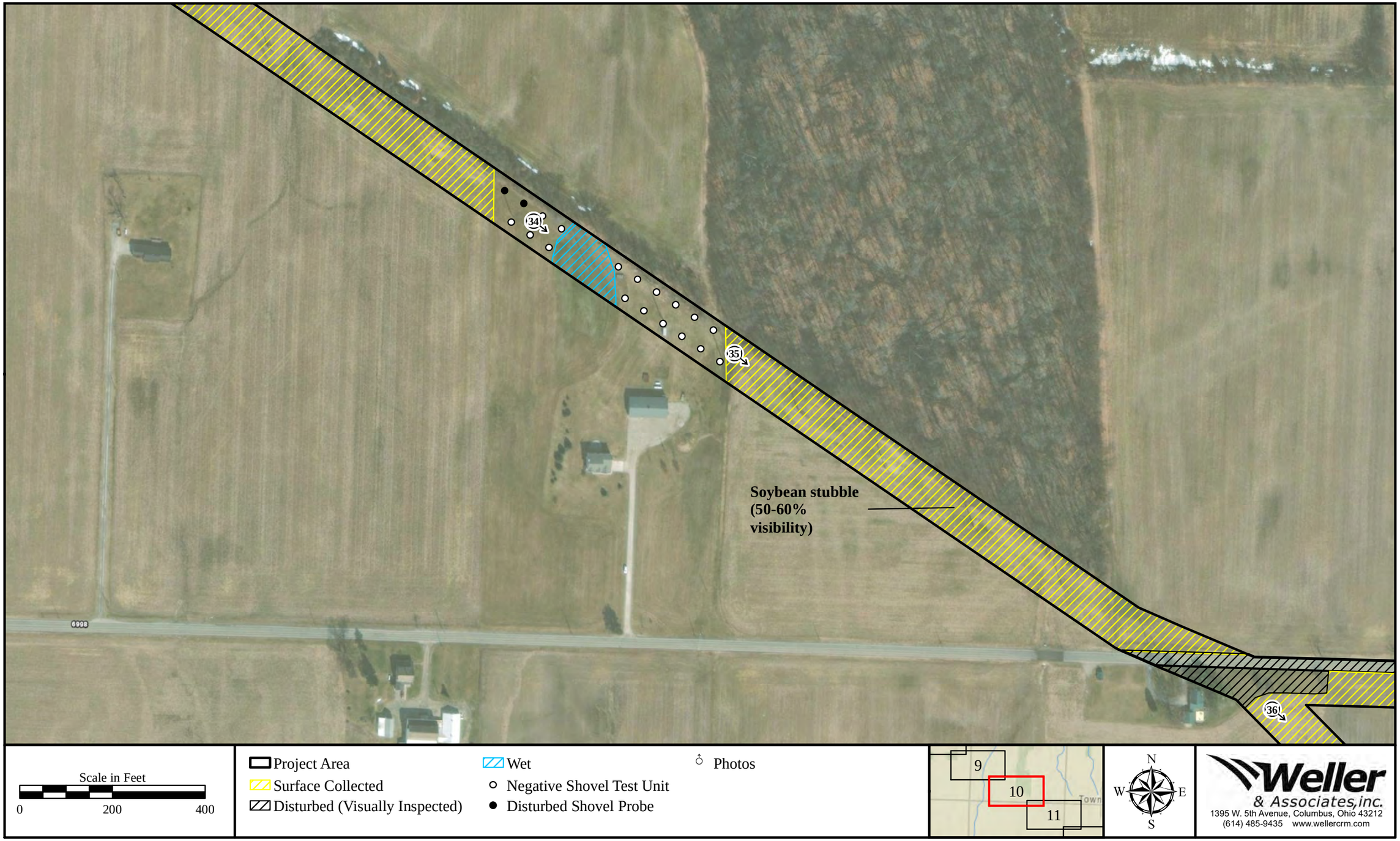

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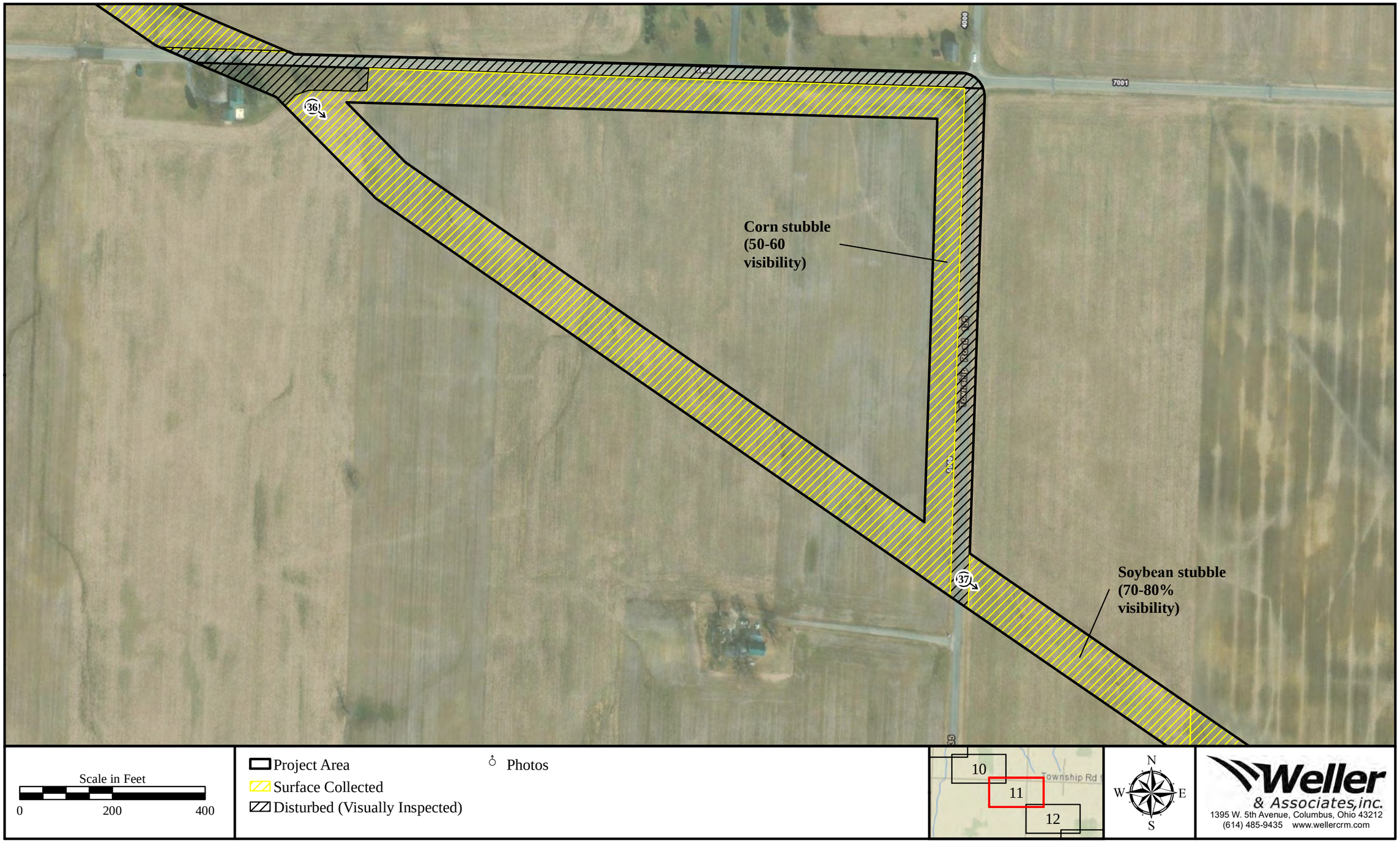


Figure 11. Fieldwork results and photo orientation map.

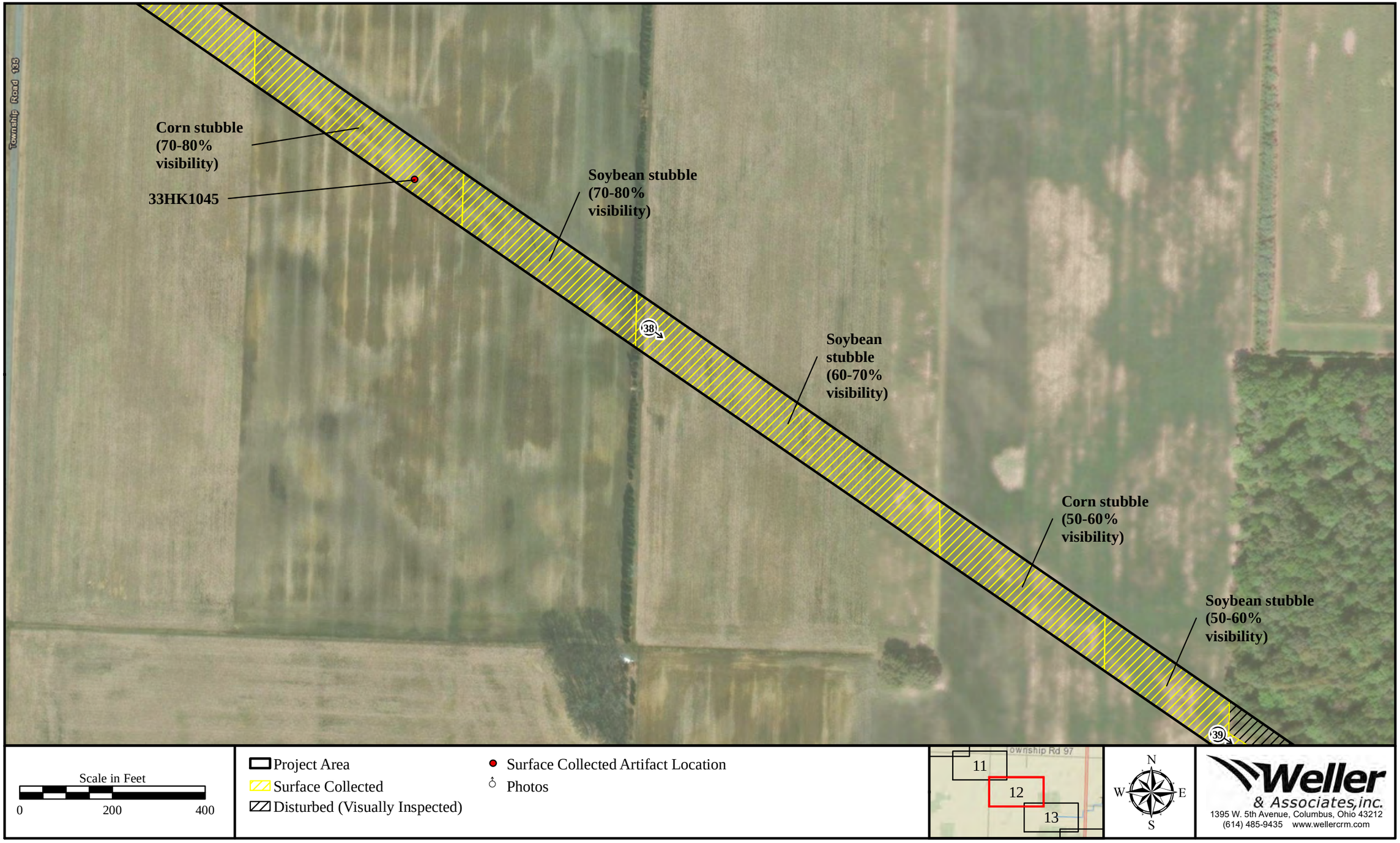


Figure 12. Fieldwork results and photo orientation map.

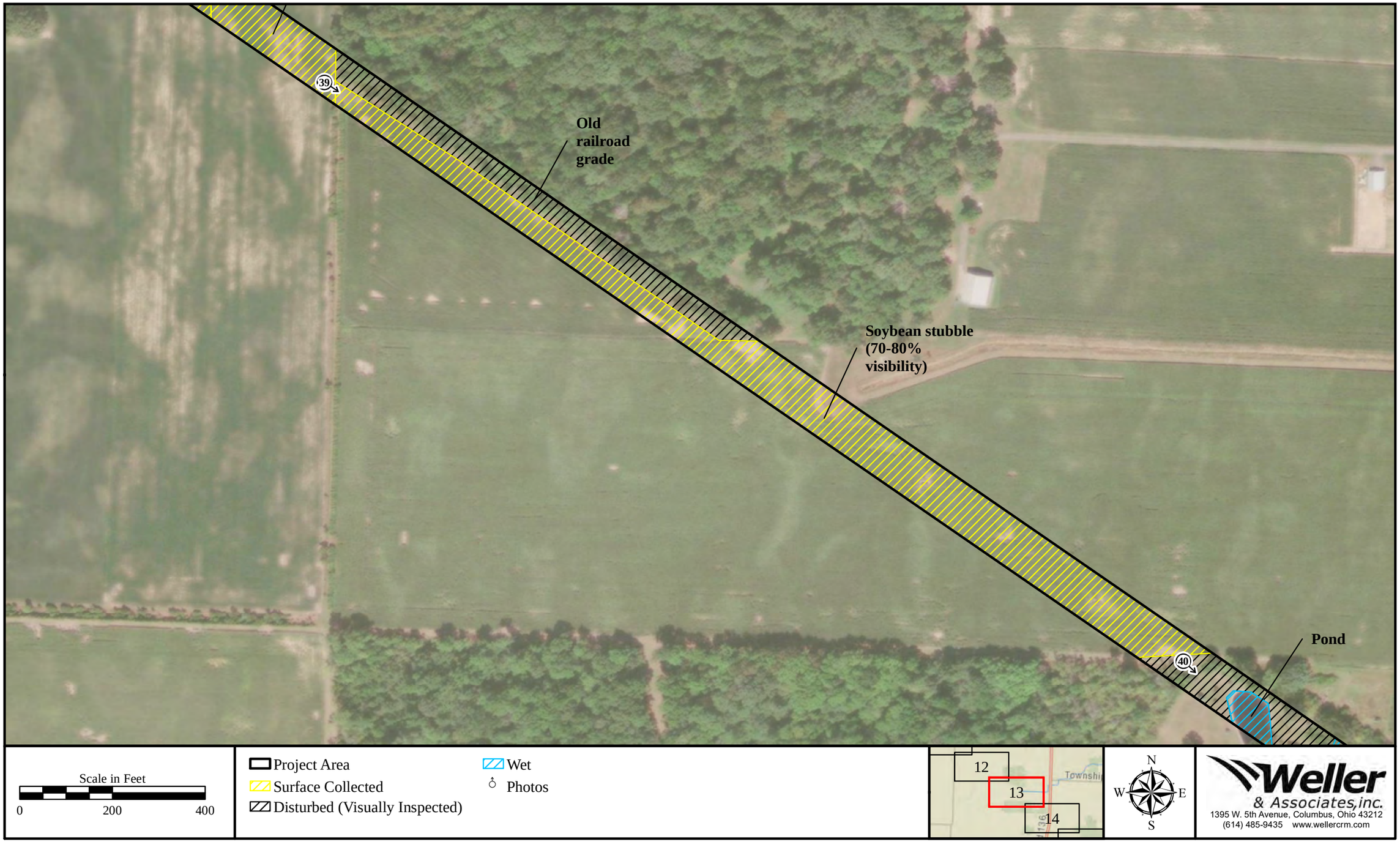


Figure 13. Fieldwork results and photo orientation map.

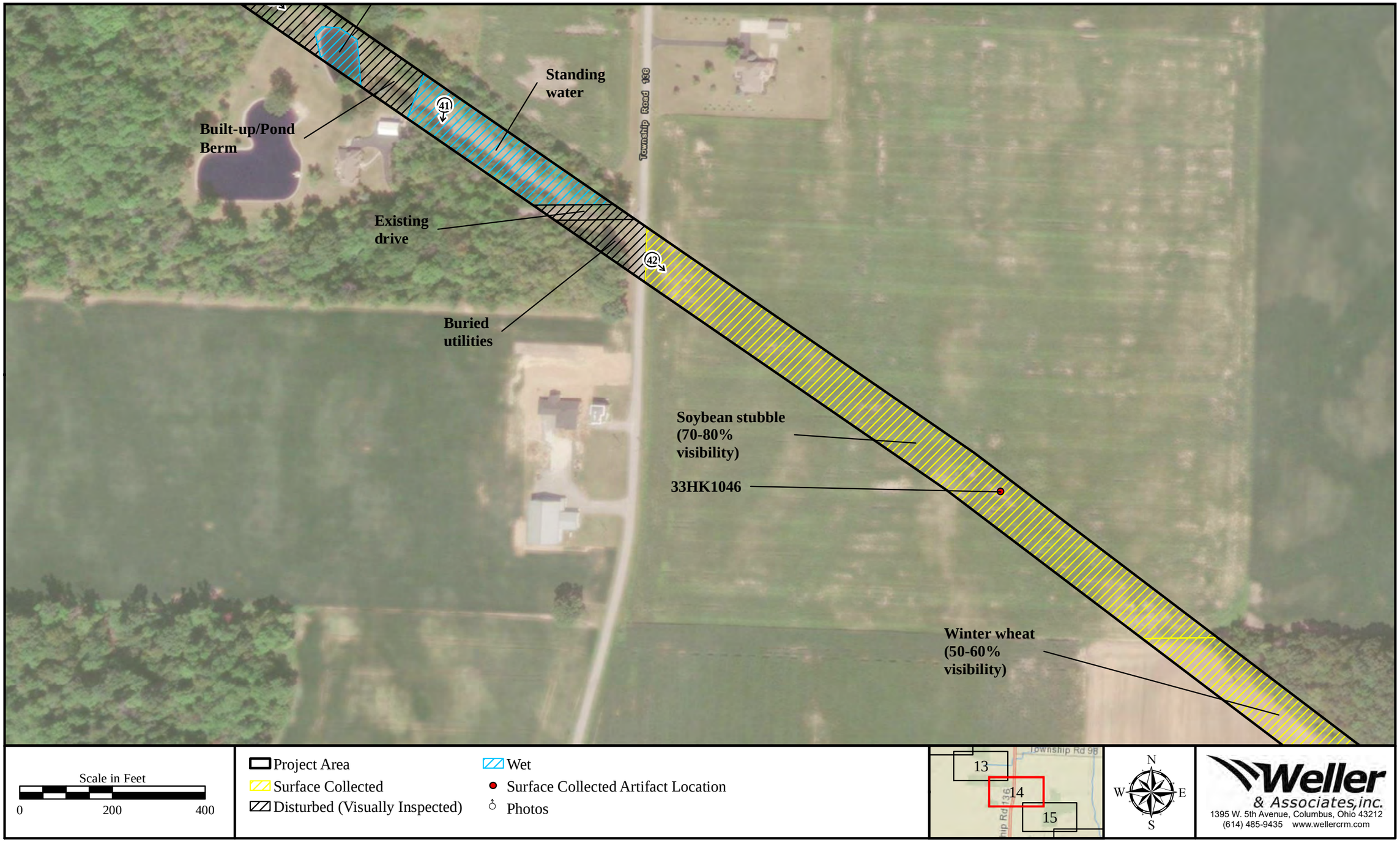


Figure 14. Fieldwork results and photo orientation map.

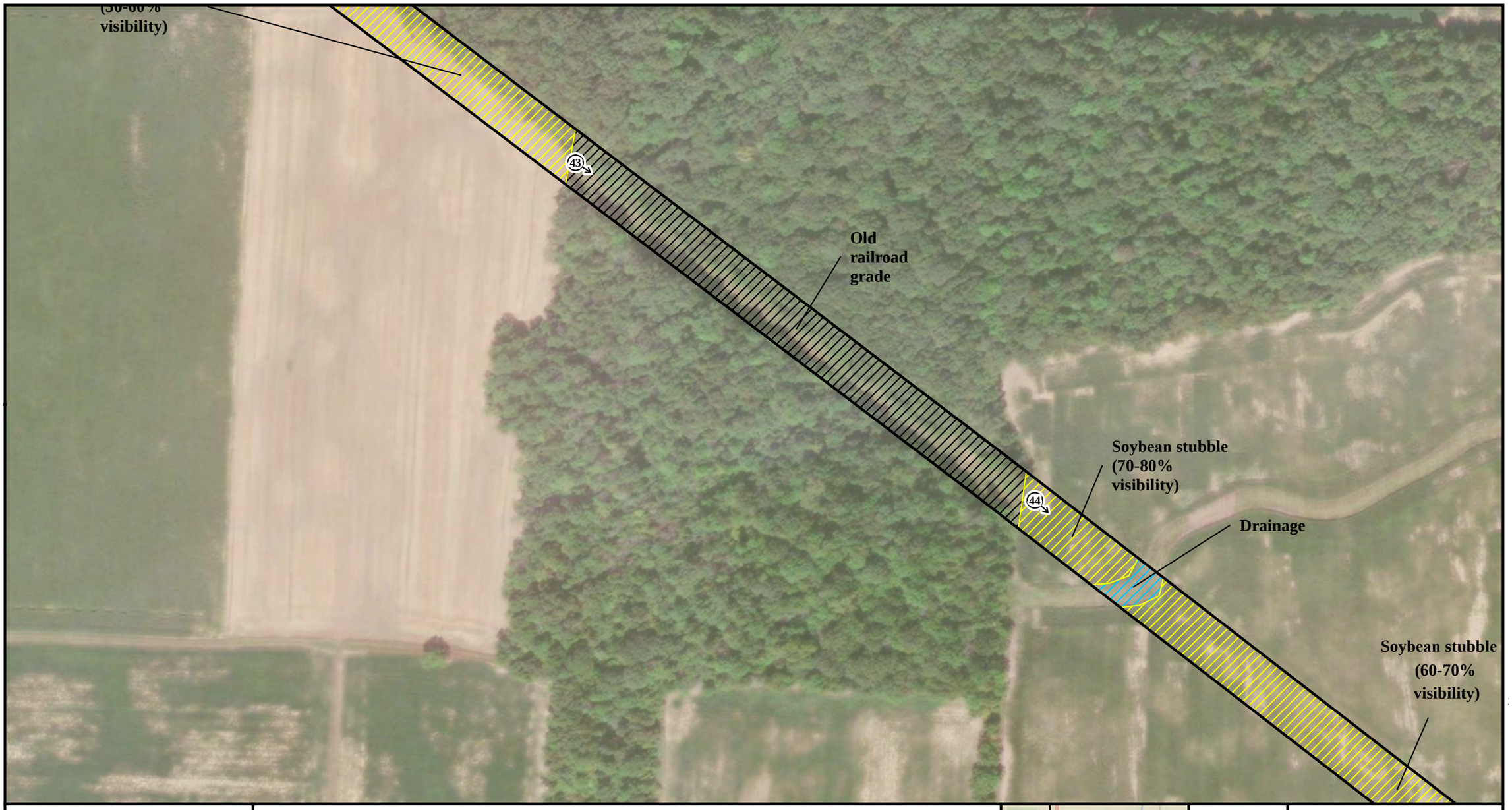


Figure 15. Fieldwork results and photo orientation map.

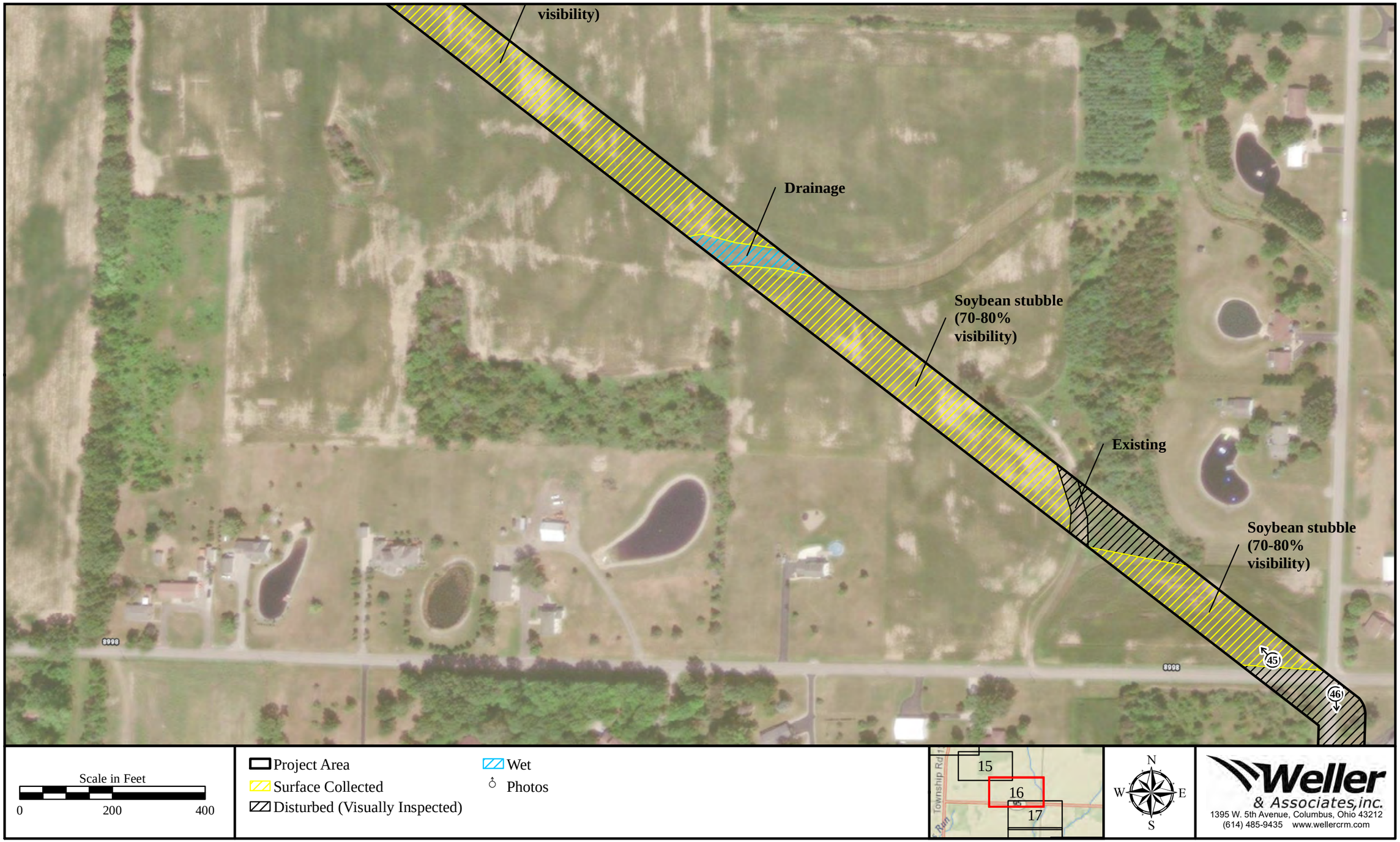


Figure 16. Fieldwork results and photo orientation map.

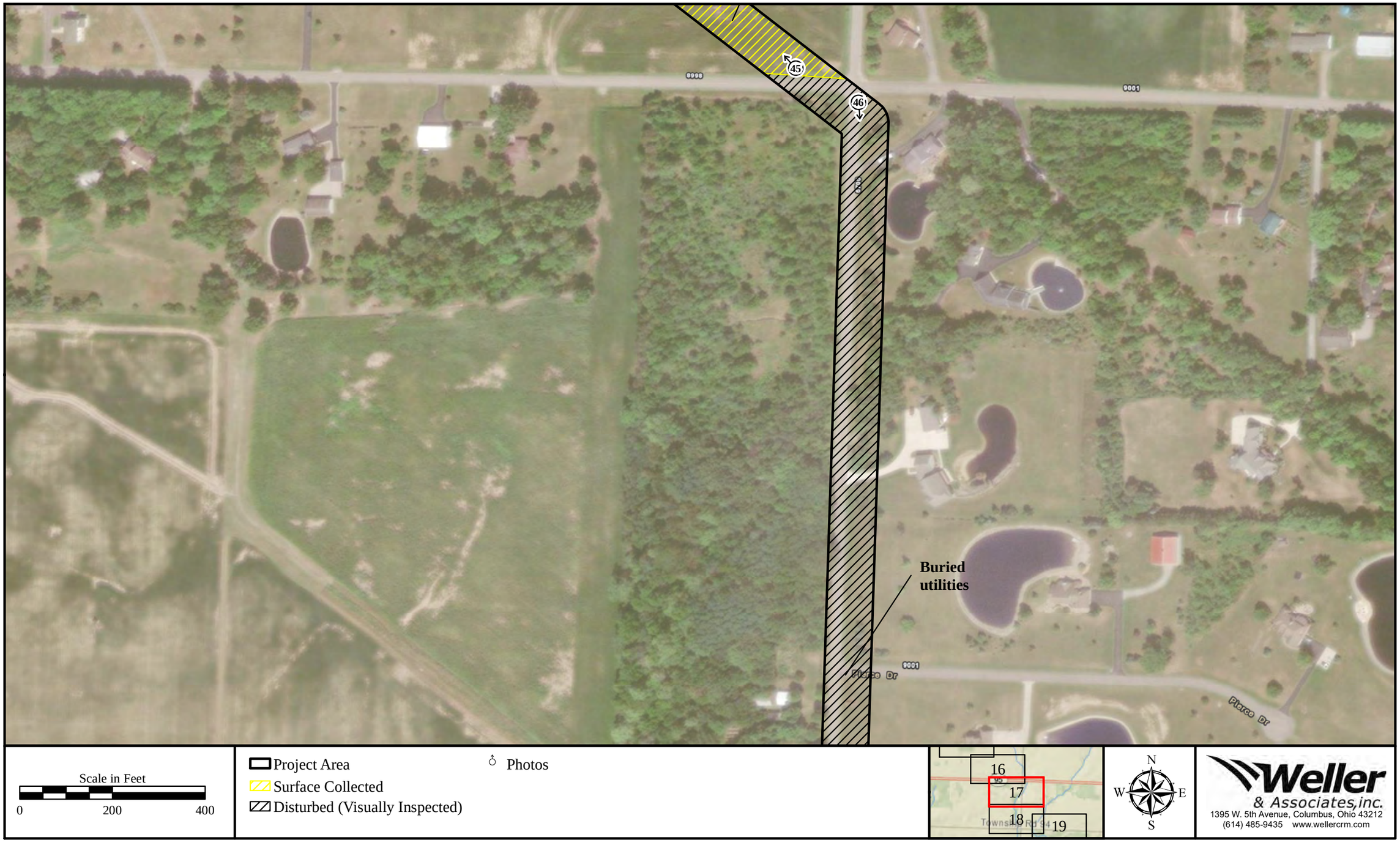
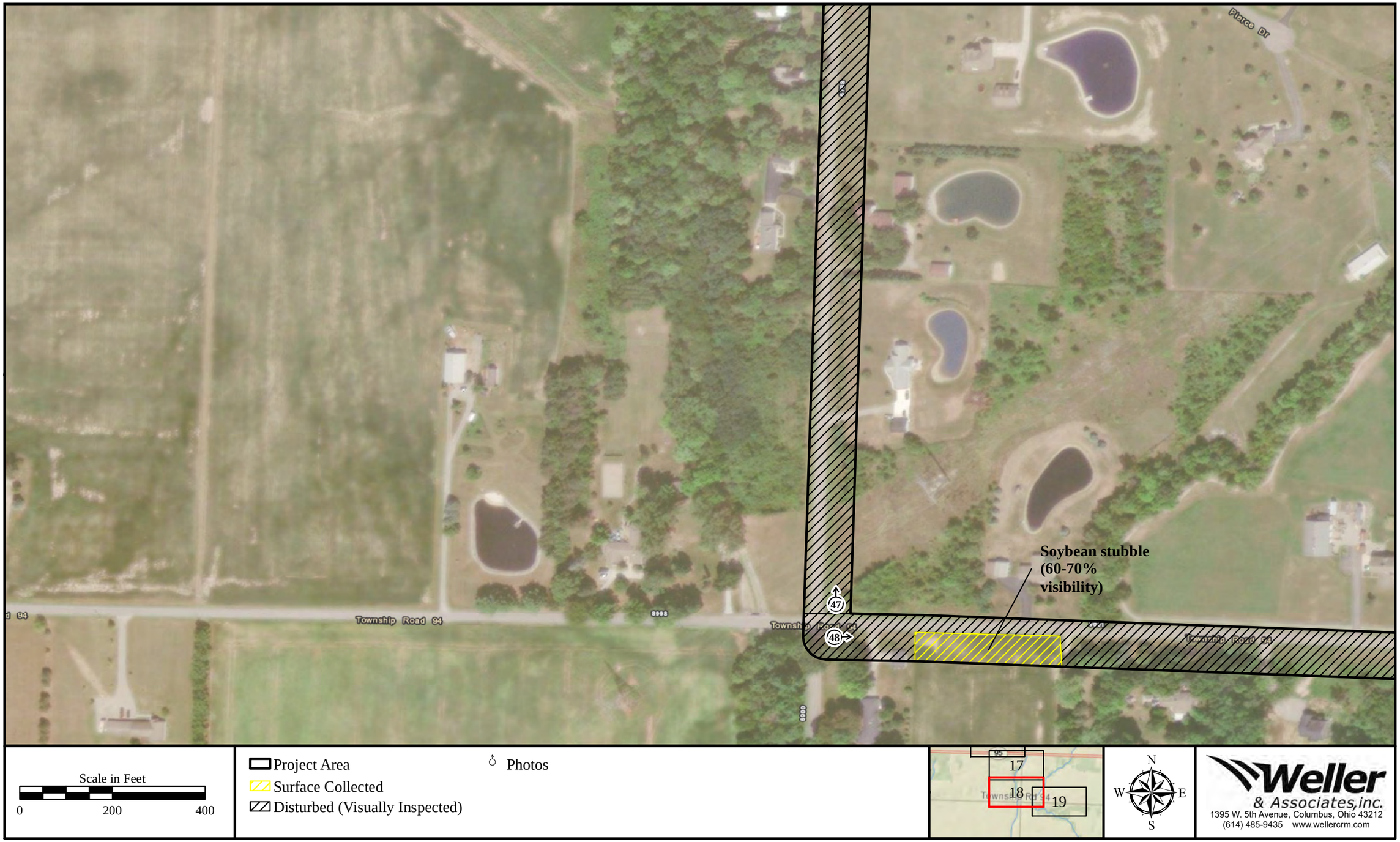


Figure 17. Fieldwork results and photo orientation map.



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Schematic of a Test Unit Profile

Glynwood-Blount-Hocktown complex (GsB)

Ap 10YR4/3 Brown silt loam

B 10YR4/4 Dark yellowish brown silty clay loam

Provenience: T4, U2
Figure 10
Depth to Subsoil: 22 cm

Scale

0cm 10cm 20cm 30cm 40cm 50cm

Figure 55. A typical shovel test unit excavated within the project.

Triangle Preform

Length:	35.7mm
Width:	25.6mm
Stem Length:	na
Neck Width:	na
Thickness:	08.8mm
Material:	Columbus-Delaware

Scale

0 12.7mm 25.4mm

0 ½” 1”

Figure 56. Artifact from Site 33HK1042.

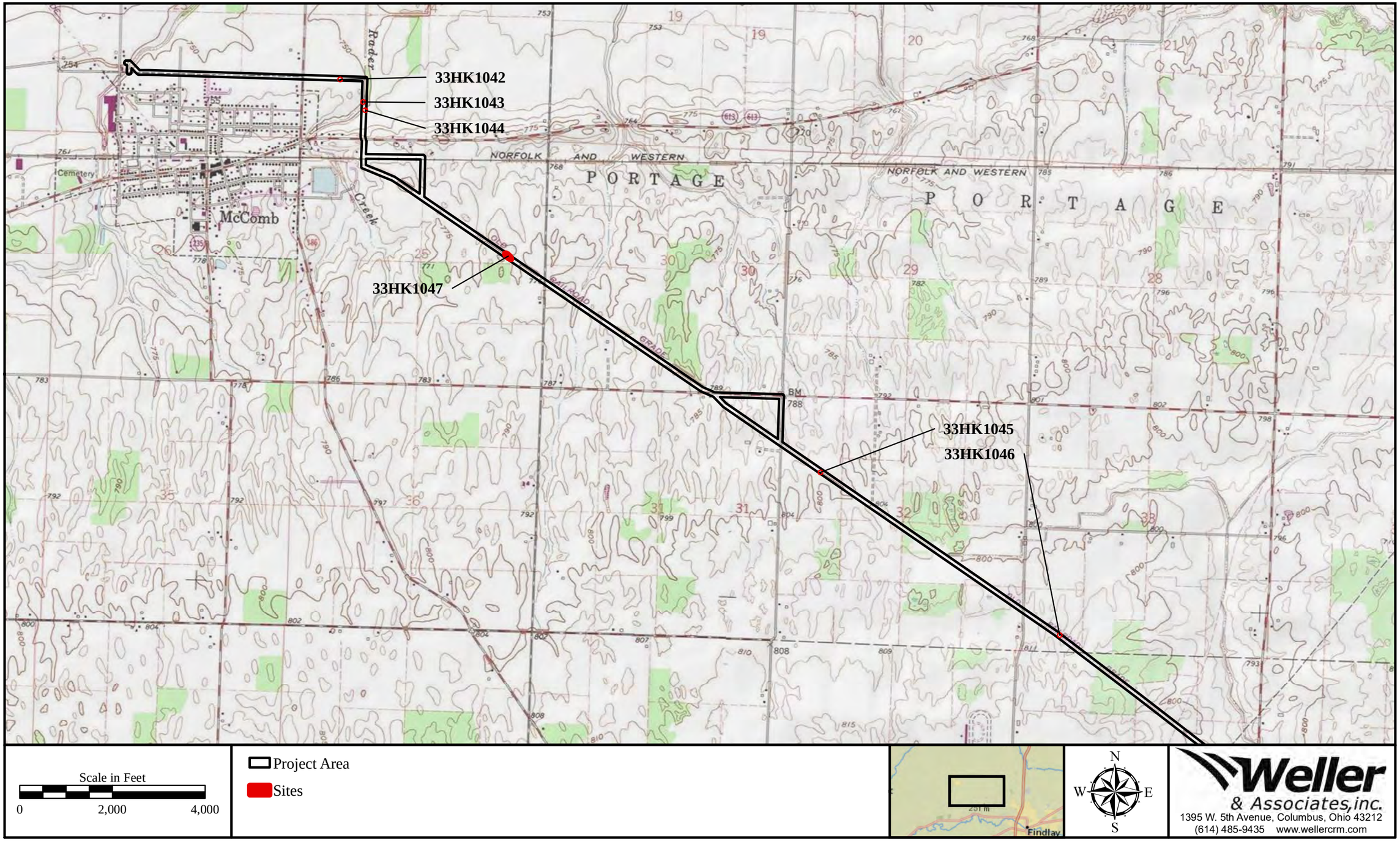

Figure 57. Portions of the USGS *1974 McComb, and 1980 Findlay, Ohio 7.5 Minute Series (Topographic)* maps indicating the location of the project and sites 33HK1042-33HK1047.

Phase I Archaeological Investigations for the 17.7 km (11 mi) East Leipsic-Rader Road 69kV to a 138kV Conversion/ Rebuild Project in Van Buren Township, Putnam County and Pleasant Township, Hancock, Ohio

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April 7, 2022

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By

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W-3067

Abstract

In March and April 2022, Weller & Associates, Inc. conducted Phase I Archaeological Investigations for the 17.7 km (11 mi) East Leipsic-Rader Road 69kV to a 138kV Conversion/Rebuild Project in Van Buren Township, Putnam County and Pleasant Township, Hancock, Ohio. The work was conducted under contract with American Electric Power (AEP) for submission to the Ohio Power Siting Board and the Ohio History Connection. These investigations were conducted for a proposed electric transmission line easement. The majority of this project corridor is located in a rural, agricultural landscape. The field investigations involved visual inspection, surface collection, and subsurface testing. The fieldwork resulted in the identification of six previously unrecorded archaeological sites including 33PU0235-236 and 33HK1038-1041.

The corridor extends through what is largely very flat, upland lake plain conditions with little to know relief/topography. The corridor is mostly located in farm field situations. The project is for the rebuilding and conversion of the East Leipsic-Rader Road 69kV transmission line to a 138kV line. The project area is considered to be a corridor, including possible alternates and greenfield sections, that is 17.7 km (11 mi) long and 30.5 m (100 ft) wide. The corridor extends in a general east-west manner with the East Leipsic Station at the western terminus and the Rader Road Station at the eastern terminus.

A literature review conducted prior to the field investigations determined that there are few sites recorded in the vicinity of the project as well as the uplands in these areas. There was a prior survey that was completed for a road widening that identified site 33PU0168 (Baker 2010). This site is within the project corridor and is a prehistoric period isolated find; it was not regarded as being significant. The majority of the project has not been investigated. There are no National Register of Historic Places (NRHP, Determination of Eligibility, or architectural sites recorded in the project or study area.

There were six previously unrecorded archaeological sites including 33PU0235-236 and 33HK1038-1041 recorded during these investigations. These sites are not considered to be significant resources; they are not eligible for the NRHP and they are not landmarks. The planned activity will not involve or affect any historic properties or landmarks. No further archaeological work is deemed necessary for this project.

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Introduction

In March and April 2022, Weller & Associates, Inc. conducted Phase I Archaeological Investigations for the 17.7 km (11 mi) East Leipsic-Rader Road 69kV to a 138kV Conversion/ Rebuild Project in Van Buren Township, Putnam County and Pleasant Township, Hancock, Ohio (Figures 1-5). The work was conducted under contract with American Electric Power (AEP) for submittal to the Ohio Power Siting Board (OPSB) and will be coordinated for Ohio History Connection (OHC) review. These investigations were conducted in a manner subject to the survey and report format established in *Archaeology Guidelines* (Ohio Historic Preservation Office 1994). The work efforts were designed in a manner that is consistent for cultural resource surveys regarding the National Register of Historic Places (NRHP) pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 [36 CFR 800]). This report summarizes the results of the archaeological fieldwork and literature review. The work includes a literature review/background documentation, archaeological field investigations, and visual inspection of the Area of Potential Effects (APE).

Alex Thomas completed the literature review in March 2022. The archaeological reconnaissance investigations for this project were conducted on from mid-March to April 1, 2022. Ryan Weller and Seth Cooper served as the Principal Investigator and Ryan Weller was the Senior Project Manager. The archaeological field crew included Justin Fryer, Ryan Weller, Seth Cooper, Daniel Ross, and Jesse Heinrich.

Project Description

The project is for the rebuilding and conversion of the East Leipsic-Rader Road 69kV transmission line to a 138kV line. The project area is considered to be a corridor, including possible alternates and greenfield sections, that is 17.7 km (11 mi) long and 30.5 m (100 ft) wide. The corridor extends in a general east-west manner with the East Leipsic Station at the western terminus and the Rader Road Station at the eastern terminus. The corridor extends through what is largely very flat, upland lake plain conditions with little to know relief/topography. The corridor is mostly located in farm field situations.

Environmental Setting

Climate

Putnam and Hancock Counties, like all of Ohio, have a continental climate with hot and humid summers and cold winters. Most of precipitation falls in June, and the smallest amount falls in February. The average annual temperature in the county is 11°C. Precipitation is favorably distributed for the production of crops (United States Department of Agriculture, Soil Conservation Service [USDA, SCS] 1965(2022).

Physiography, Relief, and Drainage

The project area is located in the Maumee Lake Plains Physiographic Province, an area that includes 'wave-planed ground moraine' from the Wisconsinan glaciation. This region is "Flat-lying Ice -Age lake basin with beach ridges, bars, dunes, deltas, and clay flats; contained the former Black Swamp; slightly dissected by modern streams; elevation 570'-800', very low relief" (Brockman 1998). These are areas that typically lack relief and topography as they were once covered by an ancient glacial lake. The terrain is nearly level with occasional elevations relative to beach ridges, fens, and sandy deposits (Forsythe 1959). The western part of the project corridor is within the Maumee River watershed and the eastern part is drained by the Middle Branch Portage River and its tributaries. The area nearer McComb is drained by Needles Creek and unnamed tributaries. The western and central part of the project, which is in the Maumee River watershed, intercepts West Creek, Little Yellow Creek, Yellow Creek, and unnamed tributaries.

Geology

Brockman (1998) describes this area as a flattened and nearly level setting caused by ice-age lakes and glaciers. The underlying bedrock is from the Silurian era, including dolomite, anhydrite, gypsum, salt, and shale (Brockman 1998).

Soils

The project area is in northeastern Putnam County and northwestern Hancock County. The project corridor is primarily located within an upland lake plains interfluvial zone setting. The majority of the project corridor is affiliated with poorly drained, flat, upland and clayey soils affiliated with the Hoytville series (about 78.8 percent). Tehre are no soils with slopes greater than six percent indicated in the area (USDA, SCS 1974 (2022a, 2022b) (Table 1). None of these soils are indicative of deep, alluvial situations.

Table 1. Soils in the Project.

Soil Name	Slope %	% in Project	Location
Hancock County Soils			
Cygnet loam	0-2	.4	Slight rises, lake plains
Hoytville silty clay loam	0-1	28.9	Lake plains, flats
Haskins loam	0-2	1.7	Beach deposits, uplands
Mermill clay loam	0-1	5.1	Low areas along drainages
Nappanee loam	0-2	1.3	Slight rises, lake plains
Nappanee silty clay loam	0-2	2.8	Slight rises, lake plains
Nappanee silty clay loam	2-6	.2	Slight rises, lake plains
Oshtemo sandy loam	2-6	.5	Beach deposits, uplands
Rawson sandy loam	2-6	.3	Beach deposits, uplands
Shawtown loam	2-6	.7	Slight rises, lake plains
Putnam County Soils			
Belmore loam	2-6	.2	Slight rises, lake plains
Digby loam	0-2	.9	Slight rises, lake plains
Haney sandy loam	2-6	.4	Beach deposits, uplands

Hoytville silty clay loam	0-1	49.9	Lake Plains, flats
Haney loam	2-6	.1	Beach deposits, uplands
Haskins loam	0-2	.8	Beach deposits, uplands
Mermill loam	0	3.4	Low areas along drainages
Nappanee loam	0-2	.4	Slight rises, lake plains
Nappanee silt loam	0-2	1.5	Slight rises, lake plains
Nappanee silt loam	2-6	.1	Slight rises, lake plains
Rawson loam	2-6	.4	Beach deposits, uplands

Flora

There was, and continues to be, great floral diversity in Ohio. This diversity is relative to the soils and the terrain that generally includes the till plain, lake plain, terminal glacial margins, and unglaciated plateau (Forsyth 1970). Three major glacial advances, including the Kansan, Illinoisan, and Wisconsinan, have affected the landscape of Ohio. The effects of the Wisconsin glaciation are most pronounced and have affected more than half of the state (Pavey et al. 1999). The following is to provide comparison of the different floral regions of Ohio relative to this project.

The least diverse part of Ohio extends in a belt from the northeast below the lake-affected areas through most of western Ohio (Gordon 1966). These areas are part of the late Wisconsin ground moraine and lateral end moraines. It is positioned between the lake plains region and the terminal glacial moraines. This area included broad forested areas of beech maple forests interspersed with mixed oak forests in elevated terrain or where relief is greater (Forsyth 1970; Gordon 1966). Prairie environments such as those in Wyandot and Marion County areas would contain islands of forests, but were mostly expansive open terrain dominated by grasses.

The northwestern Ohio terrain is nearly flat because of ancient glacial lakes and glaciation, which affected the flora. However, the vegetation was more diverse than the till plain to the south and east because of the variety of factors that contributed to its terrain. Forests within the Black Swamp were generally comprised of elm/ash stands; however, dissected areas along drainages and drier, elevated areas from beach deposits would contain mixed forests of oak and hickory (Gordon 1966, 1969). There was little upland floral diversity in the lake plains (Black Swamp region) except for the occasional patches of oak and hickory. Floral variety was most evident in narrow sleeves along larger stream valleys where there is relief.

The most biological diversity in Ohio is contained within the Allegheny Plateau, which encompasses the southeastern two-thirds of the state (Sheaffer and Rose 1998). Because this area is higher and has drier conditions, it is dominated by mixed oak forests. Some locations within the central part of this area contain beech and mixed mesophytic forests. There are large patches of oak and sugar maple forests to the south of the terminal moraine from Richland to Mahoning County (Gordon 1966).

Southwestern Ohio from about Cincinnati to Bellefontaine east to the Scioto River historically contained a very diverse floral landscape. This is an area where

moraines from three glacial episodes are prevalent (Pavey et al. 1999). Forests in this area include elm-ash swamp, beech, oak-sugar maple, mixed mesophytic, prairie grasslands, mixed oak, and bottomland hardwoods (Core 1966; Gordon 1966, 1969). These forests types are intermingled with prairies being limited to the northern limits of this area mostly in Clark and Madison Counties.

Generally, beech forests are the most common variety through Ohio and could be found in all regions. Oak and hickory forests dominated the southeastern Ohio terrain and were found with patchy frequency across most of northern Ohio. Areas that were formerly open prairies and grasslands are in glacial areas, but are still patchy. These are in the west central part of the state. Oak and sugar maple forests occur predominantly along the glacial terminal moraine. Elm-ash swamp forests are prevalent in glaciated areas including the northern and western parts of Ohio (Gordon 1966; Pavey et al. 1999). The project corridor is generally within what is considered to be a beech and elm-ash swamp forest area (Gordon 1966).

Fauna

The upland forest zone offered a diversity of mammals to the prehistoric diet. This food source consisted of white-tailed deer, black bear, Eastern cottontail rabbit, opossum, a variety of squirrels, as well as other less economically important mammals. Several avian species were a part of the upland prehistoric diet as well (i.e. wild turkey, quail, ruffed grouse, passenger pigeon, etc.). The lowland zone offered significant species as well. Raccoon, beaver, and muskrat were a few of the mammals, while wood duck and wild goose were the economically important birds. Fishes and shellfish were also an integral part of the prehistoric diet. Ohio muskellunge, yellow perch, white crappie, long nose gar, channel catfish, pike, and sturgeon were several of the fish, whereas, the Ohio naiad mollusc, butterfly's shell, long solid, common bullhead, knob rockshell, and cod shell were the major varieties of shellfish. Reptiles and amphibians, such as several varieties of snakes, frogs, and turtles, were also part of the prehistoric diet (Trautman 1981; Lafferty 1979; Mahr 1949).

Cultural Setting

The first inhabitants of Ohio were probably unable to enter this land until the ice sheets of the Wisconsin glacier melted around 14,000 B.C. Paleoindian sites are considered rare due to the age of the sites and the effects of land altering activities such as erosion. Such sites were mostly used temporarily and thus lack the accumulation of human occupational deposits that would have been created by frequent visitation. Paleoindian artifact assemblages are characteristic of transient hunter-gatherer foraging activity and subsistence patterns. In Ohio, major Paleoindian sites have been documented along large river systems and near flint outcrops in the Unglaciated Plateau (Cunningham 1973). Otherwise, Paleoindian sites in the glaciated portions of Ohio are encountered infrequently and are usually represented by isolated finds or open air scatters.

The Paleoindian period is characterized by tool kits and gear utilized in hunting Late Pleistocene megafauna and other herding animals including but not limited to short-

faced bear, barren ground caribou, flat-headed peccary, bison, mastodon, giant beaver (Bamforth 1988; Brose 1994; McDonald 1994). Groups have been depicted as being mobile and nomadic (Tankersley 1989); artifacts include projectile points, multi-purpose unifacial tools, burins, gravers, and spokeshaves (Tankersley 1994). The most diagnostic artifacts associated with this period are fluted points that exhibit a groove or channel positioned at the base to facilitate hafting. The projectiles dating from the late Paleoindian period generally lack this trait; however, the lance form of the blade is retained and is often distinctive from the following Early Archaic period (Justice 1987).

The Archaic period has been broken down into three sub-categories, including the Early, Middle, and Late Archaic. During the Early Archaic period (ca. 10,000-8000 B.P.), the environment was becoming increasingly arid as indicated by the canopy (Shane 1987). This period of dryness allowed for the exploitation of areas that were previously inaccessible or undesirable. The Early Archaic period does not diverge greatly from the Paleoindian regarding the type of settlement. Societies still appear to be largely mobile with reliance on herding animals (Fitting 1963). For these reasons, Early Archaic artifacts can be encountered in nearly all settings throughout Ohio. Tool diversity increased at this time including hafted knives that are often re-sharpened by the process of beveling the utilized blade edge and intense basal grinding (Justice 1987). There is a basic transition from lance-shaped points to those with blades that are triangular. Notching becomes a common hafting trait. Another characteristic trait occurring almost exclusively in the Early and Middle Archaic periods is basal bifurcation and large blade serrations. Tool forms begin to vary more and may be a reflection of differential resource exploitation. Finished tools from this period can include bifacial knives, points, drills/perforators, utilized flakes, and scrapers.

The Middle Archaic period (8000-6000 B.P.) is poorly known or understood in archaeological contexts within Ohio. Some (e.g., Justice 1987) regard small bifurcate points as being indicative of this period. Ground stone artifacts become more prevalent at this time. Other hafted bifaces exhibit large side notches with squared bases, but this same trait can extend back to the Paleoindian period. The climate at this time is much like that of the modern era. Middle Archaic period subsistence tended to be associated with small patch foraging that involved a consistent need for mobility with a shift towards stream valleys (Stafford 1994). Sites encountered from this time period throughout most of Ohio tend to be lithic scatters or isolated finds. The initial appearance of regional traits may be apparent at this time.

The Late Archaic period in Ohio (ca 6000-3000 B.P.) diverges from the previous periods in many ways. Preferred locations within a regional setting appear to have been repeatedly occupied. The more intensive and repeated occupations often resulted in the creation of greater social and material culture complexity. The environment at this time is warmer and drier. Most elevated landforms in northeastern Ohio have yielded Archaic artifacts (Prufer and Long 1986: 7), and the same can be stated for the remainder of Ohio.

Various artifacts are diagnostic of the Late Archaic period. Often, burial goods provide evidence that there was some long-distance movement of materials, while lithic

materials used in utilitarian assemblages are often from a local chert outcrop. There is increased variation in projectile point styles that may reflect regionalism. Slate was often used in the production of ornamental artifacts. Ground and polished stone artifacts reached a high level of development. This is evident in such artifacts as grooved axes, celts, bannerstones, and other slate artifacts.

It is during the Terminal Archaic period (ca 3500-2500 B.P.) that extensive and deep burials are encountered. Cultural regionalism within Ohio is evident in the presence of Crab Orchard (southwest), Glacial Kame (northern), and Meadowood (central to Northeastern). Along the Ohio River, intensive occupations have been placed within the Riverton phase. Pottery makes its first appearance during the Terminal Late Archaic.

The Early Woodland period (ca 3000-2100 B.P.) in Ohio is often associated with the Adena culture and the early mound builders (Dragoo 1976). Early and comparably simple geometric earthworks first appear with mounds more spread across the landscape. Pottery at this time is thick and tempered with grit, grog, or limestone; however, it becomes noticeably thinner towards the end of the period. There is increased emphasis on gathered plant resources, including maygrass, chenopodium, sunflower, and squash. Habitation sites have been documented that include structural evidence. Houses that were constructed during this period were circular, having a diameter of up to 18.3 m (Webb and Baby 1963) and often with paired posts (Cramer 1989). Artifacts dating from this period include leaf-shaped blades with parallel to lobate hafting elements, drilled slate pieces, ground stone, thick pottery, and increased use of copper. Early Woodland artifacts can be recovered from every region of Ohio.

In northwest and north-central Ohio, there are not very many mounds or village sites that indicate an Early Woodland occupation. Artifacts from these areas often are reflective of seasonal hunting excursions. Adena-like bifaces and tools are commonly found in river and stream valleys that drain into Lake Erie as well as in the uplands. It is assumed that Early Woodland inhabitants used these areas for little more than a transient hunting-collecting subsistence. One of the best-known Early Woodland sites is the Leimbach site. This site is located where the Huron River empties into Lake Erie (Shane 1975). Early Woodland ceramics and lugged vessels have been recovered from this site. Evidence of Early Woodland activity, such as ceramics, has been encountered infrequently at locations across north-central and northwestern Ohio.

The Middle Woodland period (ca 2200-1600 B.P.) is often considered to be equivalent with the Hopewell culture. The largest earthworks in Ohio date from this period. There is dramatic increase in the appearance of exotic materials that appear most often in association with earthworks and burials. Artifacts representative of this period include thinner, grit-tempered pottery, dart-sized projectile points (Lowe Flared, Steuben, Snyders, and Chesser) [Justice 1987], exotic materials (mica, obsidian, and marine shell, etc.). The points are often thin, bifacially beveled, and have flat cross sections. There seems to have been a marked increase in the population as well as increased levels of social organization. Middle Woodland sites seem to reflect a seasonal exploitation of the environment. There is a notable increase in the amount of Eastern Agricultural Complex

plant cultigens, including chenopodium, knotweed, sumpweed, and little barley. This seasonal exploitation may have followed a scheduled resource extraction year in which the populations moved camp several times per year, stopping at known resource extraction loci. Middle Woodland land use appears to center on the regions surrounding earthworks (Dancey 1992; Pacheco 1996); however, there is evidence of repeated occupation away from earthworks (Weller 2005). Household structures at this time vary with many of them being squares with rounded corners (Weller 2005). Exotic goods are often attributed to funerary activities associated with mounds and earthworks. Utilitarian items are more frequently encountered outside of funerary/ritual contexts. The artifact most diagnostic of this period is the bladelet, a prismatic and thin razor-like tool, and bladelet cores. Middle Woodland remains are more commonly recovered from central Ohio south and lacking from most areas in the northern and southeastern part of the state.

Little information is known about the Middle Woodland period of western and northwestern Ohio. This may be due to a poor representation of artifacts from this period or because the area is not directly associated with the Hopewell culture. The loosely associated patterns of earthworks to habitation sites that have been identified in central and southern Ohio areas are not present in this region. Sites associated with this period have been identified along the south and western shores of Lake Erie, but they are not common (Stothers et al. 1979; Stothers 1986).

The Late Woodland period (ca A.D. 400-900) is distinct from the previous period in several ways. There appears to be a population increase and a more noticeable aggregation of groups into formative villages. The villages are often positioned along large streams, on terraces, and were likely seasonally occupied (Cowan 1987). This increased sedentism was due in part to a greater reliance on horticultural garden plots, much more so than in the preceding Middle Woodland period. The early Late Woodland groups were growing a wide variety of crop plants that are collectively referred to as the Eastern Agricultural Complex. These crops included maygrass, sunflower, and domesticated forms of goosefoot and sumpweed. This starch and protein diet was supplemented with wild plants and animals. Circa A.D. 800 to 1000, populations adopted maize agriculture, and around this same time, shell-tempered ceramics appear. Other technological innovations and changes during this time period included the bow and arrow and changes in ceramic vessel forms.

Evidence suggests that the Late Woodland occupations in northern Ohio developed from the Western Basin Middle Woodland tradition. The Late Woodland period in northern Ohio is best defined by ceramic traditions. Western Basin Late Woodland sites have been identified in most of the river valleys in northwestern Ohio such as the Maumee, Auglaize, and the Sandusky Rivers. Radiocarbon dating establishes this Late Woodland occupation at the first century B.C. to A.D. 500 (Pratt and Bush 1981: 88). The Western Basin tradition consists of three primary phases, which include the Riviere au Vase, the Younge (Fitting 1965), and the Springwells phase. Influence from the Cole complex may extend into the area from the south, but this remains theoretical and not well researched.

The Late Prehistoric period in northwest and northern Ohio is often associated with an intensification of the use of plant resources, the presence of large villages, and a steady population increase. Permanent villages were associated with a heavy dependence on farming. These villages were often located on the meander belt zones of river valleys (Stothers et al. 1984: 6). Subsistence of these farming communities relied upon maize, beans, and squash as the major cultigens. Villages were often strategically located on bluff tops. There is a change in social structure to a chiefdom-based society. The Late Prehistoric period in northwest Ohio has been segregated into the Sandusky tradition and smaller phases based largely on age and ceramic assemblage traits.

The Sandusky tradition has been broken up into four phases. These phases are identified (in chronological order) as Eiden, Wolf, Fort Meigs, and Indian Hills. These are often associated with a style of ceramic referred to as Mixter Tool Impressed, Mixter Dentate, Mixter Cordmarked, and Parker Festooned. The Eiden and Wolf phases show a dependence upon fishing, and villages are usually associated with large cemeteries (Schneider 2000; Shane 1967).

The Fort Meigs and Indian Hills phases occur late in the Late Prehistoric period. The Fort Meigs phase may be related to the Wolf phase in that the pottery is similar. Fort Meigs phase occupations are identified by specific rim and neck motifs that are applied to their pottery. The Indian Hills phase is associated with shell-tempered pottery. Some villages show evidence of defensive features such as stockade lines, ditches, or earthen walls (Pratt and Bush 1981: 155). There is little evidence to support inter-village relationships, such as trade; this lack may have been due to competition for localized resources.

Protohistoric to Settlement

By the mid-1600s, French explorers traveled through the Ohio country as trappers, traders, and missionaries. They kept journals about their encounters and details of their travels. These journals are often the only resource historians have regarding the early occupants of seventeenth century Ohio. The earliest village encountered by the explorers in 1652 was a Tionontati village located along the banks of Lake Erie and the Maumee River. Around 1670, it is known that three Shawnee villages were located along the confluence of the Ohio River and. the Little Miami River. Because of the Iroquois Wars, which continued from 1641-1701, explorers did not spend much time in the Ohio region, and little else is known about the natives of Ohio during the 1600s. Although the Native American tribes of Ohio may have been affected by the outcome of the Iroquois Wars, no battles occurred in Ohio (Tanner 1987).

French explorers traveled extensively through the Ohio region from 1720-1761. During these expeditions, the locations of many Native American villages were documented. In 1751, a Delaware village known as Maguck existed near present-day Chillicothe. In 1758, a Shawnee town known as ‘Lower Shawnee 2’ existed at the same location. The French also documented the locations of trading posts and forts, which were typically established along the banks of Lake Erie or the Ohio River (Tanner 1987).

While the French were establishing a claim to the Ohio country, many Native Americans were also entering new claims to the region. The Shawnee were being forced out of Pennsylvania because of English settlement along the eastern coast. The Shawnee created a new headquarters at Shawnee Town, which was located at the mouth of the Scioto River. This headquarters served as a way to pull together many of the tribes which had been dispersed because of the Iroquois Wars (Tanner 1987).

Warfare was bound to break out as the British also began to stake claims in the Ohio region by the mid-1700s. The French and Indian War (1754-1760) affected many Ohio Native Americans; however, no battles were recorded in Ohio (Tanner 1987). Although the French and Indian War ended in 1760, the Native Americans continued to fight against the British explorers. In 1764, Colonel Henry Bouquet led a British troop from Fort Pitt, Pennsylvania to near Zanesville, Ohio.

In 1763, the Seven Years' War fought between France and Britain, also known as the French and Indian War ended with The Treaty of Paris. In this Peace of Paris, the French ceded their claims in the entire Ohio region to the British. When the American Revolution ended with the Second Treaty of Paris in 1783, the Americans gained the entire Ohio region from the British; however, they designated Ohio as Indian Territory. Native Americans were not to move south of the Ohio River but Americans were encouraged to head west into the newly acquired land to occupy and govern it (Tanner 1987).

By 1783, Native Americans had established fairly distinct boundaries throughout Ohio. The Shawnee tribes generally occupied southwest Ohio, while the Delaware tribes stayed in the eastern half of the state. Wyandot tribes were located in north-central Ohio, and Ottawa tribes were restricted to northeast Ohio. There was also a small band of Mingo tribes in eastern Ohio along the Ohio River, and there was a band of Mississauga tribes in northeastern Ohio along Lake Erie. The Shawnee people had several villages within Ross County along the Scioto River (Tanner 1987). Although warfare between tribes continued, it was not as intense as it had been in previous years. Conflicts were contained because boundaries and provisions had been created by earlier treaties.

In 1795, the Treaty of Greenville was signed as a result of the American forces defeat of the Native American forces at the Battle of Fallen Timbers. This allocated the northern portion of Ohio to the Native Americans, while the southern portion was opened for Euro-American settlement. Although most of the battles which led up to this treaty did not occur in Ohio, the outcome resulted in dramatic fluctuations in the Ohio region. The Greenville Treaty line was established, confining all Ohio Native Americans to northern Ohio, west of the Tuscarawas River (Tanner 1987).

Ohio Native Americans were again involved with the Americans and the British in the War of 1812. Unlike the previous wars, many battles were fought in the Ohio country during the War of 1812. By 1815, peace treaties began to be established between

the Americans, British, and Native Americans. The Native Americans lost more and more of their territory in Ohio. By 1830, the Shawnee, Ottawa, Wyandot, and Seneca were the only tribes remaining in Ohio. These tribes were contained on reservations in northwest Ohio. By the middle 1800s, the last of the Ohio Native Americans signed treaties and were removed from the Ohio region.

Putnam County History

The county was formed on April 1, 1820 but was not formally organized until 1834. David Murphy was one of the first settlers in the area who arrived circa 1824. He settled along the Auglaize River in an area referred to as "The Bayou". The first town in the county was that of Kalida and was platted in 1834. It was the county seat until 1866 when it was moved to Ottawa since it was more centrally located within the county. The comparably late settlement of Putnam County and its neighboring counties was due to its position within the Black Swamp. There were two Native American villages known in the county including Upper and Lower Tawa Towns (Howe 1888). These were located near Ottawa.

The primary economy of Putnam County is associated with agricultural pursuits. Stock raising and crop farming is the mainstay of every community (Kinder 1915; Sommers 1934). Many of the early settlers to the area were of Welsh descent and arrived from Cincinnati. The southeastern part of the county got an influx of Swiss Mennonites who arrived from 1830-1870. These immigrated either directly from Switzerland or from Wayne County, Ohio. They built two of the largest churches in the county: Grace Church and St. John Church (Calvin 1981 and 1989). Today, the population is largely dominated by German Catholics. Nearly every community has a Catholic steeple that can be seen for some distance due to the flat nature of the terrain.

In 1845, the Miami & Erie Canal was completed through Monterey Township. This was an important economic boon to the region and the county as it allowed for the local goods to be available in the market economy. However, the canal was short-lived as it gave way to the railroads. The Baltimore & Ohio was the first railroad built in the county around 1856. A few years later the Dayton Michigan Railroad was completed. The Lima-Defiance Traction extended through the communities of Rice, Continental, and Kalida but did not last long due to financial difficulties (Kinder 1915).

Just like the nineteenth century, modern Putnam County remains primarily affiliated with agriculture. There are small communities scattered throughout the area and the larger ones tend to have granaries. Much of the population is rural and occupies isolated farmsteads that dot the landscape.

Van Buren Township History

Van Buren Township was organized on February 18, 1843. The area was previously known as North Blanchard and was part of Blanchard Township. The first permanent Euro-American to settle here was Abraham Baughman in 1835 (Hardesty

1880). At the time of the organization of the township, only nine residents cast votes at the first election. The main town within the township is Leipsic and the only other village is Belmore. Leipsic was platted in 1857 by James E. Creighton under the name Creightontown. In 1859, Joseph Swartz platted Leipsic Station on the east side of the C.H. & D railroad (Seitz and Talbot 1895). These surveys are both included within Leipsic today. In 1859, the first railroad through the township was constructed, then known as the Dayton and Michigan Railroad, later called the Cincinnati, Hamilton, and Dayton (C.H. &D) Railroad. Today, there are three railways through the town of Leipsic. During the late 19th Century, the town of Leipsic was home to industries including tile and brick works, lumber mills, flour mills, machine works, and a creamery.

Hancock County History

Hancock County was originally part of the Northwestern Territory ceded by Virginia to the United States Government and was organized in 1828. Its namesake is John Hancock, signer of the Declaration of Independence and person of political significance during the Revolutionary War. The county is located in northwestern Ohio and includes comparably diverse terrain. The Defiance Moraine is the dominant landform that bisects the county from east to west and through its central part. The southern part of the county is Till Plain while the northern part is in the Lake Plain (Brockman 1998). The Blanchard River and its tributaries drain the southern majority of the county. This drainage runs along the Defiance Moraine and is the source of occasional inundations. The northern part of the county is drained by streams that flow to Lake Erie, including Middle Branch Portage River. Immigrants to the county were primarily arriving to till the soil.

Early inhabitants of the county were generally focused along the drainages and particularly the Blanchard River. Initially, settlement was at Fort Findlay, a War of 1812 stockade. Native American groups were occupying the area at this time as well including those from the Wyandot Tribe and Ottawa further down river. Shawnee were known to the area as well. One of the first inhabitants of the county and the region was that of Jean Jacques Blanchard who immigrated to the area in 1769. He was a Frenchman that originated from New Orleans and settled along the river of his namesake after marrying a Native American woman (Beardsley 1881; Brown 1886; Spaythe 1903).

Some of the early activity in the county was during the War of 1812. It was in that year that General Hull's campaign passed through the county leaving a path referred to as "Hull's Trail". Hull ordered the construction of Fort Findlay and it was located on the Blanchard River. It was constructed and named for Colonel James Findlay. This would become the site of the first Euro-American occupant of the county by a soldier named Thorp or Tharp who resided in Fort Findlay in the War of 1812 and remained there after its evacuation (Beardsley 1881). The first family to settle was the Benjamin Cox family.

The influx of settlers to the county was happening just after the War of 1812 and into the 1820s. These settlers inhabited the area around Findlay and the river and were

primarily focused on agriculture. Log cabins would often have double functions as taverns or for trades such as blacksmith or farrier. Grist and sawmills soon followed to serve the growing agricultural community.

The transportation of good and travel routes in the county was originally via pirogues that navigated the Blanchard to the Auglaize and eventually to the Maumee. Cross country trade was usually made by travel to Sandusky City to access markets such as New York. The early road systems were tethered to the various ridges and elevations in the county, which served as natural corridors. The growth of the county was furthered by the construction of various railroads starting in 1839 with the Bellefontaine & Perrysburg. Numerous other railroads would spring up and continue to be constructed to about 1900. Many of these were local lines but were significant in the economic development and prosperity of the county. The connection to the eastern market economies for the sale and transport of the agricultural products is typically what the smaller communities relied upon. Still, the communities of Findlay and Bluffton tended to be the center of attention and activity. Findlay, being centrally located was an easy choice for the county seat (Beardsley 1881; Brown 1886; Spaythe 1903).

The exploitation of mineral resources in the county happened amidst the Industrial Revolution. It was in the 1880s that oil and gas were discovered, and it has been valuable to the local economy ever since. Agriculture remains a vital source of the local economy to the area. There has been an increase in the development of industrial and business economy throughout the central part of the county and extending to Bluffton due to the accessibility to I-75. This is particularly pronounced around Findlay, Bluffton, and increasingly more to the north. According to the most recent census, the county has over 74,000 inhabitants. There are two primary colleges in the county including Bluffton and Findlay, which contribute to the demographics.

Pleasant Township History

Pleasant Township, originally part of Blanchard Township, was organized on March 2nd, 1835. Located in the northwest corner of Hancock County, the township borders Putnam County to the west, Portage Township, Hancock County, to the east, Blanchard Township, Hancock County, to the south, Liberty Township, Hancock County, to the southeast, Wood County to the north, and Henry County to the northwest (U.S. Census Bureau 2010). Pleasant Township's first Euro-American settlers were men from Fairfield, Hardin, and Franklin Counties, and Washington County (Pennsylvania), all of whom arrived in 1833 (Beardsley 1881).

The township's abundant timber and rich, loamy soil fostered economic incentive, thus further migration. Like most industries of the era, the first and largest establishments were mills: the first was a sawmill on Algire's Run, 1841; a grist mill on Picken's Run, 1845; the first steam-powered sawmill, 1850; and the first steam-powered grist mill, 1857. Pleasant Township was among Hancock County's most prosperous and populated townships thanks to the combination of lucrative farming and timber harvesting. Shortly after organization, Pleasant Township's first religious organization

(Methodists) was founded; services were held in private homes and the schoolhouse (built in 1838) until 1850 with the construction of a church (Beardsley 1881).

Pleasant Township contains two villages: McComb and Shawtown. McComb, platted in 1847 by Franklin County native Benjamin Todd as "Pleasantville," is located approximately 10 miles from Findlay and was renamed in 1858 upon incorporation. The community benefitted from two railroads, the McComb and Deshler Branch of the Dayton and Michigan Railroad, and the New York, Chicago & St. Louis Railroad, previously the Continental Railway. McComb was a bustling economic center comprised of numerous stores, shops, and churches (Beardsley 1881). Shawtown, much smaller than McComb, was platted in 1882 by E.T. Cummins along the abovementioned railroad, preceded a year earlier by a post office. The community's economy was limited to two general stores, a wagon shop, a blacksmith shop, a hoop factory, and a sawmill (Warner, Beers & Co. 1886). Olney was platted by Isaac Fairchild in 1857, however it did not advance beyond this stage (Beardsley 1881).

Research Design

The purpose of this Phase I survey is to locate and identify cultural resources that will be affected by the planned construction activities. This includes archaeological deposits as well as architectural properties that are older than 50 years regarded as being in the APE. Once these resources are identified, they are evaluated for their eligibility to the NRHP. The literature review aspect of these investigations is to answer or address the following questions:

1) Did the literature review reveal anything that suggests the project area had been previously surveyed, and what is the relationship of previously recorded properties to the project area?
2) Are cultural resources likely to be identified in the project area?

Archaeological Field Methods

The survey conducted for this project was anticipated to use several methods of sampling/testing to identify and evaluate cultural resources. These included shovel test units, surface collection, and visual inspection. The following describes the survey methods:

Shovel test unit excavation. Shovel test units were placed at 15-m intervals where adequate surface visibility was lacking. These measure 50 cm on a side and are excavated to 5 cm below the topsoil/subsoil interface. Individual shovel test units are documented regarding their depth, content and color (Munsell). Wherever sites are encountered, Munsell color readings are taken per shovel test unit. All of the undisturbed soil matrices from shovel test units are screened using .6 cm hardware mesh. When sites are identified, additional shovel test units will be excavated at 7.5 m intervals extending on grid and in the four cardinal directions from the positive locations.

Surface Collection. The majority of the project corridor is suitable for surface collection strategies. The bare ground visibility in these areas is greater than 50 percent. Pedestrian transects are spaced at 5-7.5 m intervals through these applicable areas. If artifacts are identified during this survey, they are flagged and plotted using a Trimble GeoXT global positioning system for the purposes of demonstrating distribution and for GIS layering.

Visual inspection. This method is conducted to document the nature of the project area and its flat conditions, any disturbed settings, and general nature of the area. This method is used to verify the absence or likelihood of any cultural resources within and around the project area to assist in defining the APE.

Shovel probe excavation. The excavation of shovel probes is reserved for locations where severe disturbance is prevalent, but not obvious on the surface. These will be initially excavated in a manner similar to a shovel test unit and to a depth that was usually to the subsoil or about 20 cm below the ground surface. This will be accomplished to better understand the nature of the disturbance and verify that intact deposits were lacking. These are spaced no further than 30 m intervals. If intact soils are identified, the shovel probe will be treated as a shovel test unit.

The application of the resulting field survey methods was documented in field notes, field maps, and project plan maps.

Prehistoric Artifact Analysis

An artifact inventory was accomplished upon completion of the fieldwork. This involved identifying the functional attributes of individual artifacts, as well as the artifact cluster(s) or site assemblage collectively. The prehistoric artifact types and material were identified during the inventory process. The lithic artifact categories are modeled after Flenniken and Garrison (1975) and include the following:

Biface. A biface is defined as an artifact that has been culturally modified on two faces (ventral and dorsal). Complete and fragmentary preforms, manufacturing rejects, projectiles, or knives are included in this category.

Blocky Irregular. These are chunks and amorphous chert fragments that are produced during core reduction. These frequently occur during the creation of a striking platform or by accident. They represent a transitional core reduction stage similar to that of primary thinning.

Broken Flake. This flake type is common. Flakes for this investigation are considered broken when diagnostic attributes (e.g., flake scarring or platform) are absent from the artifact. Therefore, a flake that is broken in

half and retains the platform is considered complete because the function can be ascertained regardless of its obvious fragmentary nature.

Celt. These artifacts are typically polished/ground stone pieces that are likely to have been used for cutting/dismembering/hammering. It is common for these to have a bit and poll end to serve as a duel function. They were often hafted and used like a modern hatchet.

Core. A core represents the initial stage of chert procurement and reduction. A core has evidence of flake removal or checking present to delineate that the object has been culturally modified. Cores can be recovered from bedded outcrops or gathered from alluvial and glacial deposits.

Potlid. These artifact types are reflective of accidental overheating of chert (Luedtke 1992). Small semi-circular fragments of chert pop off a flake or artifact during firing or through fortuitous deposition in a hearth. Potlids lack a striking platform but are indicative of thermal activity at a site. One should use caution when using these artifacts to interpret or recreate site formation processes because they can occur during post-depositional activities.

Pottery. This is typically recovered as fired clay sherds that are tempered with various materials. It is used for cooking vessels, storage, transport, or for serving. However, sherds are generally fragile and decompose with exposure and plowing.

Primary Decortication Flake. This flake type represents the initial reduction of a core. Generally, these flakes have a natural patina or cortex over most of the dorsal side and are void of other flake scars. Artifact assemblages with chert resources obtained from bedded resources usually do not have decortication flakes of any kind because there is no patina/cortex formation.

Primary Thinning Flake. This flake type represents a transitional mode of chert reduction. The intent of this reduction activity is to reduce a core to a crude biface. Flakes have a steep platform angle (i.e., >65°) and lack cortex. However, occasional small remnants of cortex are prevalent at this point, especially on the striking platform.

Secondary Decortication Flake. These flakes occur as a by-product of patina/cortex removal of a core. They are differentiated from the previous flake type by a lesser amount of cortex evident on the dorsal side and at least one or part of one previous flake scar. These flakes have steep flake platform angles (>75°).

Secondary Thinning Flake. These flake types represent a reduction mode that is a direct result of the previous reduction activities (i.e., primary

thinning). Soft, antler billet percussion and pressure flaking are used for this mode of reduction. At this point, the chert artifact being reduced or thinned is a biface rather than a core. The striking platform for this flake type is commonly represented by the edge of the biface. The platform angle is typically acute but can range from 30° to 65°. Previously removed flake scars are common on the dorsal side.

Sharpening Flake. These flake types are created during pressure flaking of a tool edge. The flakes are often very small with a tiny platform and are often conical. They are also created from reworking a tool edge after it has been dulled from use.

Shatter or Angular Shatter. These artifacts most frequently occur during percussion flake reduction of cores. These artifacts lack striking platforms, are thin, narrow, and triangular. They cannot be definitively associated with a specific functional category of chert reduction due to their ubiquity.

Uniface. A uniface only has evidence of use-wear on one side of the artifact. Unifacial artifacts include utilized flakes, end and side scrapers, and bladelets. However, bladelets are typically categorized as blades or lamellar flakes and are diagnostic of the Middle Woodland period.

Identification of the material type of individual artifacts is based on several attributes, including color, inclusions, and luster. Several resources were used to aid in the inventory of the material types, including Converse (1994), DeRegnaucourt and Georgiady (1998), and Stout and Schoenlaub (1945).

Historic Period Artifact Analysis

The artifacts recovered during these investigations will be inventoried and analyzed. The inventory will be specific to type and age if the artifact is temporally diagnostic. The functional inventory of the site will be similar to that of South (1977) where artifacts are segregated into categories such as kitchen, arms, architecture, and etcetera. South's (1977) theoretical approach also emphasizes the development and interpretation of artifact patterns found at sites. This method can be used to understand depositional patterning on the intra- and inter-site level. Ball (1984) modified this approach, making it applicable for use in the Ohio Valley.

Artifacts recovered from the subsurface testing will be inventoried and the results analyzed to identify differential patterning of functionally specific artifact groups within areas of high and low artifact density. The specific historic period temporal affiliation of the artifacts will be determined by relative dating. The identification of historic artifacts for purposes of determining age is guided by ceramic/artifact analyses or source books by Carskadden et al. (1985); Cushion (1980); Dalrymple (1989); Deiss (1981); Esary (1982); Ewins (1997); Greer (1981); Hughes and Lester (1981); Hume (1991); Lang (1995);

Majewski and O'Brien (1987); Mansberger (1981); McConnell (1992); McCorvie (1987); Miller (1987); Newman (1970); Ramsay (1976); Sonderman (1979); Spargo (1926); Sprague (2002); Stelle (2001); Sunbury (1979); Sussman (1977); Visser (1997); and Zimler (1987).

Curation

There were archaeological materials identified and collected during these investigations. The respective landowners will be contacted to determine the disposition of these materials, curated at the Ohio History Connection Warehouse Facility or returned. Notes and maps affiliated with this project will be maintained at Weller & Associates, Inc. files.

Literature Review

The literature review study area is defined as a 305 m (1,000 ft) area extending from the centerline of the project area (Figures 2-4). In conducting the literature review, the following resources were consulted at the Ohio State Historic Preservation Office (SHPO) and the State Library of Ohio:

1) *Archeological Atlas of Ohio* (Mills 1914);
2) SHPO United States Geological Survey (USGS) 7.5' series topographic maps;
3) Ohio Archaeological Inventory (OAI) files;
4) Ohio Historic Inventory (OHI) files;
5) National Register of Historic Places (NRHP) files;
6) SHPO consensus Determinations of Eligibility (DOE) files;
7) SHPO CRM/contract archaeology files;
8) County atlases, histories, historic USGS 15'series topographic map(s), and current USGS 7.5' series topographic map(s); and
9) Online and genealogical cemetery resource data.

A review of the *Atlas* (Mills 1914) was conducted and there are no relative resources indicated within the project area. There is a mound noted to the west of McComb and near the eastern part of the project (Figure 6).

There are few recorded archaeological sites in the Lake Plains areas of this part of the state. There is one previously recorded site, 33PU0168 that is located in the study area and is in close proximity or within the project corridor (Figure 2; Appendix A). This is a temporally unassigned prehistoric period site and was not considered to be significant (Baker 2010).

The OHI files did not indicate that there were any recorded architectural resources in the study area.

A review of the NRHP files and SHPO consensus DOE files was conducted; there are no relative resources within the study area.

A review of the CRM/contract files indicates that there has been a couple of surveys completed within the project's study area, including one that has a small overlap with the current project. Martin (2002) conducted investigations for a cell tower area that is immediately north of the survey corridor (Figure 2); no sites were identified by this survey. Baker (2010) conducted a linear survey for a road widening project that identified site 33PU0168 (Figures 2 and 4); a temporally unassigned prehistoric period isolated find that was not regarded as being significant.

Historical atlases/cartographic maps were reviewed for this project (Figures 7 and 8). Review of atlas resources did not indicate any buildings within or near the project's corridor (Hardesty 1880; Hardesty 1875). Strangely, there are no 15-Minute series maps (i.e., Deshler, Oh.) available for this area. Inspection of the *USGS 1973 Leipsic and the 1974 McComb, Ohio 7.5 Minute Series (Topographic)* maps indicates that there are buildings in the vicinity as the project does extend immediately adjacent to road rights-of-way (Figures 2 and 3). Inspection of aerial images indicates the rural and agriculture nature of the setting that dominates this region (Figures 4-5). There are no cemeteries indicated in the study area for this project.

Evaluation of Research Questions 1 and 2

There were two questions presented in the research design that will be addressed at this point. These are:

1) Did the literature review reveal anything that suggests the project area had been previously surveyed?
2) Are cultural resources likely to be identified in the project area?

The literature review for this project identified one archaeological site (33PU0168) within the project area and this is the only site recorded in the study area. This is an isolated prehistoric period artifact and is not diagnostic. The project corridor is located in an upland interfluvial lake plain setting that is nearly flat except for slight areas of topographic relief along drainages. There are no large drainages involved in this project. The project does extend immediately adjacent to roads for much of the corridor and these are the situations where historic period deposits affiliated with residences would be expected since this is where drainage was best. Dense prehistoric period deposits would not be expected from this setting.

Archaeological Fieldwork Results

The Phase I field investigations for this project were completed on April 1, 2022 (Figures 5-77). The weather at the time of survey was amiable and warmer with Fahrenheit temperatures ranging from 50-75 degrees and it was relatively dry. The weather was not a factor in the completion of the work. The field investigations mostly utilized surface collection to address and identify any archaeological deposits. Visual inspection was conducted to verify the conditions and surface visibility and the nature

and extent of disturbed conditions. Subsurface testing was limited to a few areas where surface visibility was hampered. The project corridor is located in upland and rural farm conditions and survey was conducted in various agricultural field conditions, most of which were suitable for surface collection methods of investigation. There was a previously recorded site recorded in the project corridor and a small aspect of it had been previously investigated. The field investigations resulted in the identification of six previously unrecorded archaeological sites including 33PU0235-236 and 33HK1038-1041.

These investigations were conducted in an upland and glaciated/lake plains setting that is flat and poorly drained. The project corridor extends in a basically east-west manner through rural upland agricultural settings that are between the Village of Leipsic and McComb. The survey corridor is considered to be 30.5 m (100 ft) wide and is 17.7 km (11 mi) long. The project corridor is mostly positioned immediately adjacent to road right-of-way. The majority of the corridor was suitable for surface collection methods of archaeological sampling.

Surface collection efforts were conducted through about 90 percent of the project corridor (Figures 9-28). The conditions that were experienced at the time of survey where this method was conducted included winter wheat, soybean stubble, corn stubble, wheat stubble, and tilled situations. Pedestrian transects were spaced at 5-7.5 m intervals throughout the project's corridor and where this method of sampling was suitable, when the bare ground surface visibility was 50 percent or greater. All of the sites identified during these investigations were identified during surface collection survey.

There were a couple areas where surface visibility was lacking, and shovel test unit excavation was necessary to effectively sample the area (Figures 9, 20, 21, and 24). Shovel testing accounted for a small part of the project and there were 29 shovel test units excavated over the course of these investigations. The testing encountered very clayey topsoil deposits that were consistently documented as a plowzone. The topsoil is grayish brown (10YR5/2) silty clay/clay loam and extended to an average depth of 23 cm below ground surface. The underlying subsoil was typically found to be dark yellowish brown (10YR4/6) silty clay loam (Figure 78); this is consistent with clayey lacustrine deposition that is common in this region. The soils are dense with clay and are not well drained. There were no archaeological sites identified during these investigations.

A very small aspect of the project corridor was the subject of a previous survey for a road widening project; this accounts for less than two percent of the overall project area. This previous survey (Baker 2010) did identify site 33PU0168, a prehistoric period isolated find. Weller's investigations extended through the area where this artifact had been identified but did not identify any additional materials.

There were six archaeological sites identified during these investigations. These sites all have historic period components, and one also has a prehistoric period component. The following is a description of these sites.

Archaeological Site Descriptions

33PU0235

This is a historic period site that was identified during surface collection of a soybean stubble field that offered from 70-80 percent bare ground surface visibility (Figures 11 and 35). The surface collection method focused on recovering or attempting to recover diagnostic materials and a representative sample. Pedestrian transects were spaced at 5-7.5 m intervals. These artifacts were obtained from within the delineated boundary which was plotted using a GPS. The site is located in a flat upland setting that is on the north side of Road E. This is in the Southwest Quarter of Section 21, Van Buren Township. The area is drained by Little Yellow Creek, which flows into Yellow Creek and is part of the Maumee River watershed that flows into Lake Erie. The dimensions of the site are 33 m north-south by 95 m east-west and the site size is considered to be 2,464 sq m.

Atlas and topographic maps were reviewed to further the contextual aspect of the site. The area was owned by T. D. Howe (Hardesty 1880) and then W. S. Donald (Seitz 1895) during the latter part of the nineteenth century. However, there are no buildings noted at the location where this site was identified at this time (Figure 79). There is an outbuilding noted in this area as of the early 1970s (Figure 2). The artifacts that were obtained from this location are not aberrant to a twentieth century use and into the modern era. Inspection of aerial images do not depict any buildings at this location circa 1995.

There were 17 historic period artifacts identified from this site (Table 2; Figure 81). Most of these are affiliated with kitchen-related materials such as plain whiteware, stoneware, and bottle glass. There is nothing particularly or specifically diagnostic regarding these materials. Relatively modern materials were obtained including a carbon battery cell and a pull tab (ca. 1970s). The artifact assemblage is suggestive of a twentieth century occupation/use as there are no materials that are definitively datable to the nineteenth century.

Table 2. Artifact Inventory for Site 33PU0235.

Site (33…)	Provenience	Bag #	Artifact	Material	Count
PU0235	Grab sample, surface	1	Whiteware, plain	ceramic	5
			Porcelain	Ceramic/porcelain	2
			Stoneware	ceramic	2
			Blue-green bottle glass	Glass	4
			Cobalt bottle glass	Glass	1
			12-gauge shell	copper	1
			Carbon battery cell	Carbon	1
			Soda pull tab	Aluminum	1

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the history of the region. The site has a numerically and functionally limited, diffuse artifact assemblage and generally lacks temporally diagnostic materials; the materials are only known from surface contexts. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33PU0236

This is a historic period site that was identified during surface collection of a corn stubble field that offered from 50-60 percent bare ground surface visibility (Figures 19 and 51). The surface collection method focused on recovering or attempting to recover diagnostic materials and a representative sample. Pedestrian transects were spaced at 5-7.5 m intervals. These artifacts were obtained from within the delineated boundary which was plotted using a GPS. The site is located in a flat upland setting that is on the south side of Road E. This is in the Southeast Quarter of Section 24, Van Buren Township. The area is drained by West Creek, which flows northward and is part of the Maumee River watershed that flows into Lake Erie. The dimensions of the site are 21 m north-south by 55 m east-west and the site size is considered to be 1,087 sq m.

Atlas and topographic maps were reviewed to further the contextual aspect of the site. The area was owned by Slanson & Ewing (Hardesty 1875) and then J. W. Jennings (Seitz 1895) during the latter part of the nineteenth century. However, there are no buildings noted at the location where this site was identified at this time (Figure 79). There are no buildings indicated in this area according to 1970s era topographic mapping. The artifacts that were obtained from this location appear to date from the early to middle twentieth century, which would not be aberrant to the cartographic materials that were reviewed. Inspection of aerial images do not depict any buildings at this location circa 1995.

There were 11 historic period artifacts identified from this site (Table 3; Figure 82). Most of these are affiliated with kitchen-related materials such as plain whiteware, stoneware, and bottle glass. There was a single sherd of Decalware identified that generally dates from the early twentieth century (Ramsey 1969; Majewski and O'Brien 1987). There is nothing particularly or specifically diagnostic regarding these materials. There was a cold cream jar of opaque glass identified, which typically dates from the early to middle twentieth century. The observed materials in the field were not very diverse or decorative. The artifacts that were identified are not averse to an early to middle twentieth century deposit.

Table 3. Artifact Inventory for Site 33PU0236.

Site (33…)	Provenience	Bag #	Artifact	Material	Count
PU0236	Grab sample, surface	2	Whiteware, plain	ceramic	4

			Decalware	ceramic	1
			Stoneware	ceramic	2
			Green bottle glass	Glass	3
			Cold cream jar fragment	Glass	1

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the history of the region. The site has a numerically and functionally limited, diffuse artifact assemblage and generally lacks temporally diagnostic materials; the materials are only known from surface contexts. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33HK1038

This is a historic period site that was identified during surface collection of a soybean stubble field that offered from 60-70 percent bare ground surface visibility (Figures 21 and 56). The surface collection method focused on recovering or attempting to recover diagnostic materials and a representative sample. Pedestrian transects were spaced at 5-7.5 m intervals. These artifacts were obtained from within the delineated boundary which was plotted using a GPS. The site is located from a slight rise that is within Shawtown and west of a drainage; it is on the south side of Township Road 103. This is in the northcentral part of Section 30, Pleasant Township. The area is drained by West Creek, which flows northward and is part of the Maumee River watershed that flows into Lake Erie. The dimensions of the site are 13 m north-south by 27 m east-west and the site size is considered to be 322 sq m.

Atlas and topographic maps were reviewed to further the contextual aspect of the site. The area was owned by E. M. Shaw (Hardesty 1875) during the latter part of the nineteenth century (Figure 80). However, there are no buildings noted at the location where this site was identified at this time. This is in the town of what is now Shawtown. There are no buildings indicated in this area according to 1970s era topographic mapping. The artifacts that were obtained from this location appear to date from the early to middle twentieth century, which would not be aberrant to the cartographic materials that were reviewed. Inspection of aerial images do not depict any buildings at this location circa 1988.

There were 17 historic period artifacts identified from this site (Table 4; Figure 83). Most of these are affiliated with kitchen-related materials such as plain whiteware, stoneware, canning jar seals, and bottle glass. The canning jar porcelain seals generally can be attributed to late nineteenth to early twentieth century use. A glass toy marble likely dates from the middle twentieth century (Carskadden et al. 1985). There were few artifacts that were regarded as being diagnostic to a specific period.

Table 4. Artifact Inventory for sites 33HK1038.

Site (33…)	Provenience	Bag #	Artifact	Material	Count
HK1038	Grab sample, surface	5	Whiteware, plain	Ceramic	2
			Porcelain	Ceramic	1
			Stoneware	Ceramic	3
			Canning jar porcelain seal	Ceramic	4
			Cobalt bottle glass	Glass	1
			Blue-green bottle glass	Glass	3
			Toy marble	Glass	1
			Iron nut	Iron	1
			Pane glass	Glass	1

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the history of the region. The site has a numerically and functionally limited, diffuse artifact assemblage and generally lacks temporally diagnostic materials; the materials are only known from surface contexts. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33HK1039

This is a historic period site that was identified during surface collection of a soybean stubble field that offered from 50-60 percent bare ground surface visibility (Figures 21 and 57). The surface collection method focused on recovering or attempting to recover diagnostic materials and a representative sample. Pedestrian transects were spaced at 5-7.5 m intervals. These artifacts were obtained from within the delineated boundary which was plotted using a GPS. The site is located from a rise along the margin of the West Creek stream valley. This is on the south side of Township Road 103 and is in the Northeast Quarter of Section 30, Pleasant Township. The area is drained by West Creek, which flows northward and is part of the Maumee River watershed that flows into Lake Erie. The dimensions of the site are 18 m north-south by 32 m east-west and the site size is considered to be 532 sq m.

Atlas and topographic maps were reviewed to further the contextual aspect of the site. The area was owned by I. Crusar (Hardesty 1875) during the latter part of the nineteenth century (Figure 80). However, there are no buildings noted at the location where this site was identified at this time. There are no buildings indicated in this area according to 1970s era topographic mapping. The historic period artifacts that were obtained from this location appear to date from the late nineteenth to middle twentieth century, which would not be aberrant to the cartographic materials that were reviewed. Inspection of aerial images do not depict any buildings at this location circa 1988.

There were 19 historic period artifacts identified from this site (Table 5; Figure 84). Most of these are affiliated with kitchen-related materials such as plain whiteware, stoneware, canning jar seals, and bottle glass. There was a decorative Art Deco porcelain

fragment recovered from the site that is indicative of the early twentieth century (Ramsey 1969). There was a canning jar porcelain seal identified that can generally be tied to the late nineteenth to early twentieth century. Salt-glazed stoneware, though still rather generic, is typically affiliated with the nineteenth century. The bottle glass that was identified can collectively be dated after 1865 as these were all machine-made (Newman 1970). There were two prehistoric period artifacts identified that are both temporally diagnostic tool forms.

Table 5. Prehistoric Artifact Inventory for sites 33HK1039.

Site (33…)	Provenience	Bag #	Artifact	Material	Count
HK1039	Grab sample, surface	3	Whiteware, plain	ceramic	6
			Salt-glazed stoneware	ceramic	1
			Stoneware	ceramic	2
			Art Deco decorative porcelain	Porcelain/ceramic	1
			Amethyst-colored bottle glass	Glass	3
			Blue-green bottle glass	Glass	3
			Lt. Green bottle glass	Glass	2
			Clear bottle glass	Glass	1
			Canning jar seal	Porcelain	1
			Brewerton Corner Notched point (proximal)	Columbus-Delaware chert	1
			Brewerton Corner Notched point fragment	Cedarville-Guelph chert	1

The proximal portion of a Brewerton Corner Notched point of Columbus-Delaware chert was identified from this site (Table 5; Figure 84). The cross-section of the blade is rhomboid as it is beveled and has been reworked. The base is nearly straight and evidences thinning/reworking, it is not ground. Based on the blade edge reworking and attrition, it is likely that this tool was formerly used as a knife. Brewerton Tradition points were manufactured during the Late Archaic Laurentian Tradition from about 3000-1700 BC (Justice 1987:116).

A fragmented Brewerton Corner Notched point of Cedarville-Guelph chert material was identified from this site (Table 5; Figure 84). The identified portion includes the distal part (tip), a notch and shoulders, and part of the base. The cross-section is plano-biconvex. The blade has been heavily reworked and is irregular due to its use; it was previously used as a knife. The base is not ground and there is a slight barb at the shoulder. Brewerton Tradition points were manufactured during the Late Archaic Laurentian Tradition from about 3000-1700 BC (Justice 1987:116).

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the history/prehistory of the region. The site has a numerically and functionally limited,

diffuse artifact assemblage and generally lacks temporally diagnostic historic period materials; the materials are only known from surface contexts. The prehistoric period component is functionally and numerically limited. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33HK1040

This is a historic period site that was identified during surface collection of a soybean stubble field that offered from 80-100 percent bare ground surface visibility (Figure 22). The surface collection method focused on recovering or attempting to recover diagnostic materials and a representative sample. Pedestrian transects were spaced at 5-7.5 m intervals. These artifacts were obtained from within the delineated boundary which was plotted using a GPS. The site is located from a flat area that is in an upland setting and south of Township Road 103 and is in the Northwest Quarter of Section 29, Pleasant Township. The area is drained by an unnamed tributary of West Creek, which flows northward and is part of the Maumee River watershed that flows into Lake Erie. The dimensions of the site are 24 m north-south by 25 m east-west and the site size is considered to be 468 sq m.

Atlas and topographic maps were reviewed to further the contextual aspect of the site. The area was owned by W. V. Craig (Hardesty 1875) during the latter part of the nineteenth century. However, there are no buildings noted at the location where this site was identified at this time. There are no buildings indicated in this area according to 1970s era topographic mapping. The historic period artifacts that were obtained from this location appear to date from the late nineteenth to middle twentieth century, which would not be aberrant to the cartographic materials that were reviewed but minus confirmation of any buildings. Inspection of aerial images do not depict any buildings at this location circa 1988.

There were 15 historic period artifacts identified from this site (Table 6; Figure 85). Despite efforts to obtain diagnostic materials, only one artifact is relatively datable as the remainder are plain wares or stoneware. A Kaolin pipestem fragment was identified from this site. This is typically regarded as dating from the nineteenth century (Sunbury 1979). However, there were very few artifacts with limited diversity identified at this location and it may be secondary or trash deposit (Ball 1980).

Table 6. Prehistoric Artifact Inventory for Site 33HK1040.

Site (33…)	Provenience	Bag #	Artifact	Material	Count
HK1040	Grab sample, surface	4	Whiteware, plain	ceramic	9
			Stoneware	ceramic	2
			Kaolin pipestem	ceramic	1
			Clear bottle glass	Glass	2

			Pane glass	Glass	1

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the history of the region. The site has a numerically and functionally limited, diffuse artifact assemblage and generally lacks temporally diagnostic historic period materials; the materials are only known from surface contexts. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

33HK1041

This is a historic period site that was identified during surface collection of a soybean stubble field that offered from 50-60 percent bare ground surface visibility (Figures 23 and 61). The surface collection method focused on recovering or attempting to recover diagnostic materials and a representative sample. Pedestrian transects were spaced at 5-7.5 m intervals. These artifacts were obtained from within the delineated boundary which was plotted using a GPS. The site is located from a flat area that is in an upland setting and east of County Road 53 and is in the Southwest Quarter of Section 21, Pleasant Township. The area is drained by Needles Creek, which flows into the Middle Branch Portage River and is part of the Lake Erie watershed. The dimensions of the site are 24 m north-south by 18 m east-west and the site size is considered to be 264 sq m.

Atlas and topographic maps were reviewed to further the contextual aspect of the site. The area was owned by "E. L." (Hardesty 1875) during the latter part of the nineteenth century and there is a building indicated at this general location (Figure 80). There are no buildings indicated in this area according to 1970s era topographic mapping. The historic period artifacts that were obtained from this location appear to date from the middle to late nineteenth century, which would be consistent to the cartographic materials that were reviewed. Inspection of aerial images do not depict any buildings at this location circa 1988.

There were seven historic period artifacts that were identified from this site (Table 7; Figure 86). These are all affiliated with kitchen-related materials including ceramic and glass. A whiteware sherd with spongeware and hand-painted décor likely dates from the middle of the nineteenth century (Majewski and O'Brien 1987; Ramsey 1969). Salt-glazed stoneware generally dates from the nineteenth century regarding its most abundant use and popularity (Ramsey 1969). The remaining artifacts are not diagnostic of any specific period.

Table 7. Prehistoric Artifact Inventory for Site 33HK1041.

Site (33…)	Provenience	Bag #	Artifact	Material	Count
HK1041	Grab sample, surface	6	Sponged hand-painted ware	ceramic	1
			Salt-glazed stoneware	ceramic	1
			Stoneware	ceramic	2

			Flint-Colored bottle glass	Glass	1
			Clear bottle glass	Glass	2

This site was evaluated for its eligibility for the NRHP. This site lacks integrity (Little et al. 2000:39-43; U.S. Department of the Interior, National Park Service [USDI, NPS] 1997:44-45) and the ability to yield further and important information regarding the history of the region. The site has a numerically and functionally limited, diffuse artifact assemblage and generally lacks temporally diagnostic historic period materials; the materials are only known from surface contexts. This site is not considered to be eligible for inclusion into the NRHP, and further work is not deemed necessary.

APE Definition and NRHP Determination

The APE is a term that must be applied on an individual project basis. The nature of the project or undertaking is considered in determining the APE. This may include areas that are off the property or outside of the actual project's boundaries to account for possible visual impacts. When construction is limited to underground activity, the APE may be contained within the footprint of the project. The APE includes the transmission lines easement, which is 30.5 m (100 ft) wide and 17.7 km (11 mi) long. These investigations resulted in the identification of six previously unrecorded archaeological sites including 33PU235-236 and 33HN1038-1041. There are no significant archaeological recorded resources involved with this project.

Recommendations

In March and April 2022, Weller & Associates, Inc. conducted Phase I Archaeological Investigations for the 17.7 km (11 mi) East Leipsic-Rader Road 69kV to a 138kV Conversion/Rebuild Project in Van Buren Township, Putnam County and Pleasant Township, Hancock, Ohio. The archaeological fieldwork largely consisted of surface collection methods and visual inspection with lesser areas that were subject to subsurface testing. These investigations resulted in the identification of six previously unrecorded archaeological sites, 33PU235-236 and 33HN1038-1041. These sites are not considered to be significant, and they are not eligible for the National Register of Historic Places, they are not landmarks. It is considered that this will not affect any historic properties or landmarks. No further archaeological work is deemed necessary.

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Figures

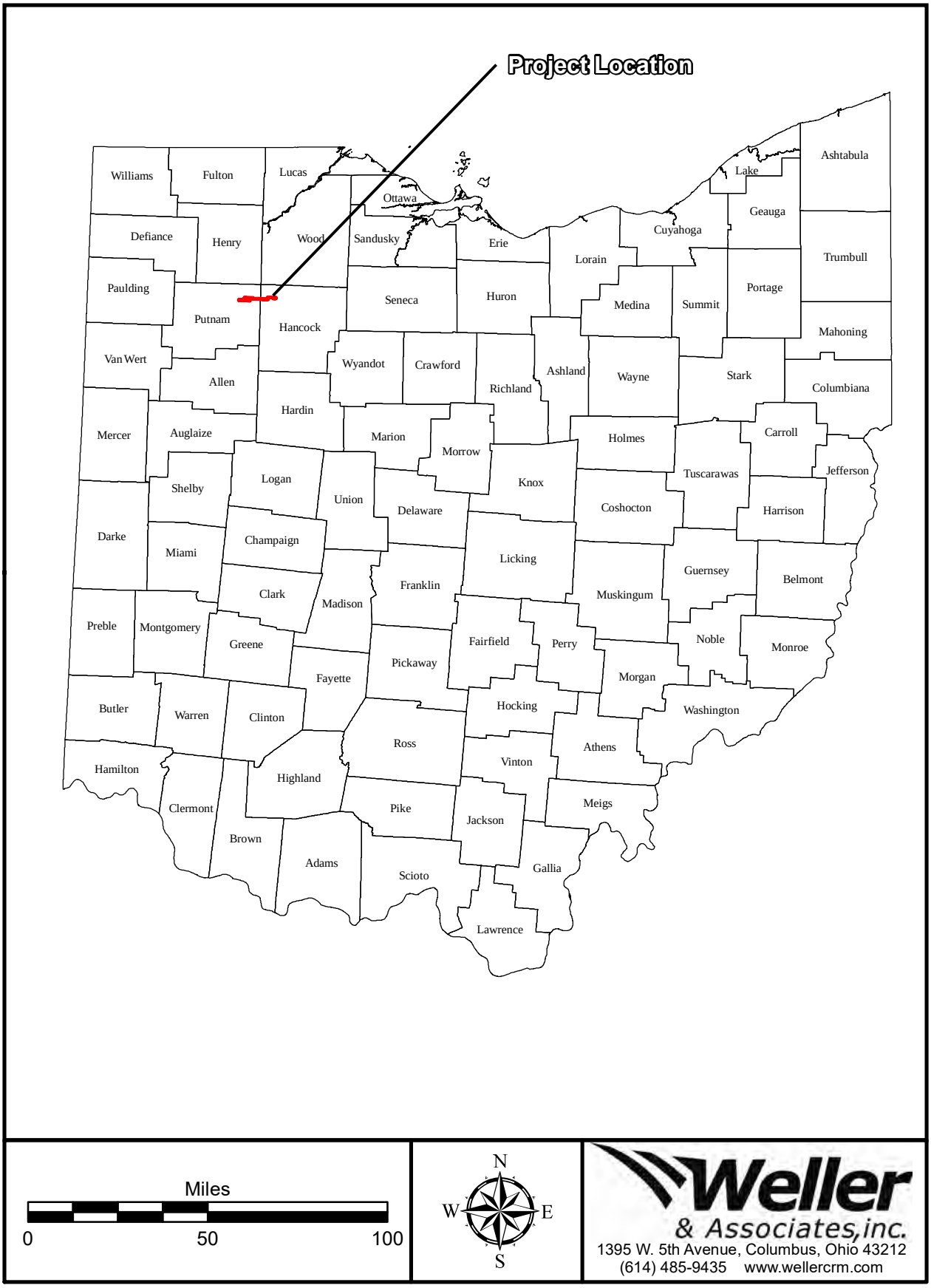


Figure 1. Political map of Ohio showing the approximate location of the project.

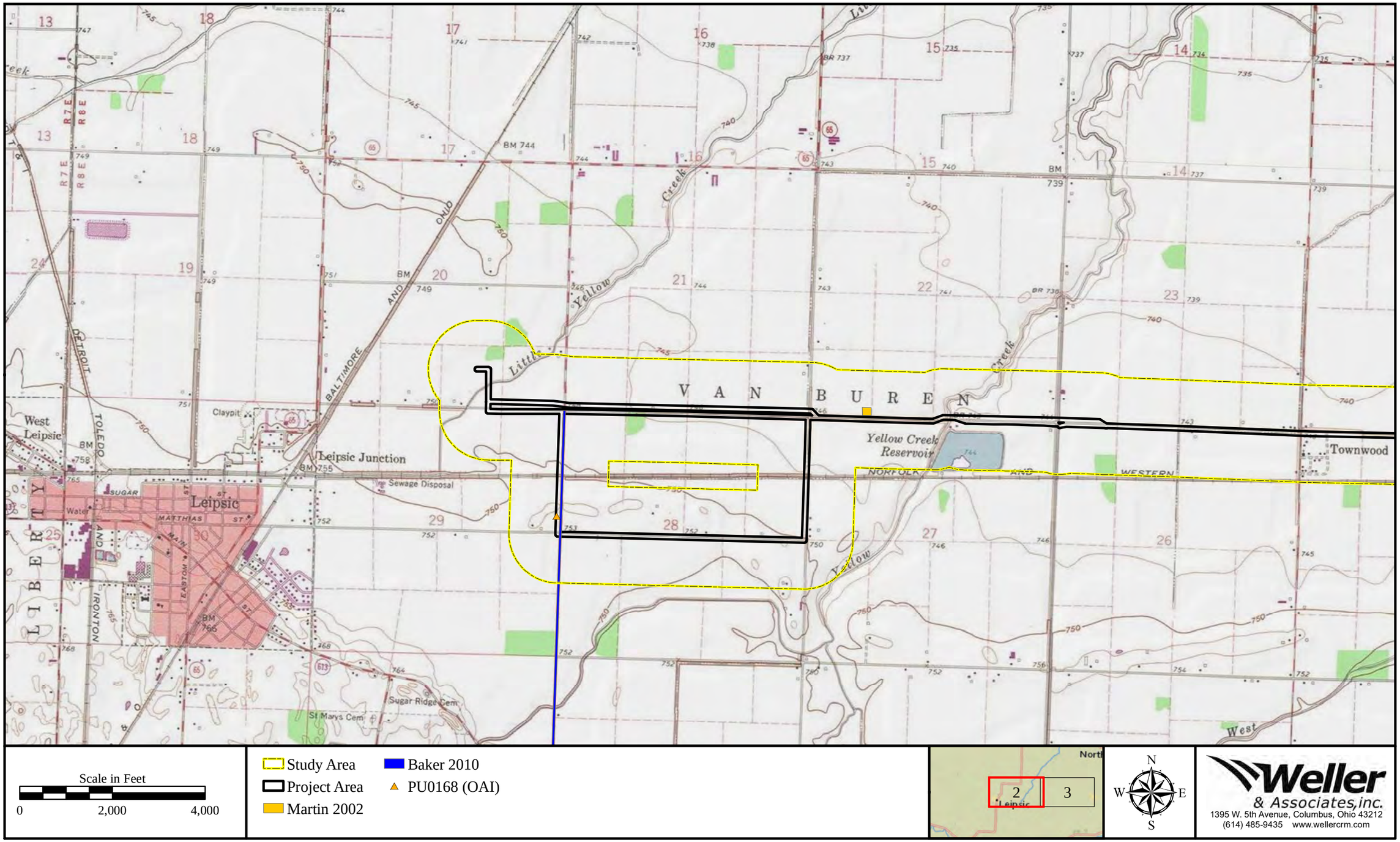


Figure 2. Portions of the USGS *1973 Leipsic, and 1974 McComb, Ohio 7.5 Minute Series (Topographic)* maps indicating the location of the project and recorded resources within the study area.

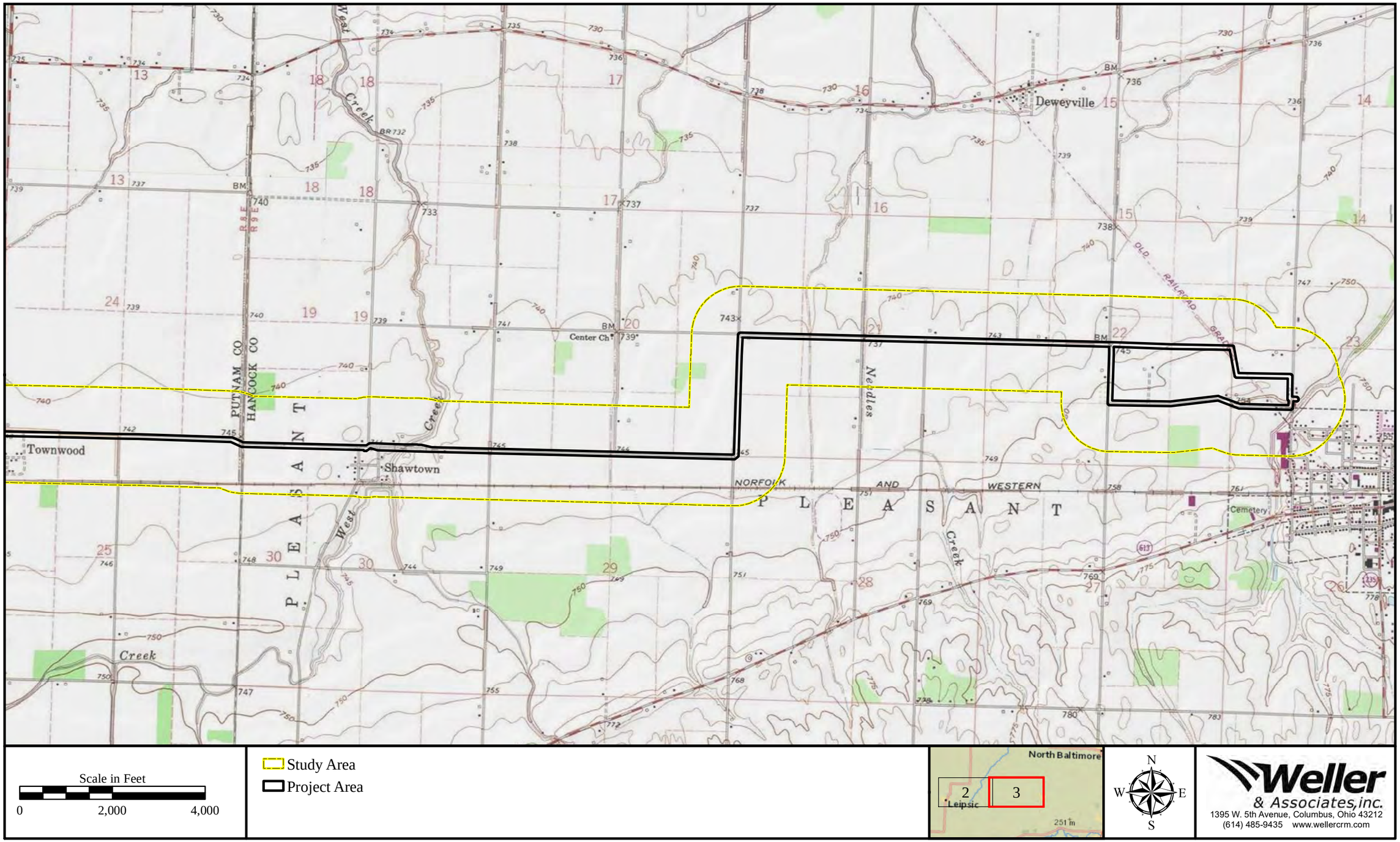


Figure 3. Portions of the USGS *1973 Leipsic, and 1974 McComb, Ohio 7.5 Minute Series (Topographic)* maps indicating the location of the project and recorded resources within the study area.

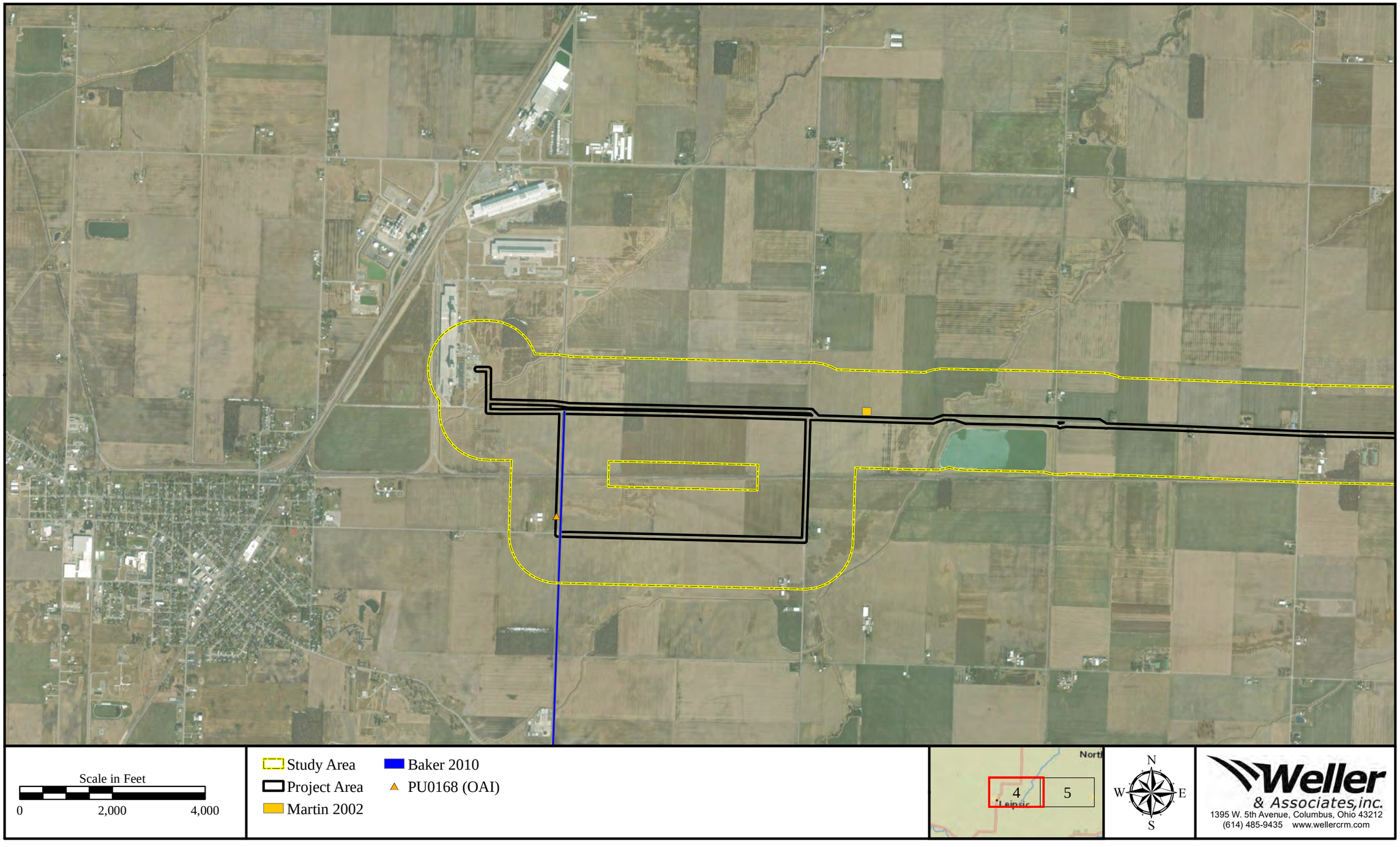


Figure 4. Aerial map indicating the location of the project area and recorded resources within the study area.

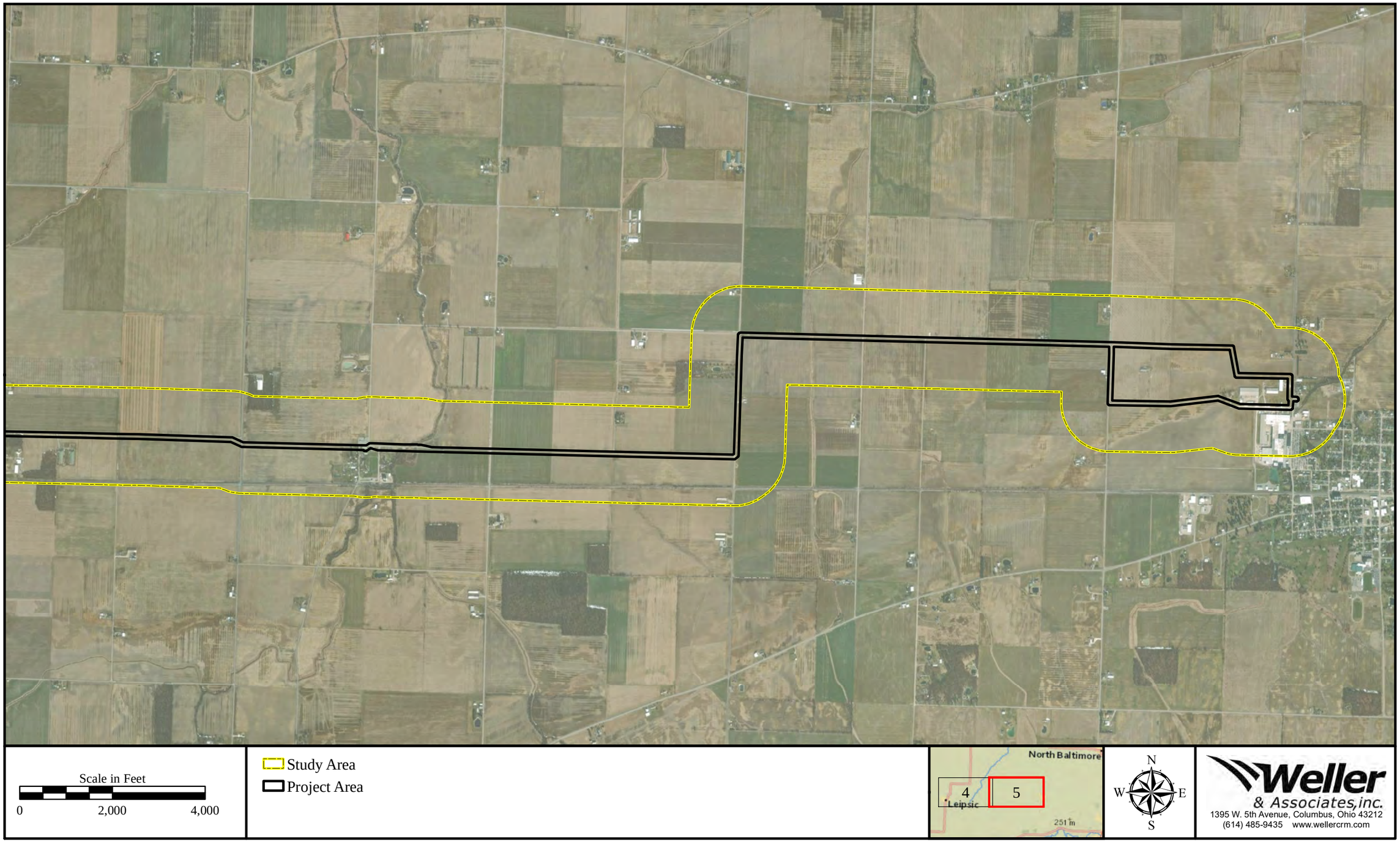


Figure 5. Aerial map indicating the location of the project area and recorded resources within the study area.

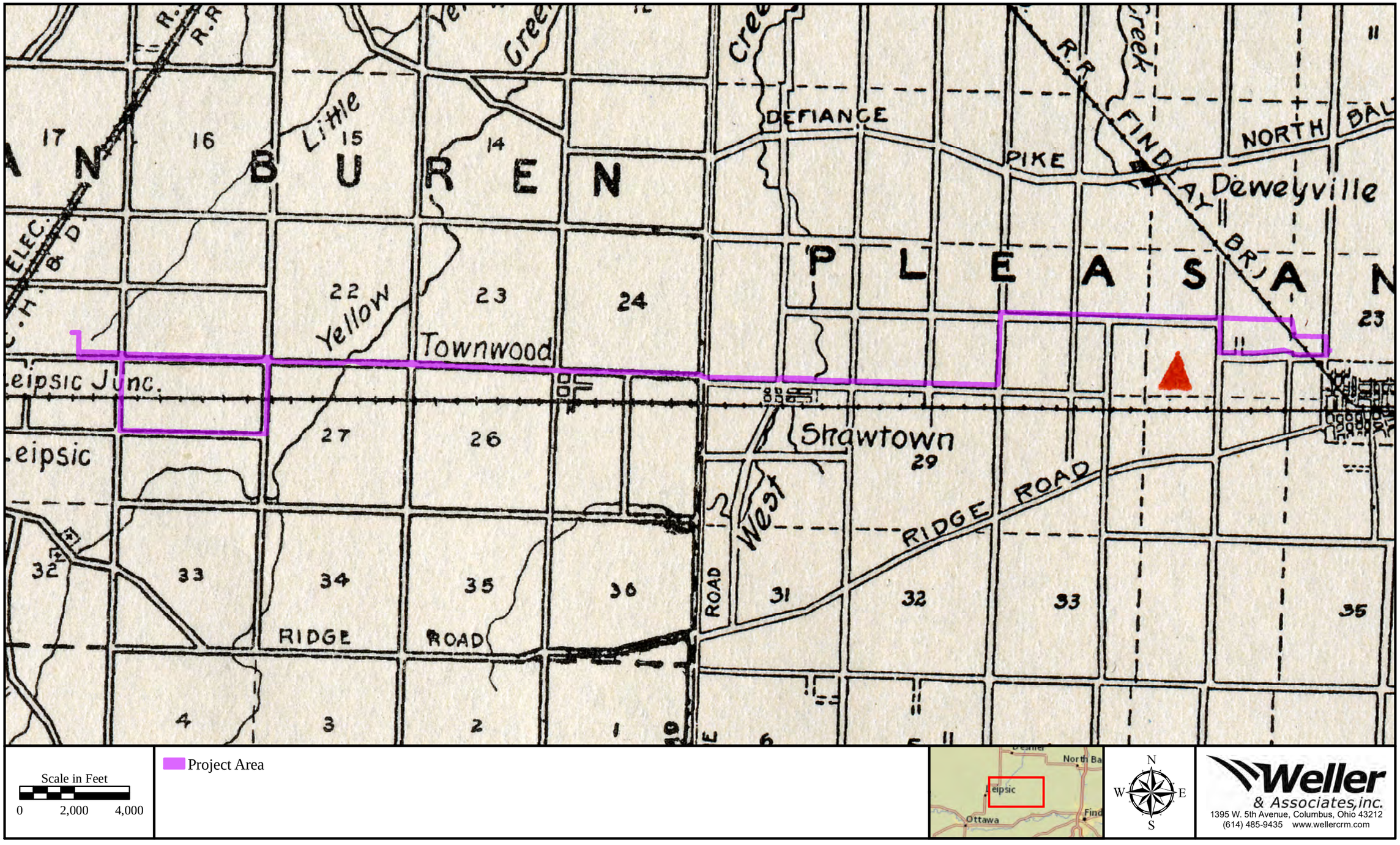


Figure 6. Portion of the *Archeological Atlas of Ohio* (Mills 1914) indicating the approximate location of the project.

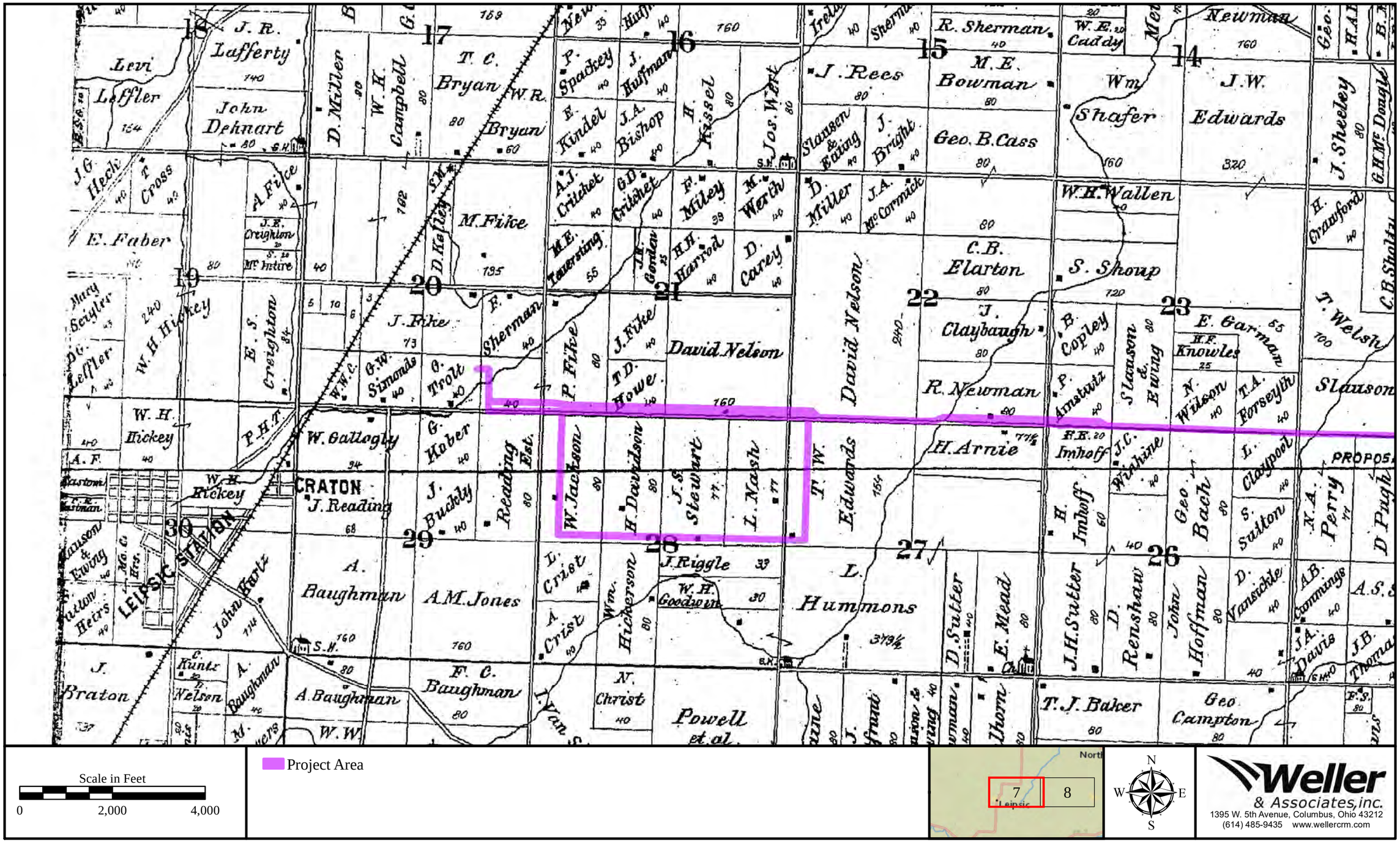


Figure 7. Portions of the *Atlas of Putnam County, Ohio and Atlas of Hancock County, Ohio* (Hardesty 1875, 1880) indicating the approximate location of the project.

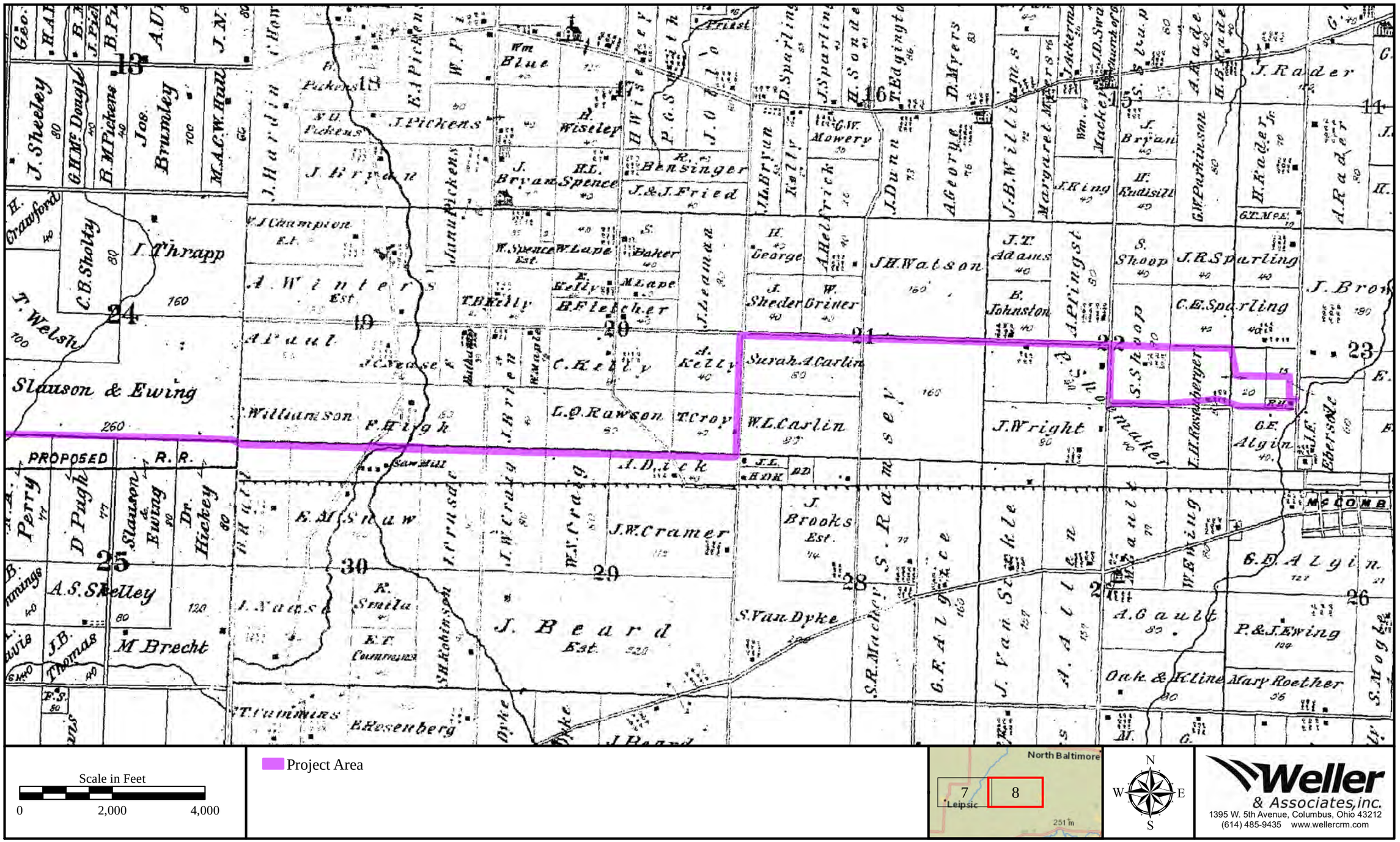


Figure 8. Portions of the *Atlas of Putnam County, Ohio and Atlas of Hancock County, Ohio* (Hardesty 1875, 1880) indicating the approximate location of the project.

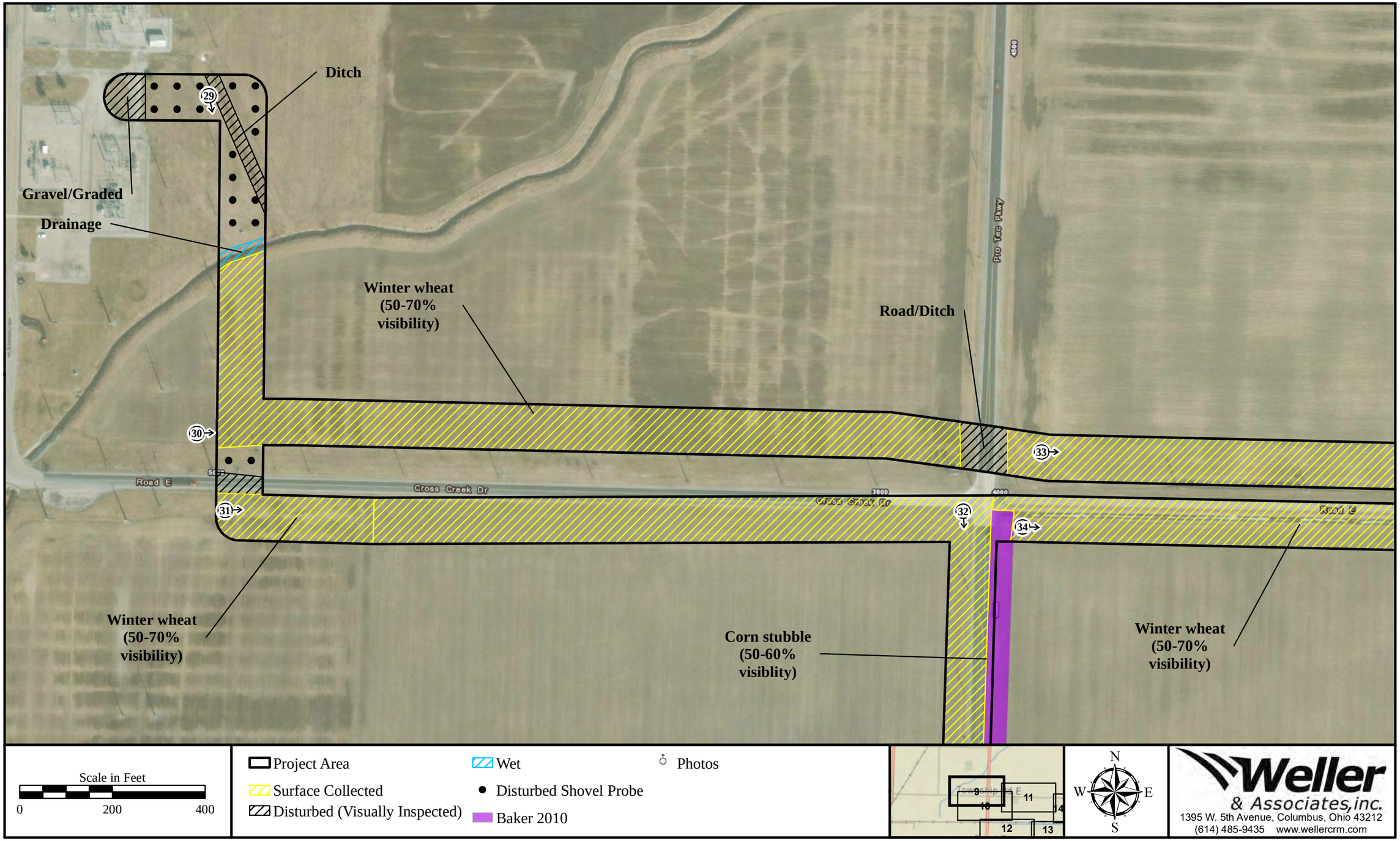
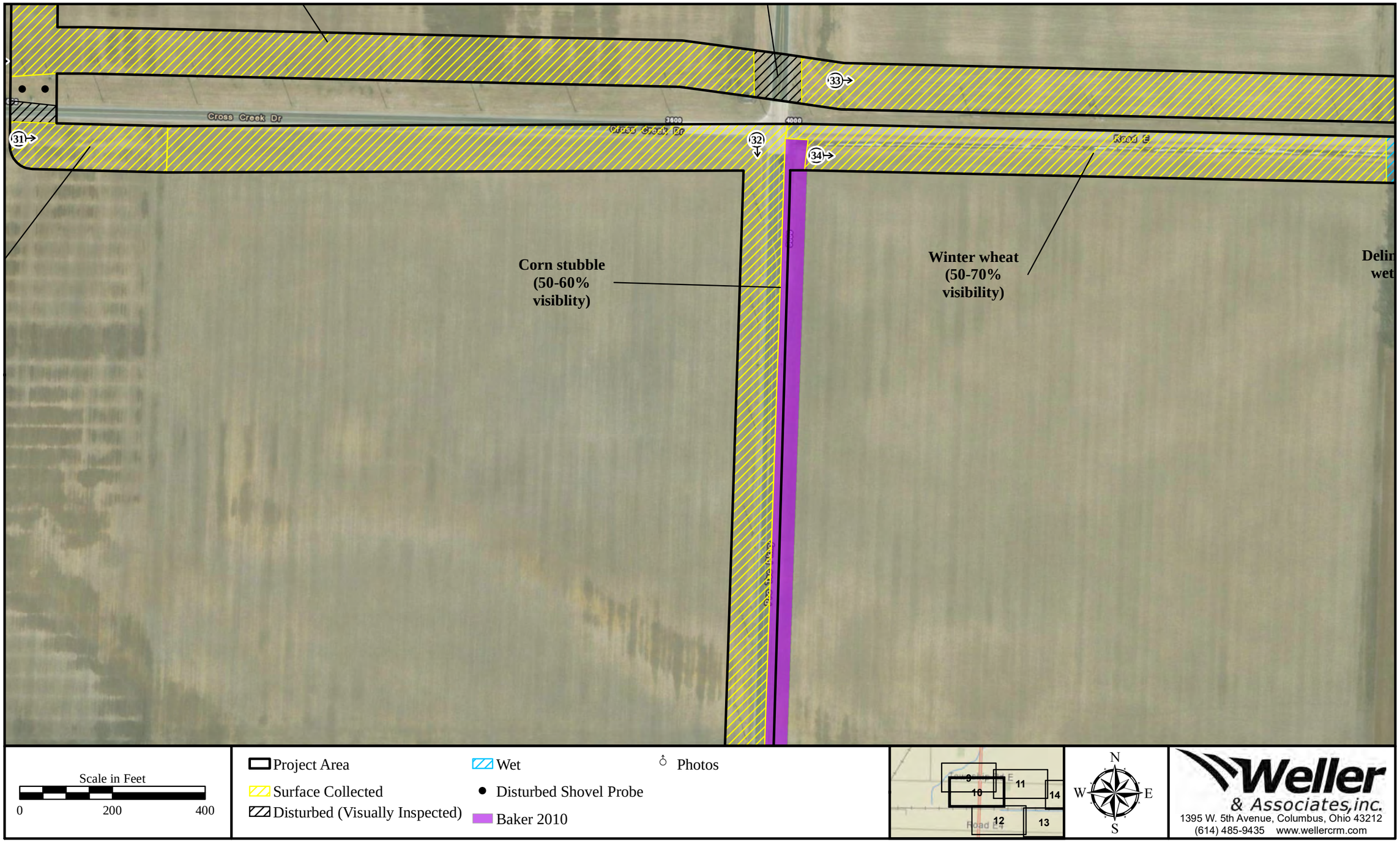


Figure 9. Fieldwork results and photo orientation map.



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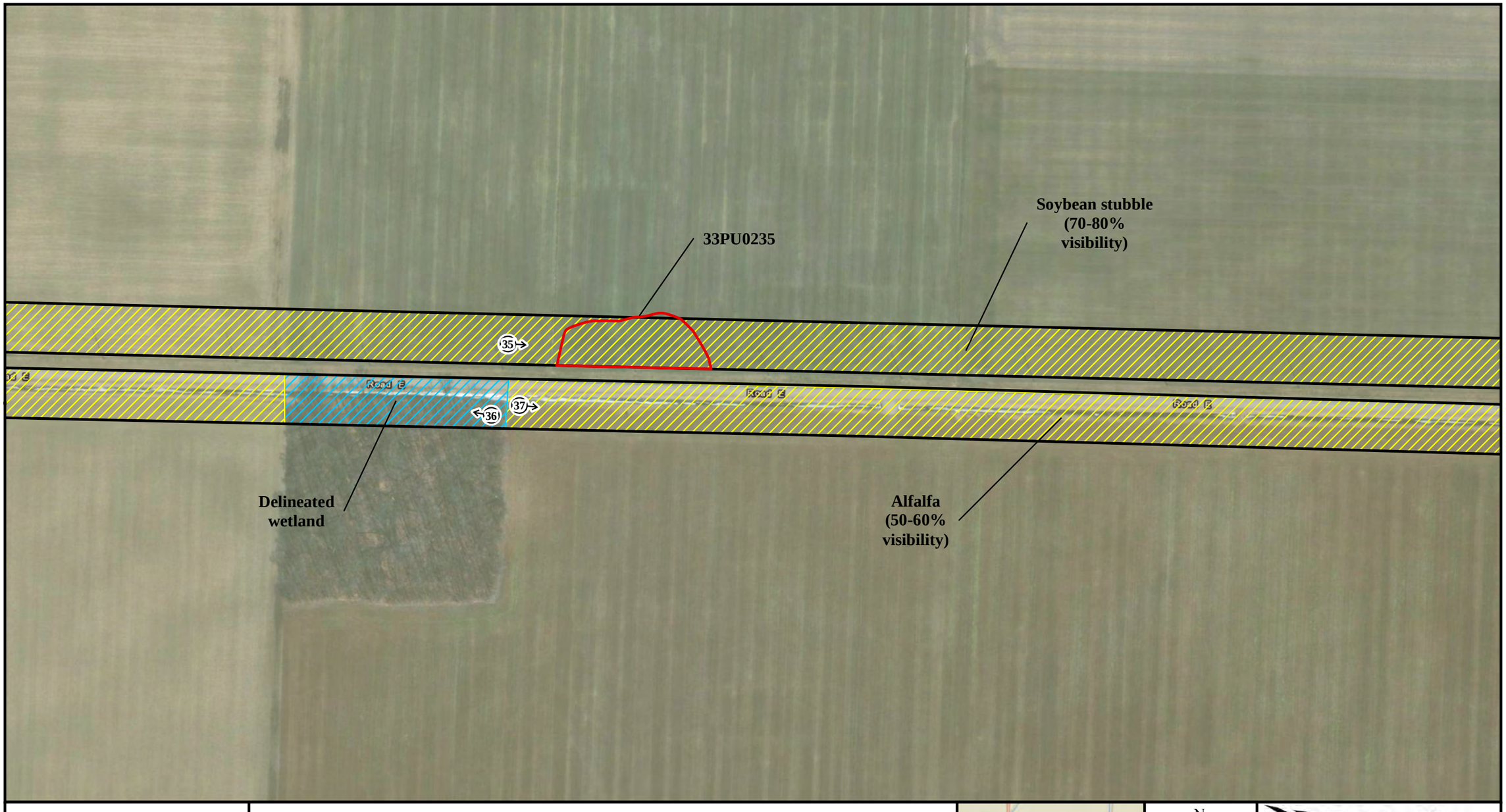

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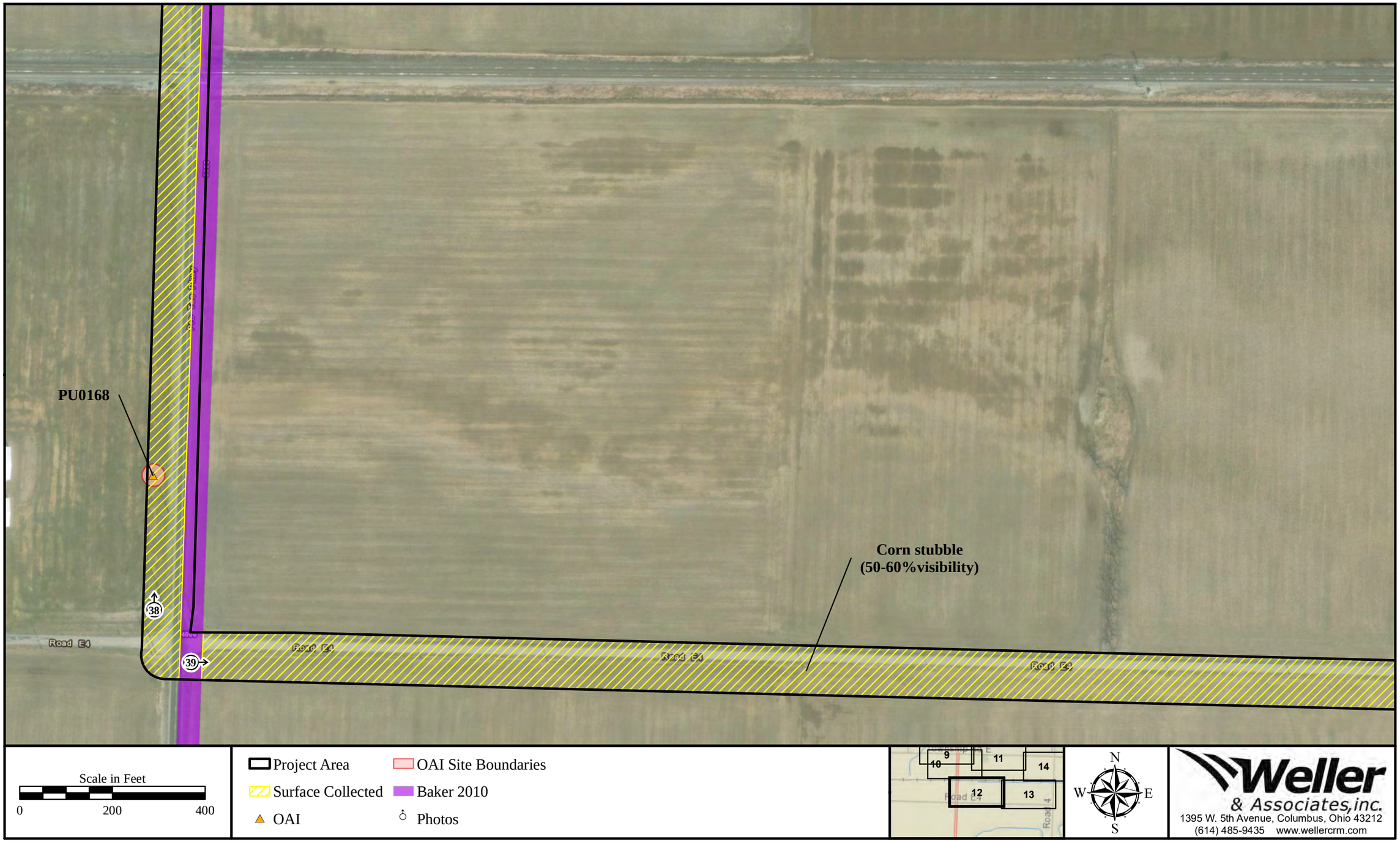

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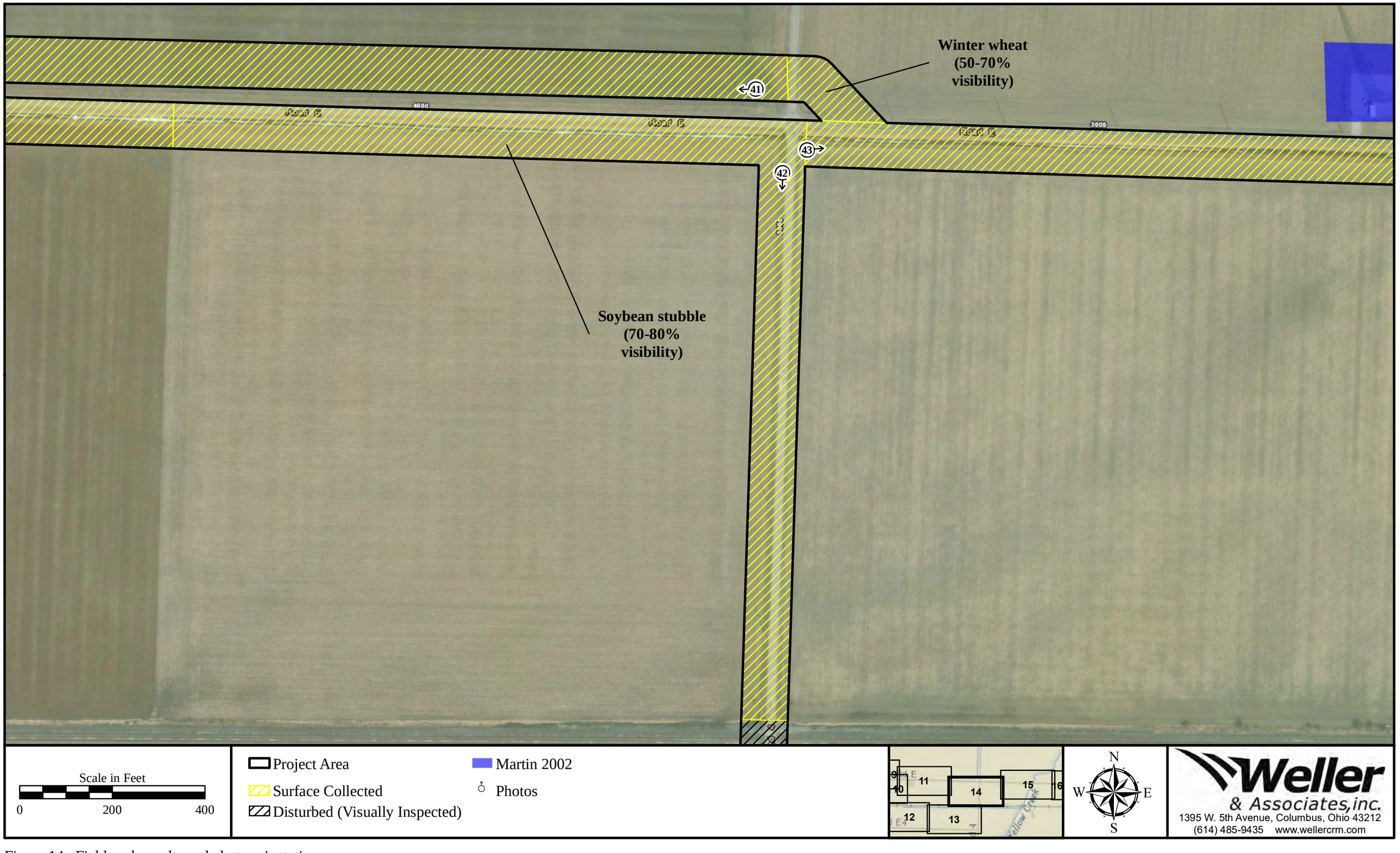
Figure 13. Fieldwork results and photo orientation map.



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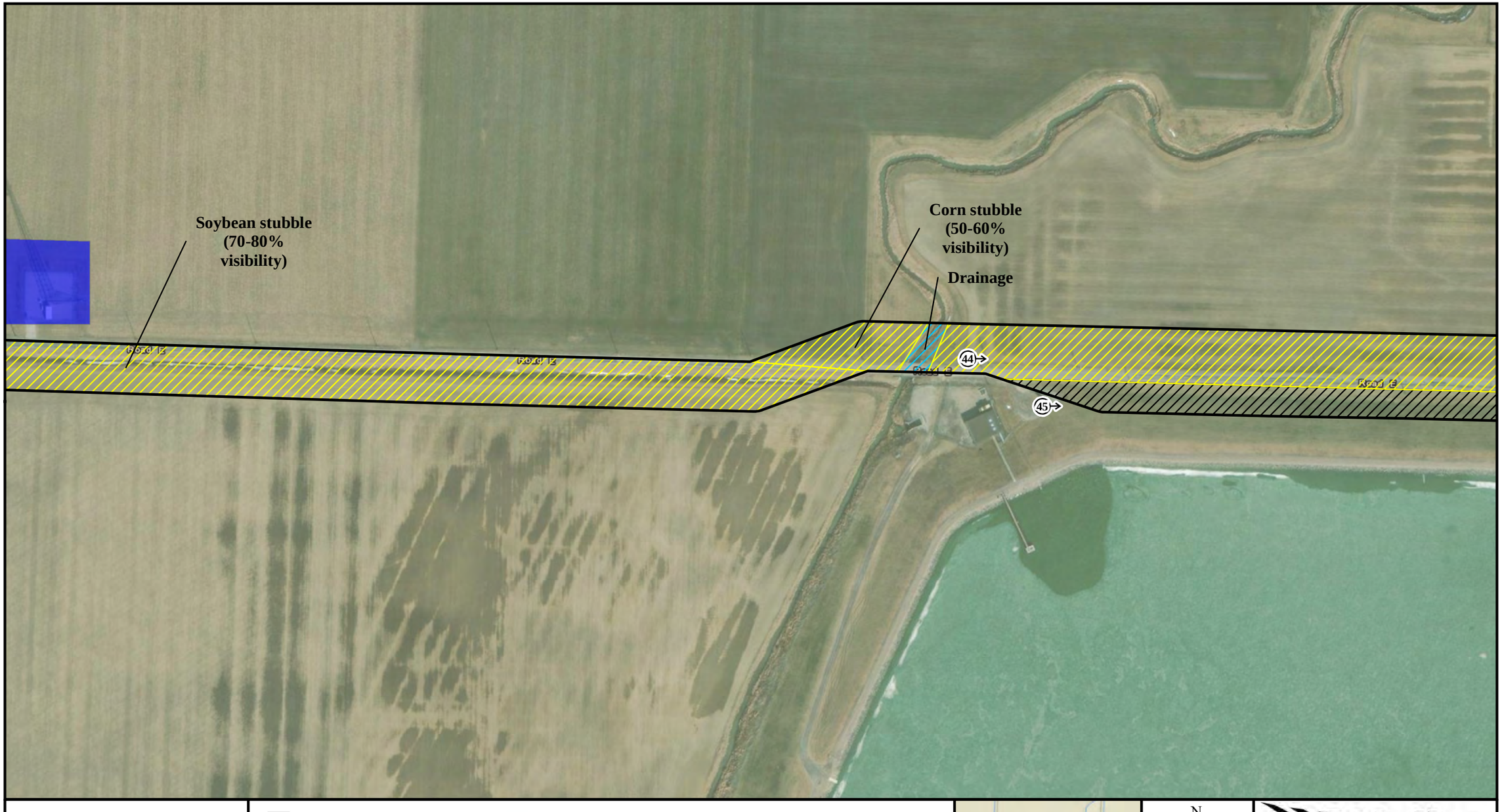

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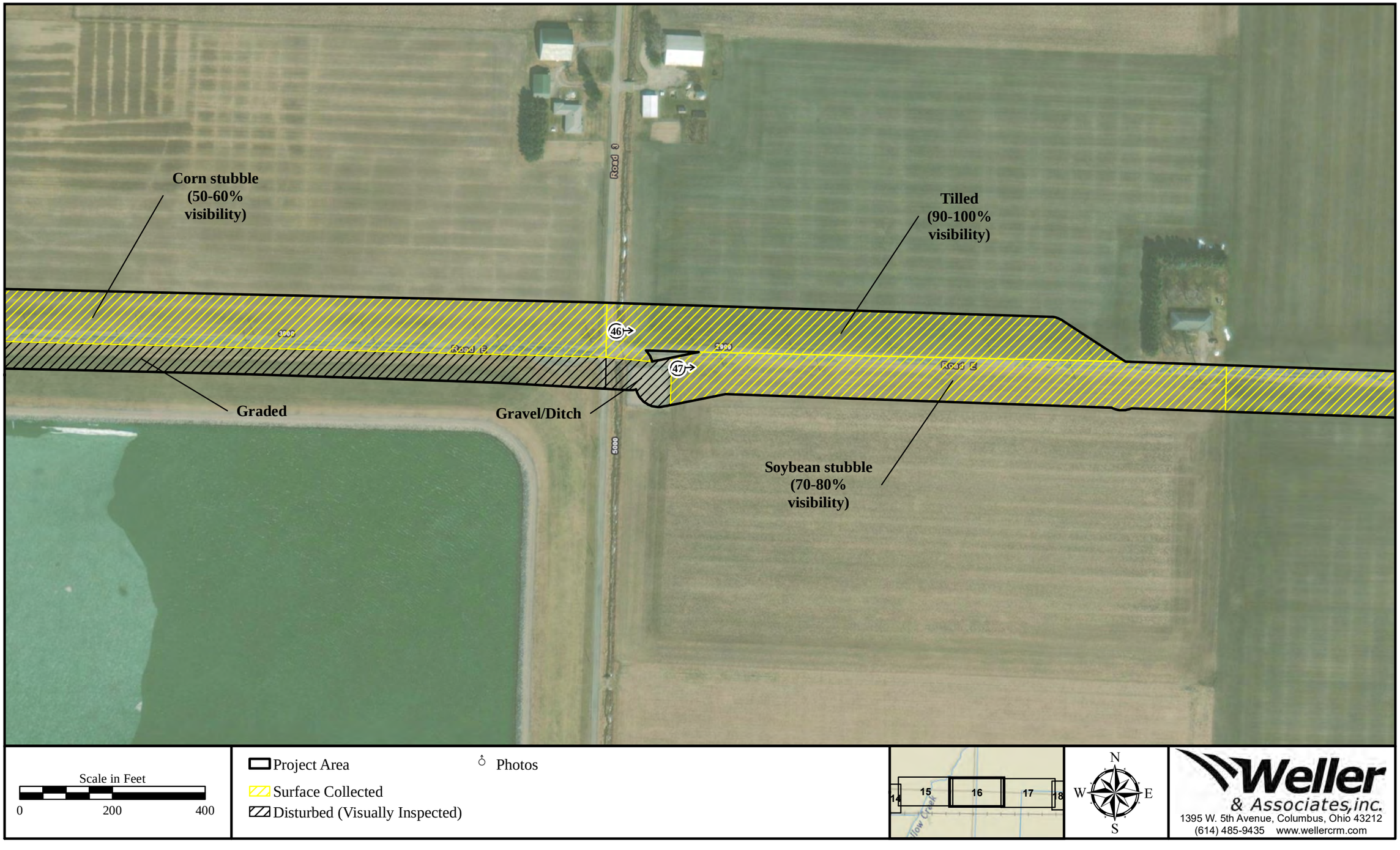

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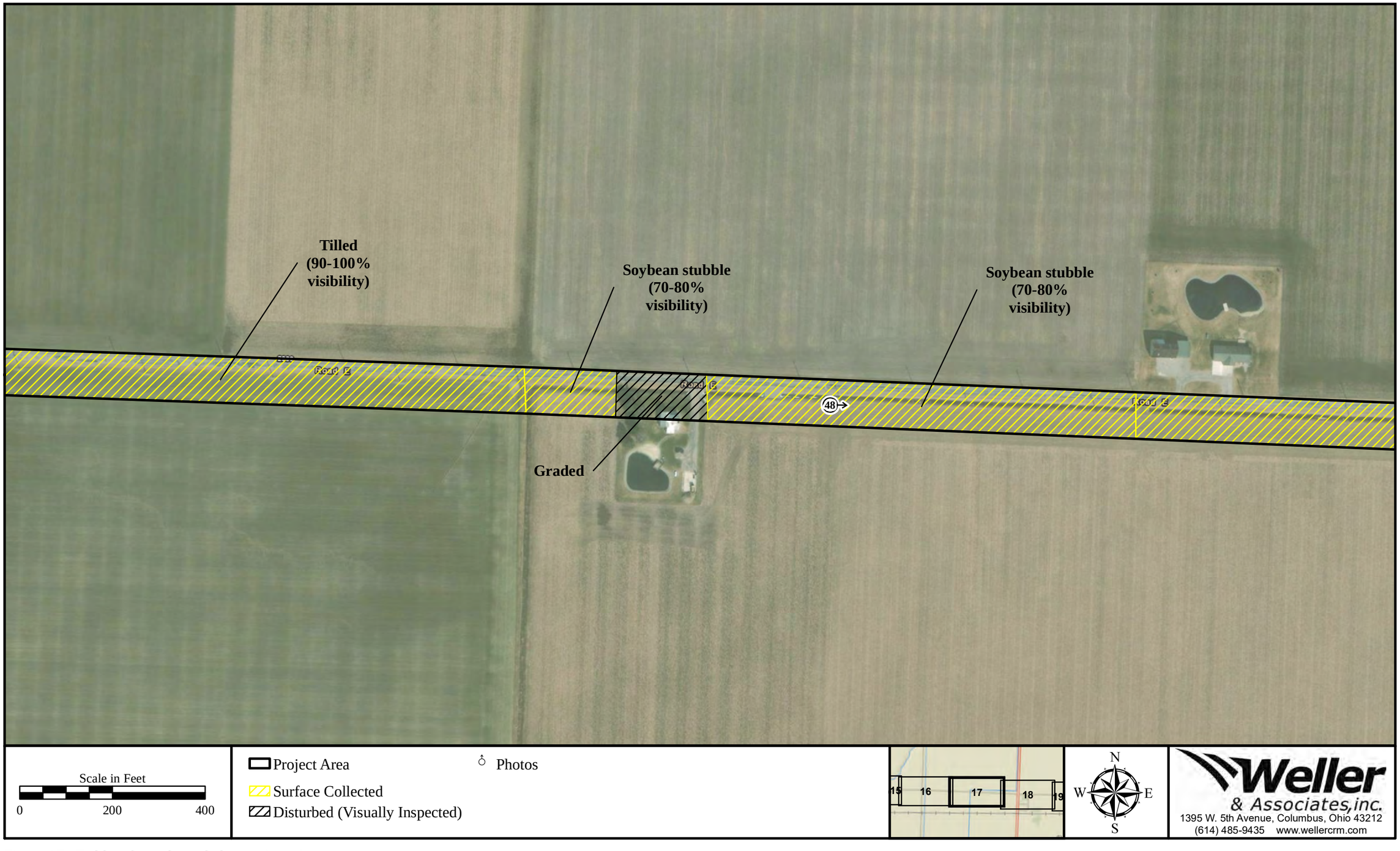

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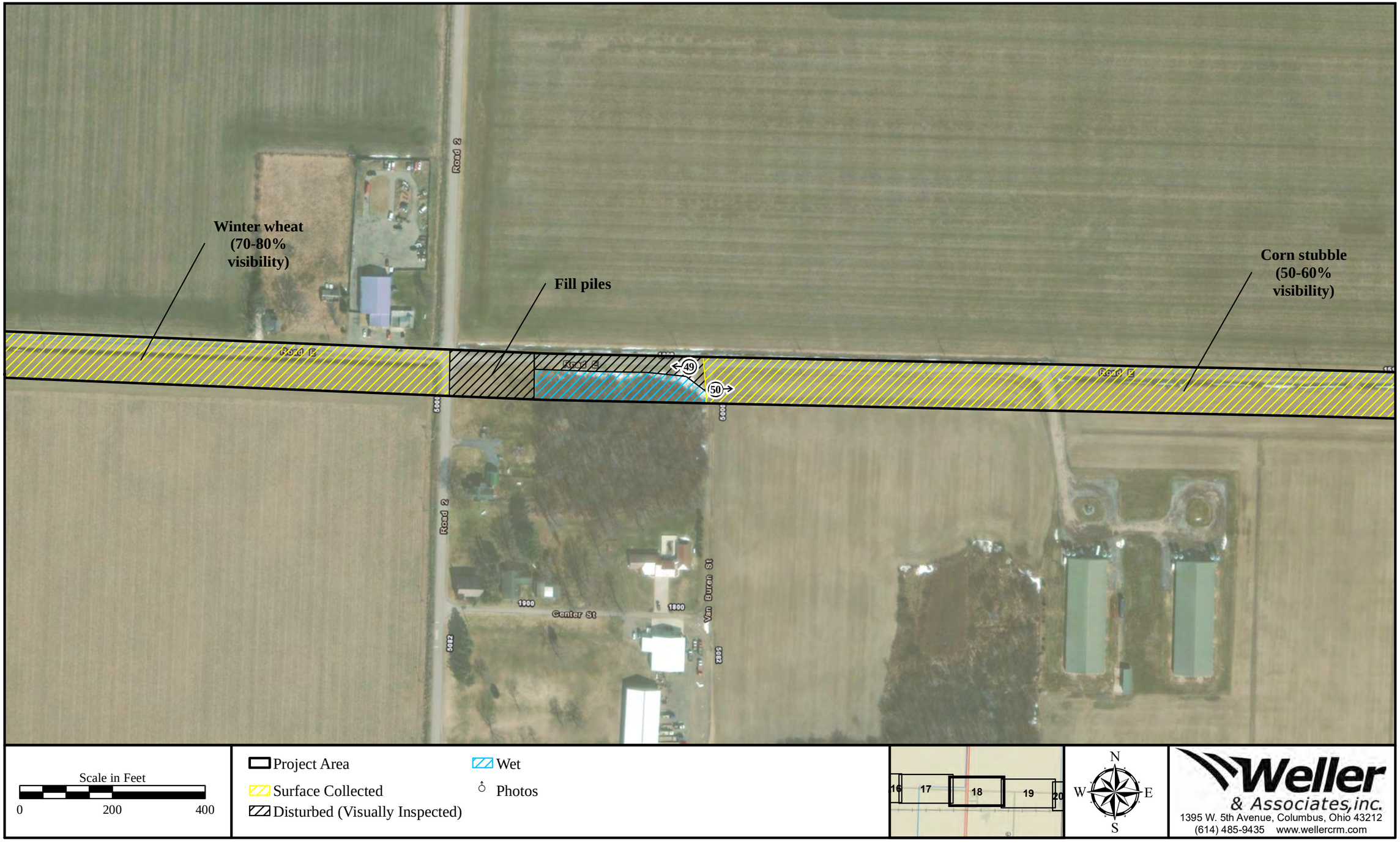

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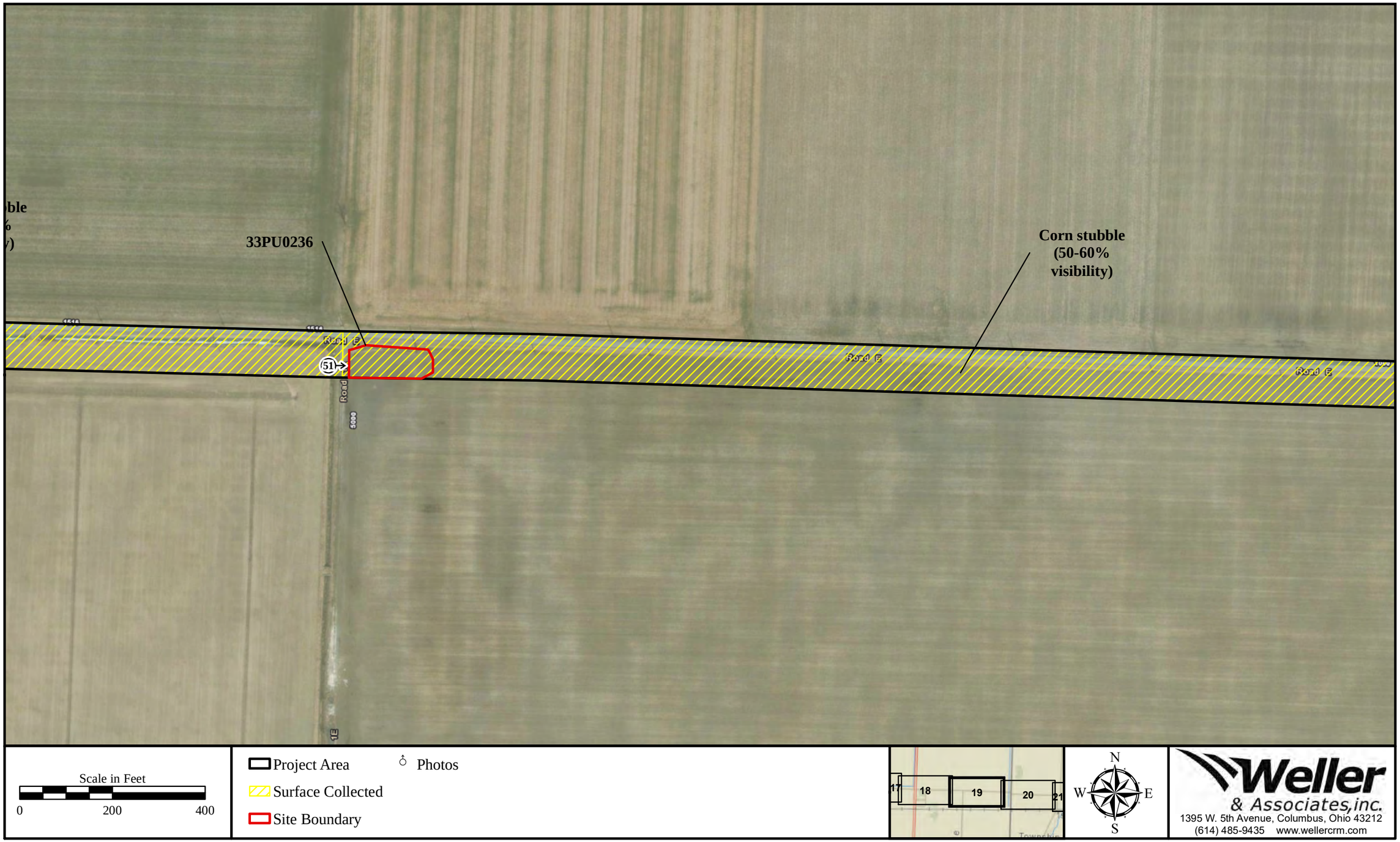

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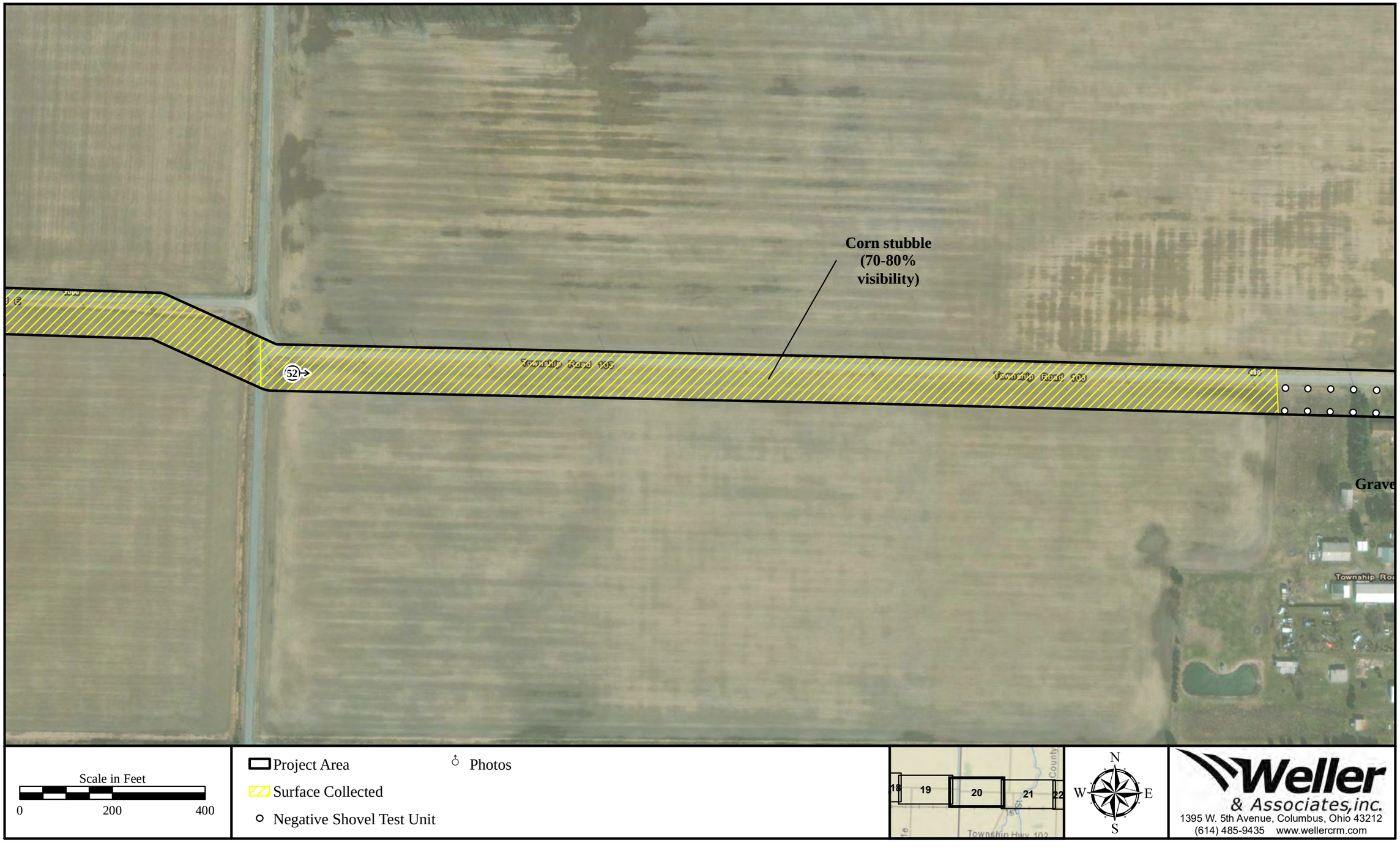

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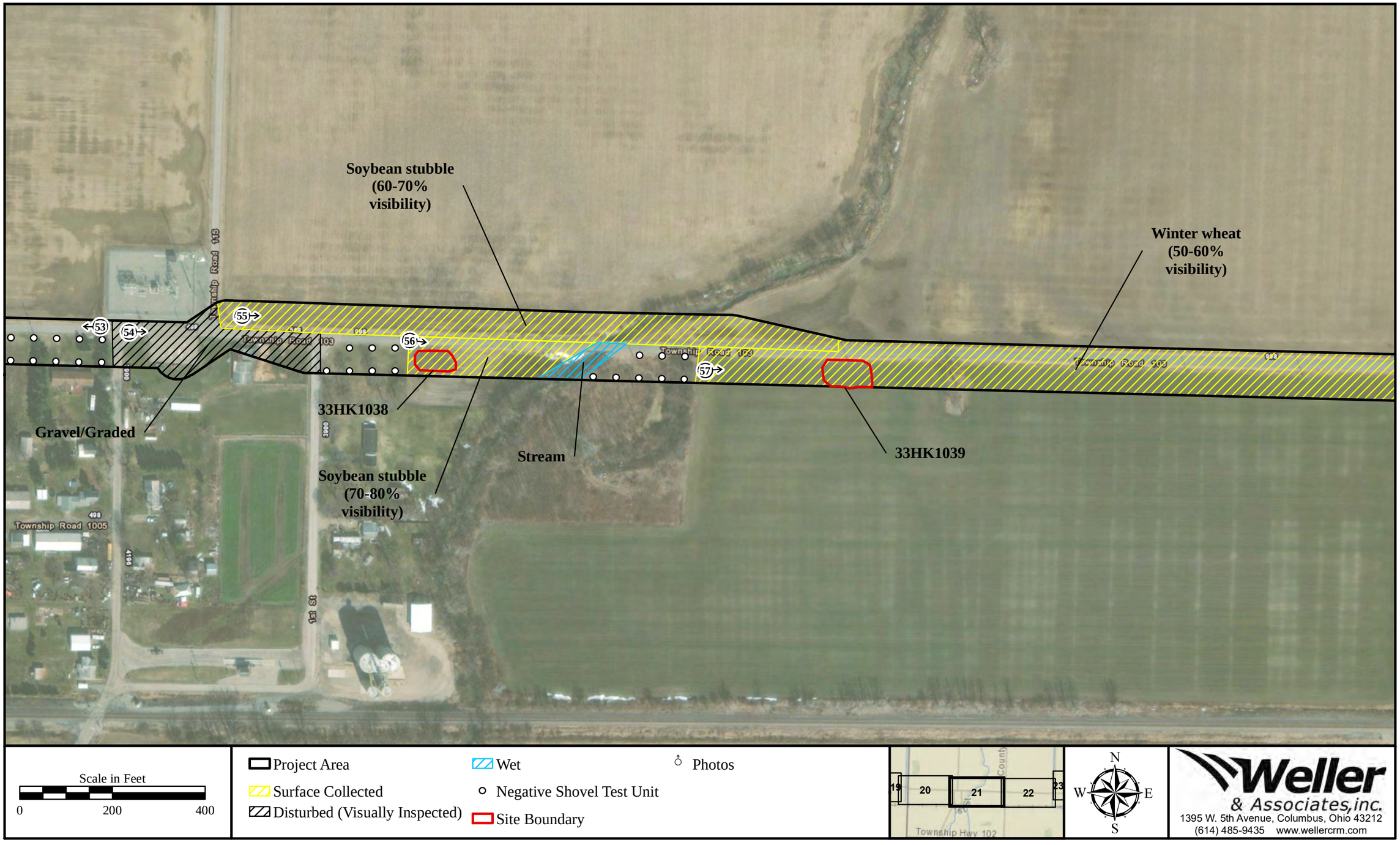

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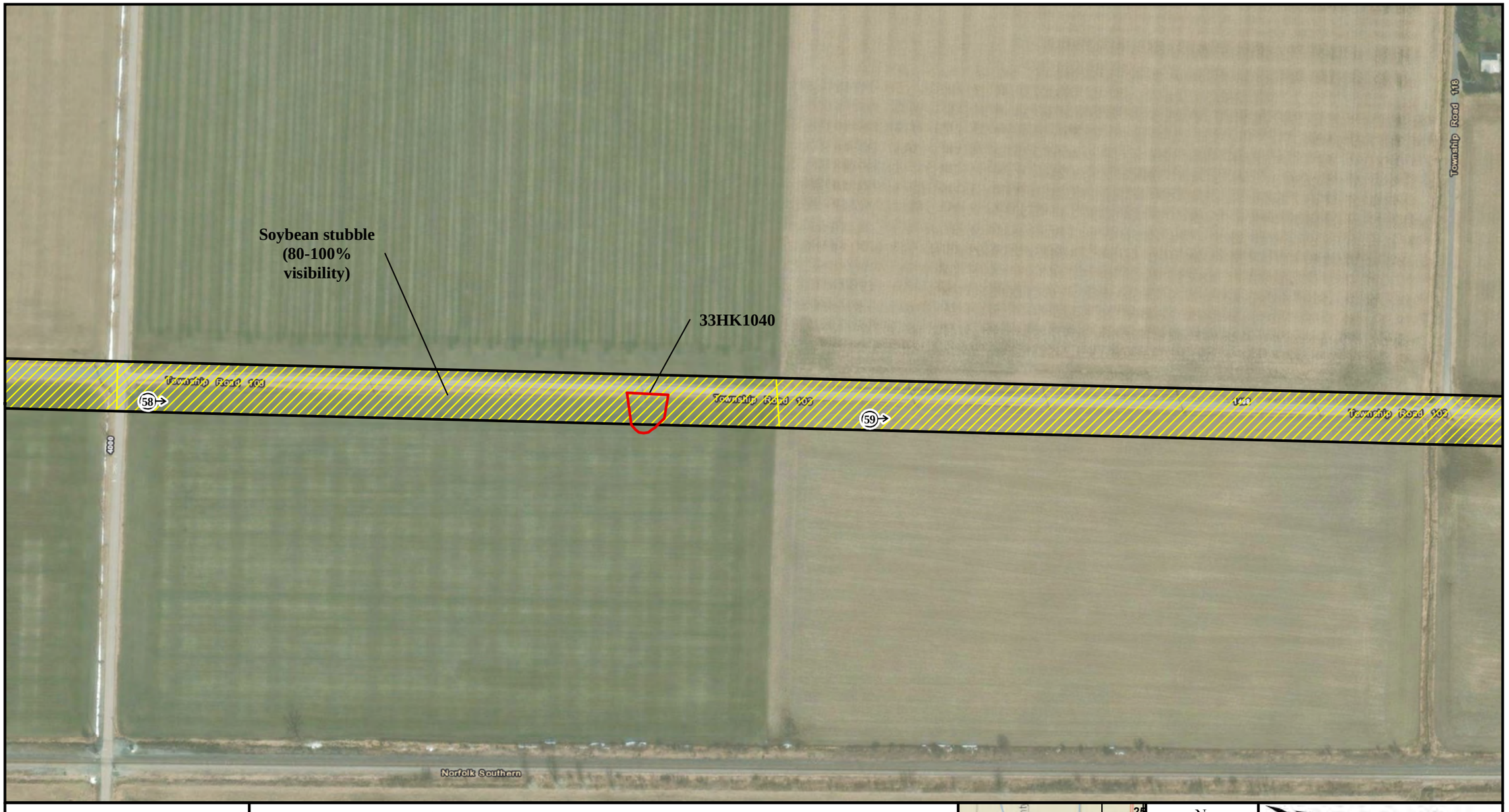

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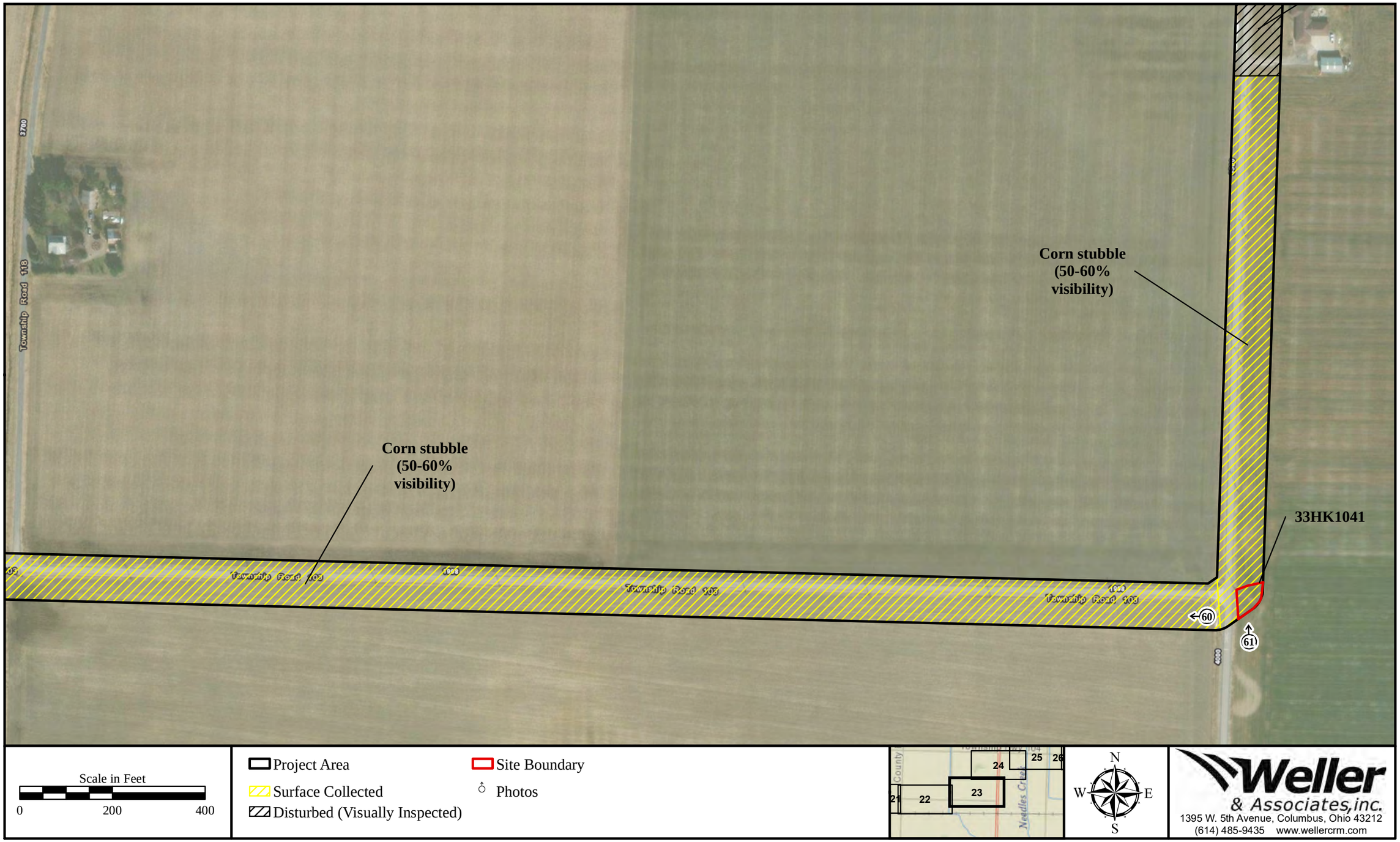

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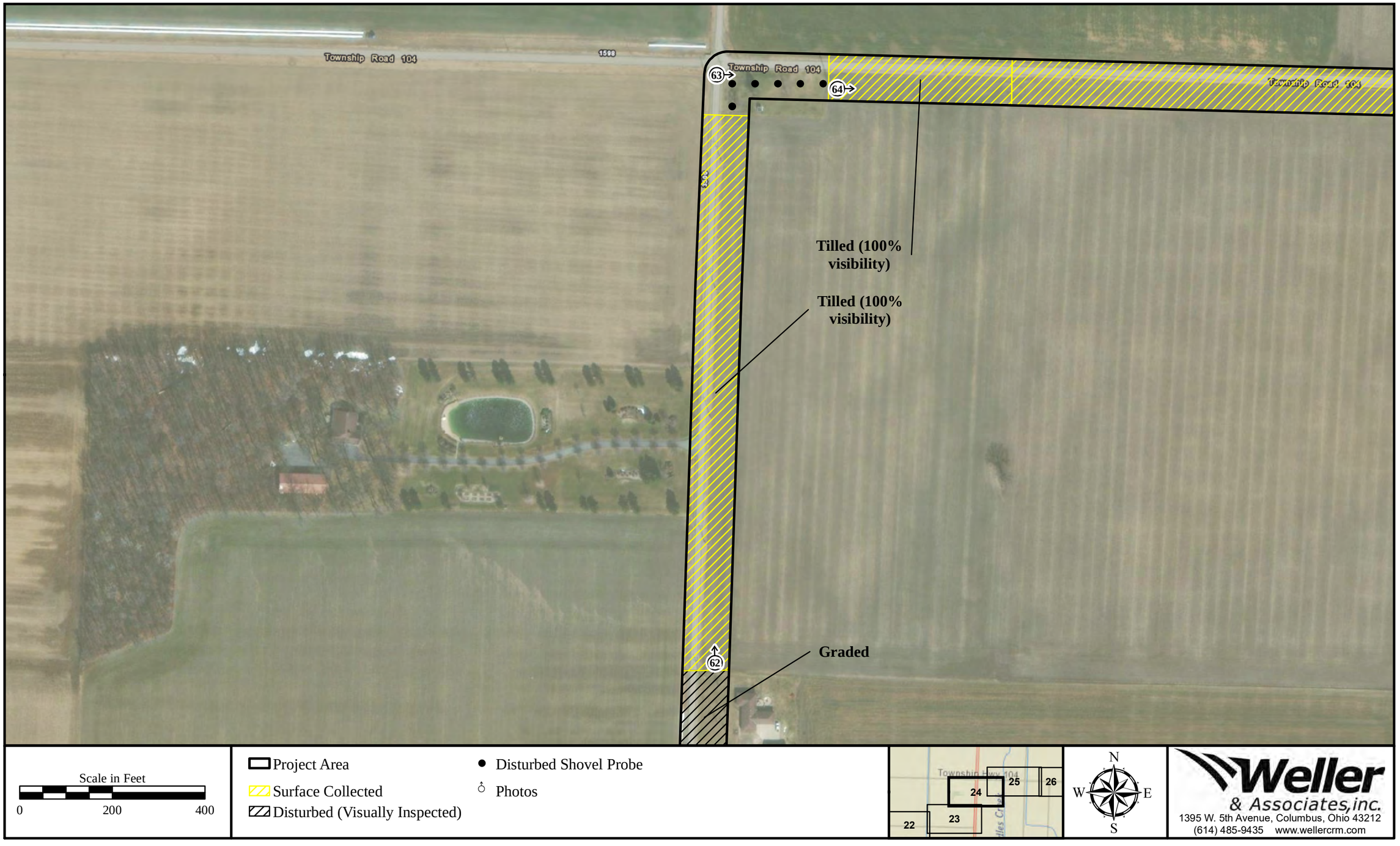

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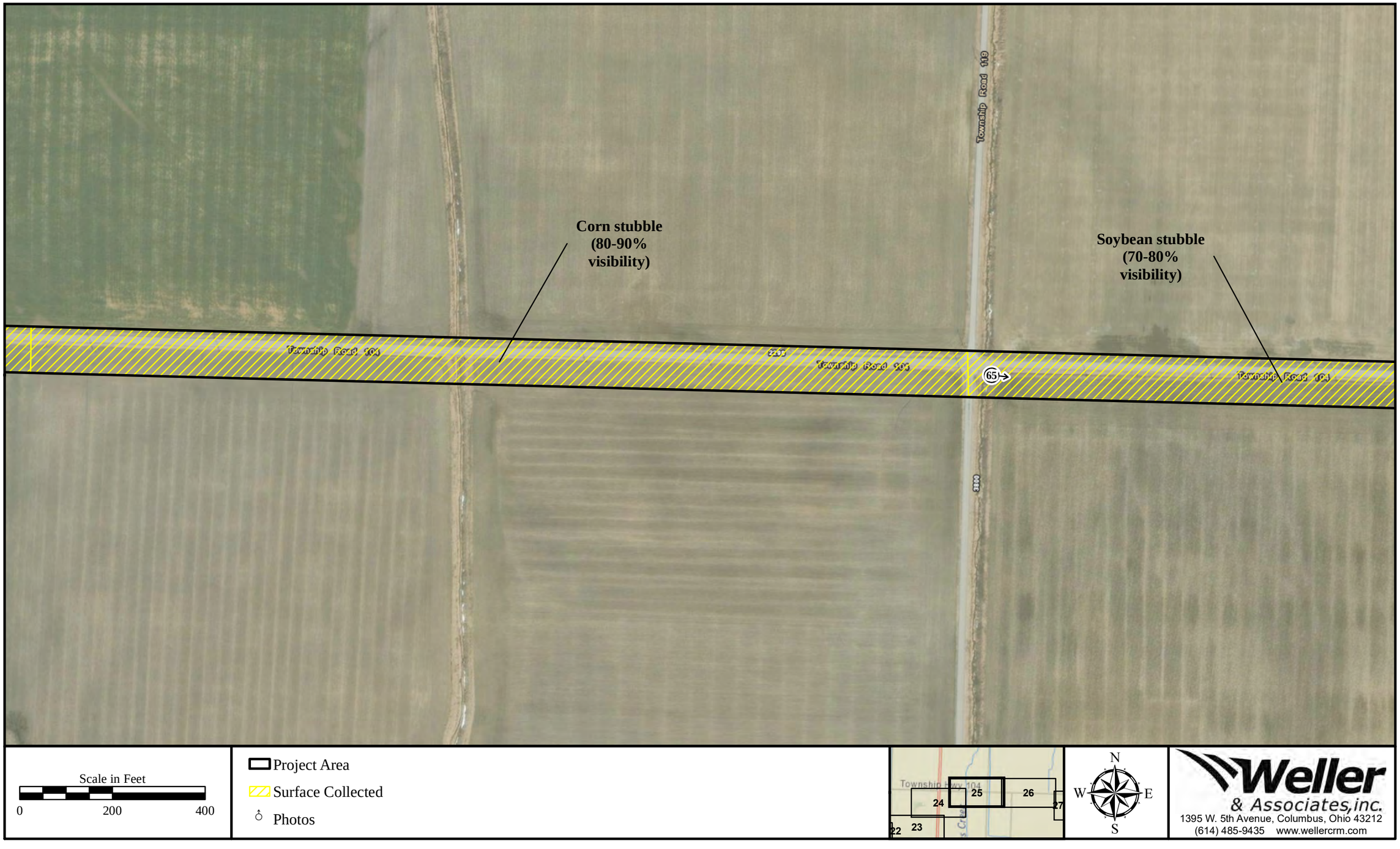

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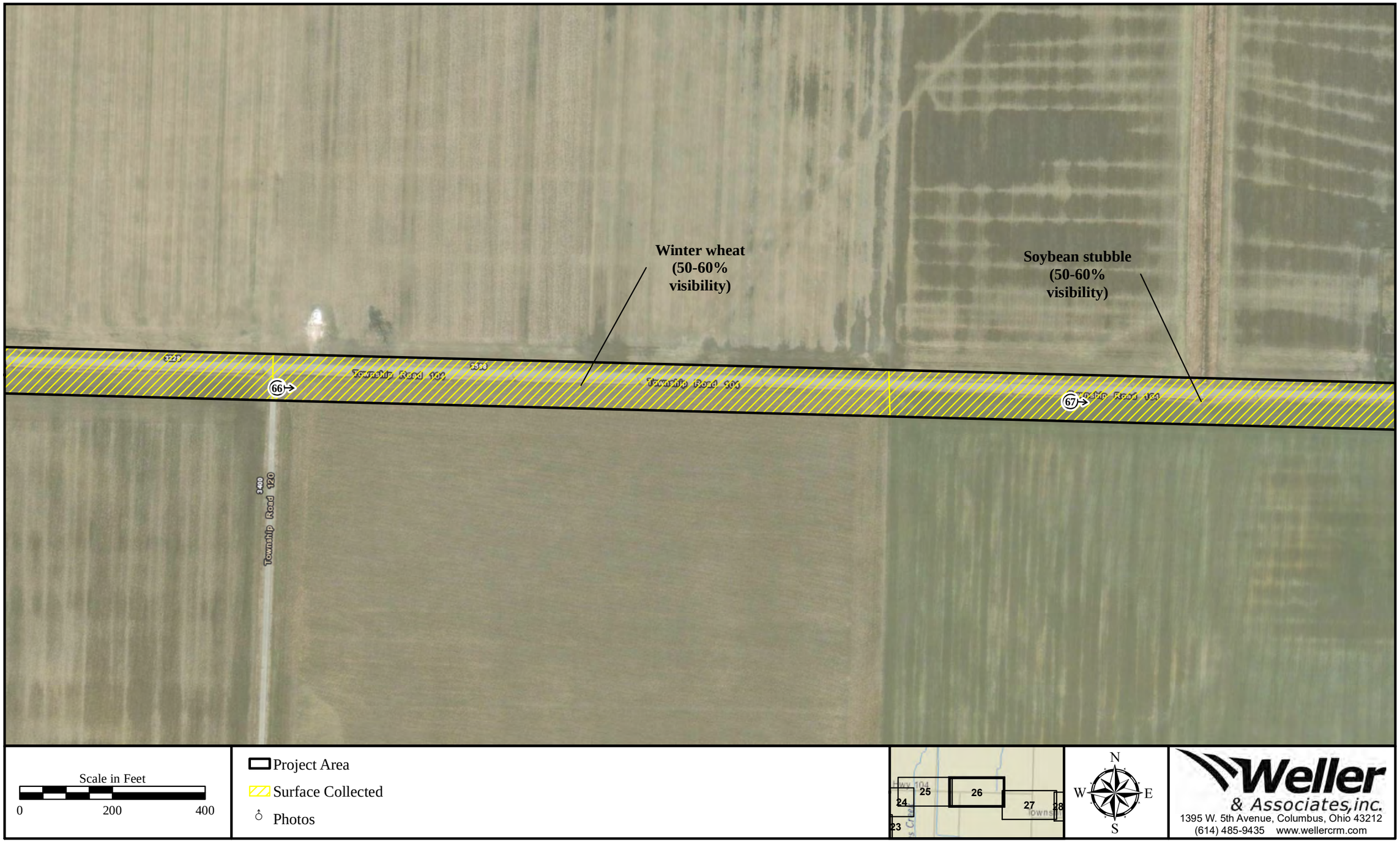


Figure 26. Fieldwork results and photo orientation map.

Figure 27. Fieldwork results and photo orientation map.

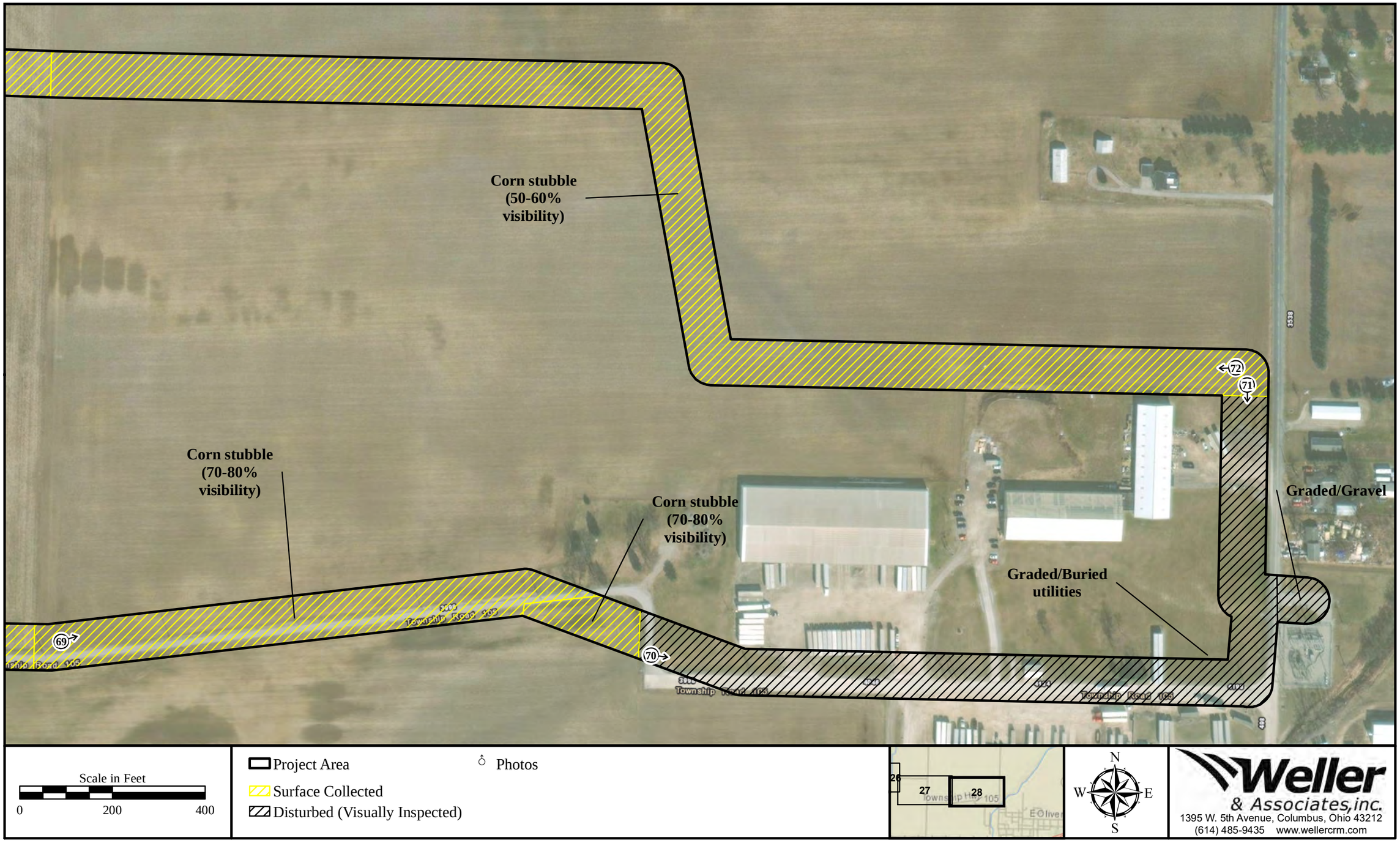


Figure 28. Fieldwork results and photo orientation map.

Figure 29. View of grassy area containing disturbed shovel probes and a ditch looking south.

Figure 30. View of surface collected winter wheat field looking east.

Figure 31. View of surface collected winter wheat field looking east.

Figure 32. View of surface collected corn stubble field looking south.

Figure 33. View of surface collected soybean stubble field looking east.

Figure 34. View of surface collected winter wheat field looking east.

Figure 35. View of surface collected soybean stubble field containing site 33PU0235 looking east.

Figure 36. View of delineated wetland looking west.

Figure 37. View of surface collected alfalfa field looking east.

Figure 38. View of surface collected corn stubble field looking north.

Figure 39. View of surface collected soybean stubble field looking east.

Figure 40. View of surface collected winter wheat field looking west.

Figure 41. View of surface collected soybean stubble field looking west.

Figure 42. View of surface collected soybean stubble field looking south.

Figure 43. View of surface collected soybean stubble field looking east.

Figure 44. View of surface collected corn stubble field looking east.

Figure 45. View of disturbed graded area looking east.

Figure 46. View of surface collected tilled field looking east.

Figure 47. View of surface collected soybean stubble field looking east.

Figure 48. View of surface collected winter wheat field looking east.

Figure 49. View of disturbed area containing fill piles looking west.

Figure 50. View of surface collected corn stubble field looking east.

Figure 51. View of surface collected corn stubble field containing site 33PU0236 looking east.

Figure 52. View of surface collected corn stubble field looking east.

Figure 53. View of shovel tested grassy area looking west.

Figure 54. View of disturbed conditions looking east.

Figure 55. View of surface collected soybean stubble field looking east.

Figure 56. View of surface collected soybean stubble field containing site 33HK1038 looking east.

Figure 57. View of surface collected winter wheat field containing site 33HK1039 looking east.

Figure 58. View of surface collected soybean stubble field containing site 33HK1040 looking east.

Figure 59. View of surface collected corn stubble field looking east.

Figure 60. View of surface collected corn stubble field looking west.

Figure 61. View of surface collected corn stubble field containing site 33HK1041 looking north.

Figure 62. View of surface collected tilled field looking north.

Figure 63. View of grassy area containing disturbed shovel probes looking east.

Figure 64. View of surface collected tilled field looking east.

Figure 65. View of surface collected soybean stubble field looking east.

Figure 66. View of surface collected winter wheat field looking east.

Figure 67. View of surface collected corn stubble field looking east.

Figure 68. View of surface collected soybean stubble field looking east.

Figure 69. View of surface collected corn stubble field looking east.

Figure 70. View of disturbed area containing buried utilities/grading.

Figure 71. View of surface collected corn stubble field and disturbed area containing buried utilities/grading looking south.

Figure 72. View of surface collected corn stubble field looking west.

Figure 73. Typical surface visibility throughout the surface collected winter wheat fields in the project.

Figure 74. Typical surface visibility throughout the surface collected corn stubble fields in the project.

Figure 75. Typical surface visibility throughout the surface collected soybean stubble fields in the project.

Figure 76. Typical surface visibility throughout the surface collected alfalfa field in the project.

Figure 77. Disturbed soils encountered within a disturbed shovel probe in the project.

Schematic of a Test Unit Profile

Nappanee Silty Clay Loam (NpA)

Scale

0cm 10cm 20cm 30cm 40cm 50cm

Ap 10YR5/2 Grayish Brown Silty Clay Loam

B 10YR4/6 Dark Yellowish Brown Silty Clay Loam

Provenience: T5, TU3
Figure 20
Depth to Subsoil: 24 cm

Figure 78. A typical shovel test unit excavated within the project.

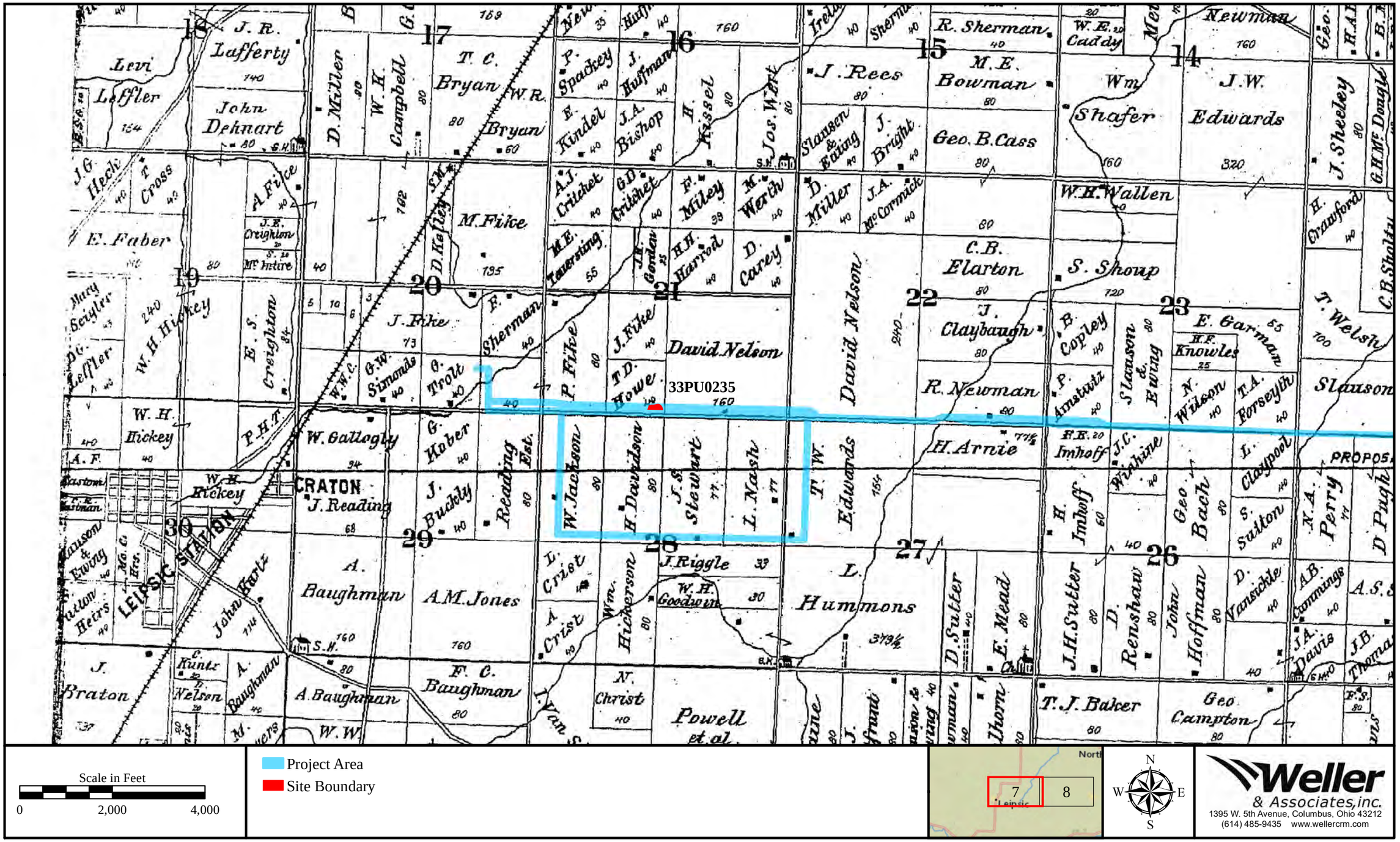


Figure 79. Portions of the *Atlas of Putnam County, Ohio and Atlas of Hancock County, Ohio* (Hardesty 1875, 1880) indicating the approximate location of the project and recorded site locations.

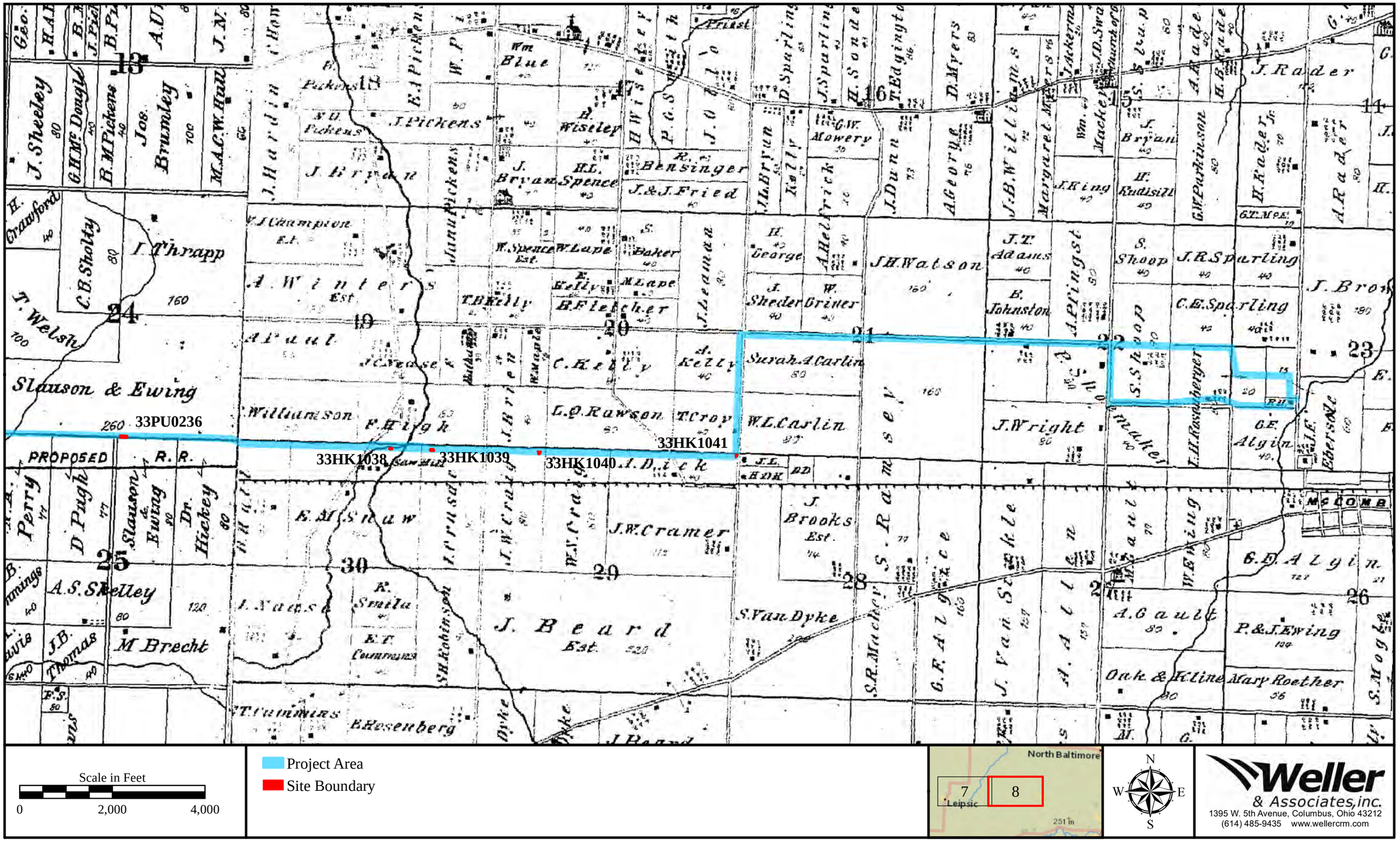


Figure 80. Portions of the *Atlas of Putnam County, Ohio and Atlas of Hancock County, Ohio* (Hardesty 1875, 1880) indicating the approximate location of the project and recorded site locations.

PU0235

Scale

0 12.7mm 25.4mm

0 ½” 1”

Figure 81. Some of the artifacts from Site PU0235.

PU0236

Figure 82. Some of the artifacts from Site PU0236.

HK1038

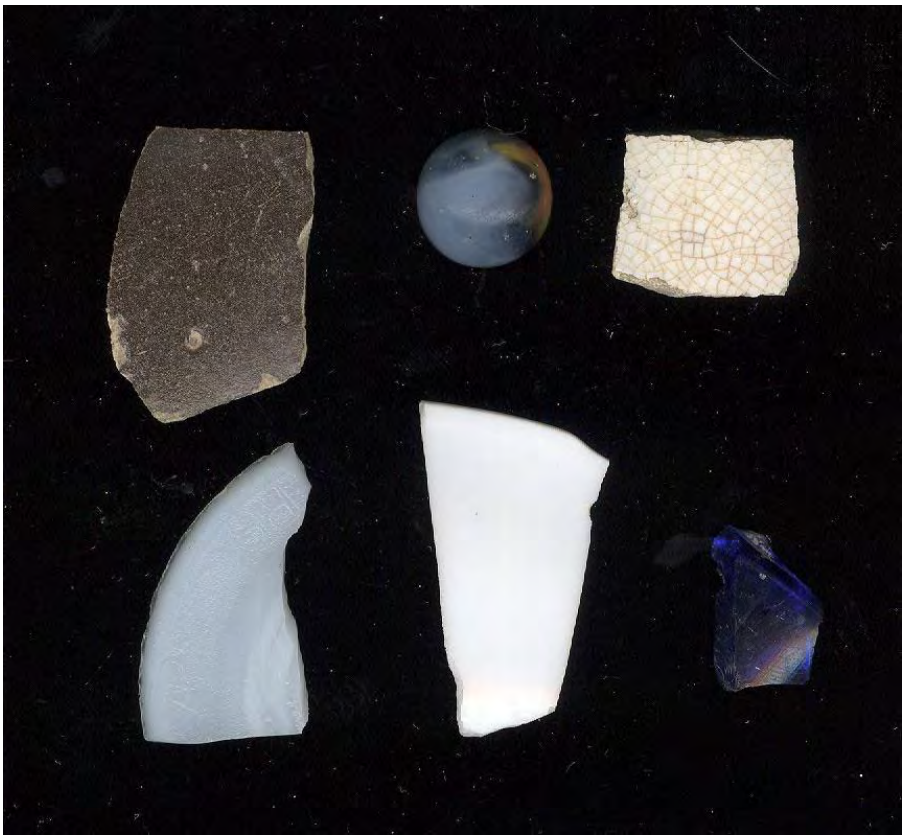
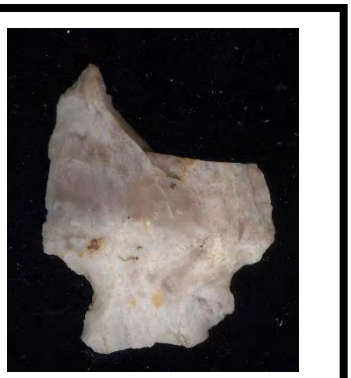


Figure 83. Some of the artifacts from Site HK1038.



Brewerton Corner Notched

Length:	na
Width:	30.9mm
Stem Length:	11.6mm
Neck Width:	17.8mm
Thickness:	08.4mm

Material: Columbus-Delaware

Brewerton Corner Notched

Length:	41.0mm
Width:	na
Stem Length:	10.3mm
Neck Width:	na
Thickness:	07.9mm

Material: Cedarville-Guelph

Scale

0 12.7mm 25.4mm

0 ½” 1”

Figure 84. Some of the artifacts from Site HK1039.

Figure 85. Some of the artifacts from Site HK1040.

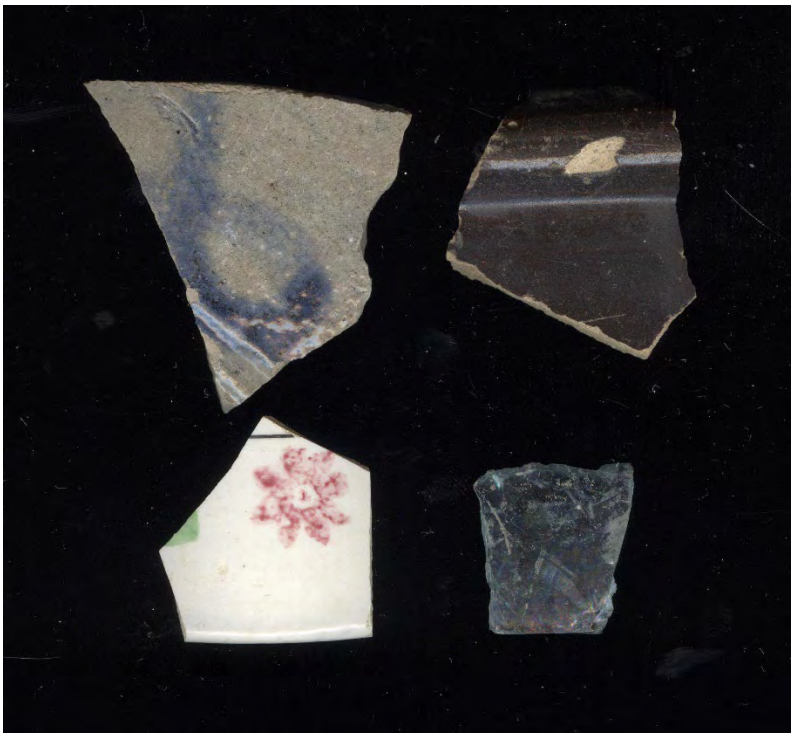


Figure 86. Some of the artifacts from Site HK1041.

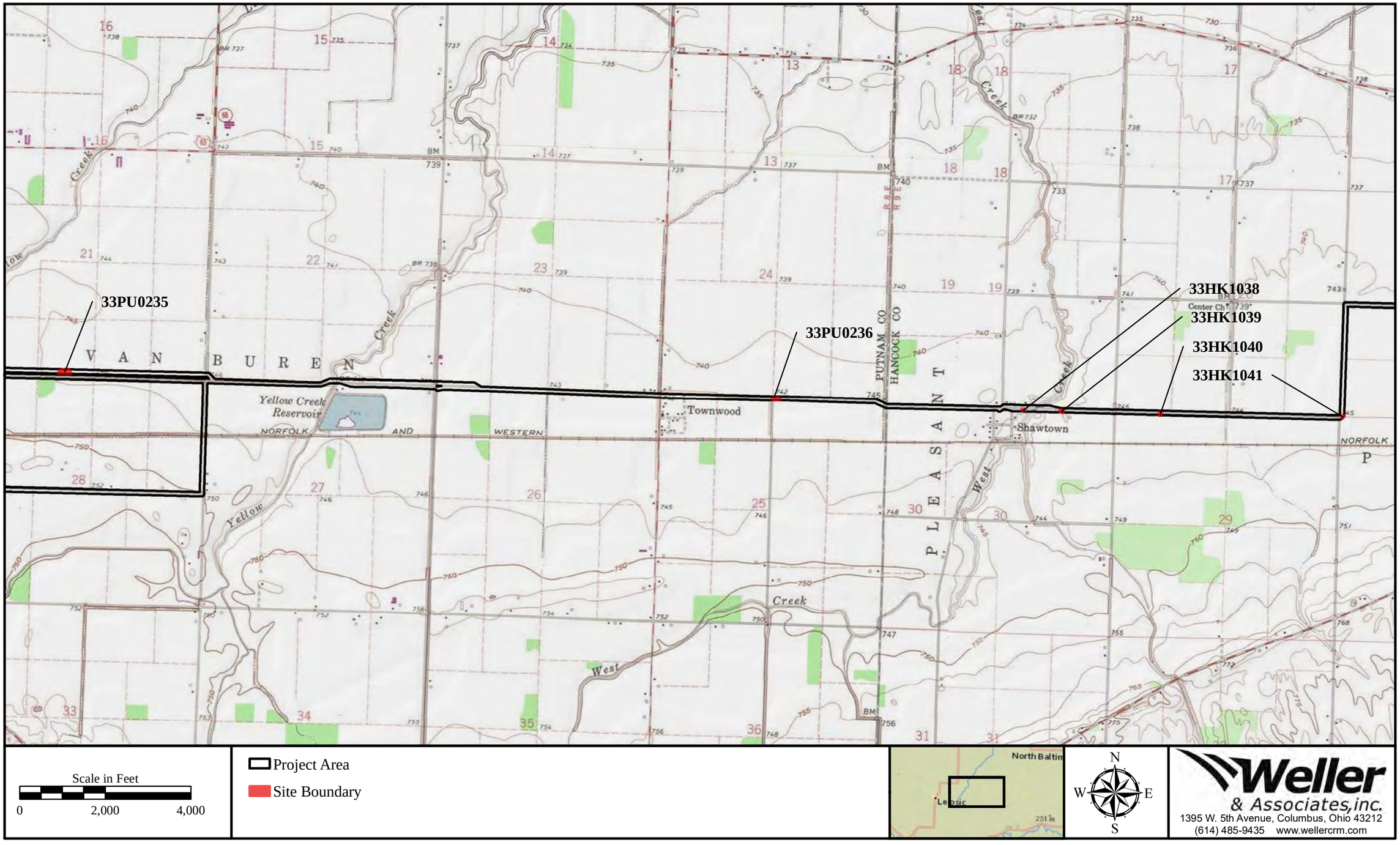


Figure 87. Portion of the USGS *1973 Leipsic, and 1974 McComb, Ohio 7.5 Minute Series (Topographic)* maps indicating the location of the project and sites 33PU0235-33PU0236 and 33HK1038-33HK1041.

Appendix A:

Previously Recorded Resources Within or Adjacent to the Project Area

Ohio Historic Preservation Office
567 E. Hudson St.
Columbus, OH 43211
614/298-2000

Site No. 33-**PU0168**

OHIO ARCHAEOLOGICAL INVENTORY ISOLATED FIND SITE FORM

Location

Zone: **17** Easting: **251605** Northing: **4554200**

Quadrangle: **Leipsic** Quadrangle Date: **1960**

Township: **2N** Range: **9E**

Section: **29** Quarter Section: **NE** Not Applicable:

Township Name: **van Buren**

Drainage System:

Major Drainage: **LAKE ERIE**

Minor Drainage: **Portage River**

Temporal Affiliation:

Unassigned Prehistoric

Artifact Description:

Category	Prehistoric Material	Count
Lithics	Utilized flake - glacial chert	1

Category	Historic Material	Count

Reporting Information

Form Preparer: **Stanley Baker**

Institution: **ODOT-OES**

Form Date: **10/04/2010**

Field Date: **09/30/2010**

Primary Reference:

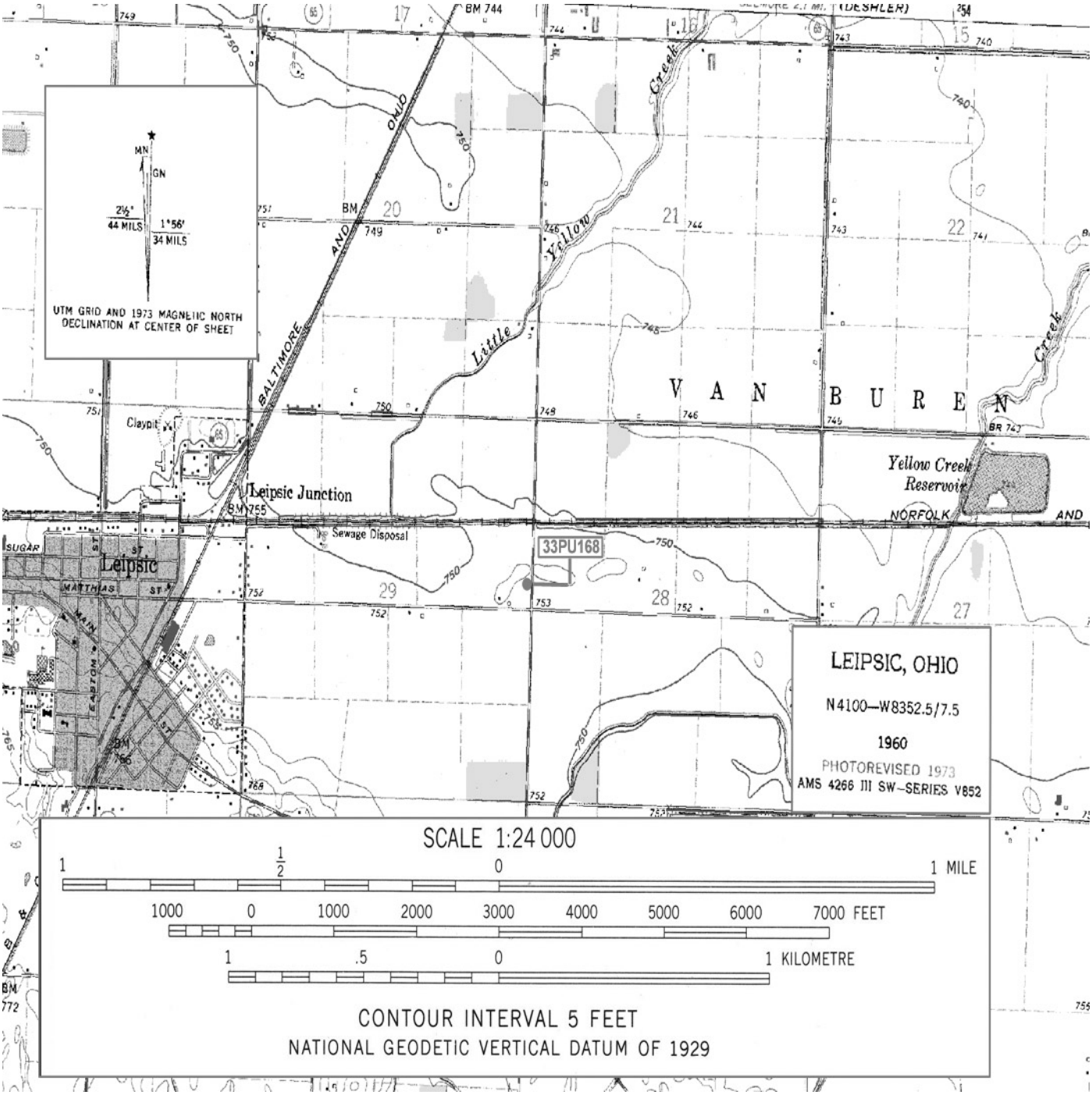
NADB #:

Survey Report Associated With Project:

Baker, Stanley	**2010**	**Phase I archaeological survey for the widening of PUT-CR 5-7.00...**

Site No. 33 - **PU0168**
Plotted ☐

MAPPING/CONTINUATION SHEET



History/Architecture Investigations for the 17.7 km (11 mi) East Leipsic-Rader Road 69kV to a 138kV Conversion/ Rebuild Project in Van Buren Township, Putnam County and Pleasant Township, Hancock, Ohio

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April 7, 2022

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By

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April 7, 2022

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Abstract

In March of 2022, Weller & Associates, Inc. conducted History/Architecture Investigations for the 17.7 km (11 mi) East Leipsic-Rader Road 69kV to a 138kV Conversion/ Rebuild Project in Van Buren Township, Putnam County and Pleasant Township, Hancock, Ohio. The work was conducted under contract with American Electric Power (AEP) for submittal to the Ohio Power Siting Board (OPSB) and will be coordinated for Ohio History Connection (OHC) review. The report was conducted in accordance with the Ohio Historic Preservation Office (OHPO) History/Architecture Guidelines (2014) and prepared in a manner that is suitable for review regarding Section 106 of the National Historic Preservation Act of 1966, as amended (54 U.S.C. 306108 [36 CFR 800]).

The archival and literature review did not identify any OHIs, NRHP listings, DOEs, OGS cemeteries, nor any previously conducted professional surveys with an architectural component.

A total of 41 architectural resources 50 years of age or older were identified in the APE. Building types and styles are consistent with patterns of settlement in the area and most of the resources are vernacular exhibiting no academic style. The resources are primarily single-family residences and barns dating from the late-19th century to 1972.

None of the resources in the APE were found to be significant in a manner necessary for inclusion in the NRHP. Weller concludes a finding of 'no historic properties affected.' No further architectural work is considered necessary.

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Introduction

In March of 2022, Weller & Associates, Inc. conducted History/Architecture Investigations for the 17.7 km (11 mi) East Leipsic-Rader Road 69kV to a 138kV Conversion/ Rebuild Project in Van Buren Township, Putnam County and Pleasant Township, Hancock, Ohio (Figures 1-5). The work was conducted under contract with American Electric Power (AEP) for submittal to the Ohio Power Siting Board (OPSB) and will be coordinated for Ohio History Connection (OHC) review. The report was conducted in accordance with the Ohio Historic Preservation Office (OHPO) History/Architecture Guidelines (2014) and prepared in a manner that is suitable for review regarding Section 106 of the National Historic Preservation Act of 1966, as amended (54 U.S.C. 306108 [36 CFR 800]).

The investigations were conducted in two parts: a history/architecture survey and an archaeological investigation. This report covers the results of the history/architecture survey of the entire area that may be affected by the proposed development of the project. The history/architecture investigations consisted of a survey focusing on potentially significant properties 50 years of age or older that are situated within 1000 ft (305 m) on either side of the proposed project area. The results of the archaeological investigations will be presented in a separate report.

The documentation of properties in the field and report authoring were conducted by Scott McIntosh. Mapping and figures for the project were generated by John Sidor who also assisted with documentation of the properties in the field. The archival research was conducted in March 2022 and the field survey was conducted on March 28-29, 2022.

Project Description

The project is for the rebuilding and conversion of the East Leipsic-Rader Road 69kV transmission line to a 138kV line. The project area is considered to be a corridor, including possible alternates and greenfield sections, that is 17.7 km (11 mi) long and 30.5 m (100 ft) wide. The corridor extends in a general east-west manner with the East Leipsic Station at the western terminus and the Rader Road Station at the eastern terminus. The corridor extends through what is largely very flat, upland lake plain conditions with little to no relief/topography. The corridor is mostly located in farm field situations.

Research Design

Architectural Field Methods

This survey was conducted following the guidelines established in *Archeology and Preservation: Secretary of the Interior's Standards and Guidelines* (National Park Service 1983) and *Guidelines for Local Surveys: A Basis for Preservation Planning. National Register Bulletin No. 24* (National Park Service 1997). When properties are identified, they are subjected to the guidelines outlined in *National Register Bulletin 15, How to Apply the National Register Criteria for Evaluation* (National Park Service 1996).

There are four criteria for eligibility to be listed in the National Register of Historic Places (NRHP). Only one of these criteria must be met to be considered eligible for listing; however, oftentimes more than one of the criteria is met. The criteria for significance include:

A. Association with historic events or patterns of events;
B. Association with persons important to our past;
C. Exceptional or important architectural characteristics; and/or
D. Data potential.

Architectural properties typically qualify under Criteria A, B, or C. Criterion D is typically reserved for archaeological sites.

In addition to meeting at least one of the established criteria, the appropriate integrity must also be retained by the resource. There must be integrity of location, design, workmanship, setting, materials, feeling, and association.

Prior to commencing fieldwork, a literature review was conducted to determine if any previously recorded architectural properties, NRHP properties, or Ohio Genealogical Society cemeteries were present within the project survey area. Historic maps were also reviewed to aid in guiding the fieldwork and detecting the possible presence of significant within the survey area. Background research was also conducted to establish a historic context of the region. The context was compiled by utilizing materials from the State Historic Preservation Office (SHPO), archival materials at the respective county courthouses, local libraries, and several online resources. The establishment of the historic context helped to guide the interpretation of the field survey results.

The field survey included a systematic approach to identifying all properties that have potential significance for inclusion within the NRHP, within the survey area (1000-feet from either side) of the proposed project but extending to any areas containing significant or potentially eligible resources within view of the project area. Some areas will be blocked from having a direct line-of-sight to the proposed project by topography and forested areas. The areas that did not have a direct line-of-sight to the project were visually verified in the field and the survey did not include all of these areas. Each property identified within the survey area was photographed and annotated on appropriate mapping and included in the report. The approach was to identify those properties with NRHP potential, followed by a more intensive documentation and evaluation of those potentially eligible aboveground resources. The comprehensive survey involved recording of each property with potential historic significance to a baseline level of documentation.

Weller focused on the ground plan, the height, and the roof configuration of each structure, noting all visible materials, appendages, extensions, or other alterations. Housing types and structural details within the report and utilized on Ohio Historic Inventory (OHI) forms follow the terminology used by architectural historians McAlester (2013), and Gordon (1992). Weller then supplemented the field survey data with an examination of available tax records, aerial photographs, and cartographic sources.

Definitions

Within this report, an *architectural resource* is defined as aboveground buildings or structures that are 50 years of age or older. A *historic property* is defined as a building, structure, object, or site that is listed in, or considered eligible for listing in, the NRHP. An *effect* is defined as an activity associated with the project that alters a characteristic of a historic property that qualified it for inclusion in the NRHP.

Historic Context

Putnam County History

The county was formed on April 1, 1820, but was not formally organized until 1834. David Murphy was one of the first settlers in the area who arrived circa 1824. He settled along the Auglaize River in an area referred to as "The Bayou". The first town in the county was that of Kalida and was platted in 1834. It was the county seat until 1866 when it was moved to Ottawa since it was more centrally located within the county. The comparably late settlement of Putnam County and its neighboring counties was due to its position within the Black Swamp. There were two Native American villages known in the county including Upper and Lower Tawa Towns (Howe 1888). These were located near Ottawa.

The primary economy of Putnam County is associated with agricultural pursuits. Stock raising and crop farming is the mainstay of every community (Kinder 1915; Sommers 1934). Many of the early settlers to the area were of Welsh descent and arrived from Cincinnati. The southeastern part of the county got an influx of Swiss Mennonites who arrived from 1830-1870. These immigrated either directly from Switzerland or from Wayne County, Ohio. They built two of the largest churches in the county: Grace Church and St. John Church (Calvin 1981 and 1989). Today, the population is largely dominated by German Catholics. Nearly every community has a Catholic steeple that can be seen for some distance due to the flat nature of the terrain.

In 1845, the Miami & Erie Canal was completed through Monterey Township. This was an important economic boon to the region and the county as it allowed for the local goods to be available in the market economy. However, the canal was short-lived as it gave way to the railroads. The Baltimore & Ohio was the first railroad built in the county around 1856. A few years later the Dayton Michigan Railroad was completed. The Lima-Defiance Traction extended through the communities of Rice, Continental, and Kalida but did not last long due to financial difficulties (Kinder 1915).

Just like the nineteenth century, modern Putnam County remains primarily affiliated with agriculture. There are small communities scattered throughout the area and the larger ones tend to have granaries. Much of the population is rural and occupies isolated farmsteads that dot the landscape.

Van Buren Township History

Van Buren Township was organized on February 18, 1843. The area was previously known as North Blanchard and was part of Blanchard Township. The first permanent Euro-American to settle here was Abraham Baughman in 1835 (Hardesty 1880). At the time of the organization of the township, only nine residents cast votes at the first election. The main town within the township is Leipsic and the only other village is Belmore. Leipsic was platted in 1857 by James E. Creighton under the name Creightontown. In 1859, Joseph Swartz platted Leipsic Station on the east side of the C.H. & D railroad (Seitz and Talbot 1895). These surveys are both included within Leipsic today. In 1859, the first railroad through the township was constructed, then known as the Dayton and Michigan Railroad, later called the Cincinnati, Hamilton, and Dayton (C.H. &D) Railroad. Today, there are three railways through the town of Leipsic. During the late 19th Century, the town of Leipsic was home to industries including tile and brick works, lumber mills, flour mills, machine works, and a creamery.

Hancock County History

Hancock County was originally part of the Northwestern Territory ceded by Virginia to the United States Government and was organized in 1828. Its namesake is John Hancock, signer of the Declaration of Independence and person of political significance during the Revolutionary War. The county is located in northwestern Ohio and includes comparably diverse terrain. The Defiance Moraine is the dominant landform that bisects the county from east to west and through its central part. The southern part of the county is Till Plain while the northern part is in the Lake Plain (Brockman 1998). The Blanchard River and its tributaries drain the southern majority of the county. This drainage runs along the Defiance Moraine and is the source of occasional inundations. The northern part of the county is drained by streams that flow to Lake Erie, including Middle Branch Portage River. Immigrants to the county were primarily arriving to till the soil.

Early inhabitants of the county were generally focused along the drainages and particularly the Blanchard River. Initially, settlement was at Fort Findlay, a War of 1812 stockade. Native American groups were occupying the area at this time as well including those from the Wyandot Tribe and Ottawa further down river. Shawnee were known to the area as well. One of the first inhabitants of the county and the region was that of Jean Jacques Blanchard who immigrated to the area in 1769. He was a Frenchman that originated from New Orleans and settled along the river of his namesake after marrying a Native American woman (Beardsley 1881; Brown 1886; Spaythe 1903).

Some of the early activity in the county was during the War of 1812. It was in that year that General Hull's campaign passed through the county leaving a path referred to as "Hull's Trail". Hull ordered the construction of Fort Findlay and it was located on the Blanchard River. It was constructed and named for Colonel James Findlay. This would become the site of the first Euro-American occupant of the county by a soldier named Thorp or Tharp who resided in Fort Findlay in the War of 1812 and remained there after its evacuation (Beardsley 1881). The first family to settle was the Benjamin Cox family.

The influx of settlers to the county was happening just after the War of 1812 and into the 1820s. These settlers inhabited the area around Findlay and the river and were primarily focused on agriculture. Log cabins would often have double functions as taverns or for trades such as blacksmith or farrier. Grist and sawmills soon followed to serve the growing agricultural community.

The transportation of good and travel routes in the county was originally via pirogues that navigated the Blanchard to the Auglaize and eventually to the Maumee. Cross country trade was usually made by travel to Sandusky City to access markets such as New York. The early road systems were tethered to the various ridges and elevations in the county, which served as natural corridors. The growth of the county was furthered by the construction of various railroads starting in 1839 with the Bellefontaine & Perrysburg. Numerous other railroads would spring up and continue to be constructed to about 1900. Many of these were local lines but were significant in the economic development and prosperity of the county. The connection to the eastern market economies for the sale and transport of the agricultural products is typically what the smaller communities relied upon. Still, the communities of Findlay and Bluffton tended to be the center of attention and activity. Findlay, being centrally located was an easy choice for the county seat (Beardsley 1881; Brown 1886; Spaythe 1903).

The exploitation of mineral resources in the county happened amidst the Industrial Revolution. It was in the 1880s that oil and gas were discovered, and it has been valuable to the local economy ever since. Agriculture remains a vital source of the local economy to the area. There has been an increase in the development of industrial and business economy throughout the central part of the county and extending to Bluffton due to the accessibility to I-75. This is particularly pronounced around Findlay, Bluffton, and increasingly more to the north. According to the most recent census, the county has over 74,000 inhabitants. There are two primary colleges in the county including Bluffton and Findlay, which contribute to the demographics.

Pleasant Township History

Pleasant Township, originally part of Blanchard Township, was organized on March 2nd, 1835. Located in the northwest corner of Hancock County, the township borders Putnam County to the west, Portage Township, Hancock County, to the east, Blanchard Township, Hancock County, to the south, Liberty Township, Hancock County, to the southeast, Wood County to the north, and Henry County to the northwest (U.S. Census Bureau 2010). Pleasant Township's first Euro-American settlers were men from Fairfield, Hardin, and Franklin Counties, and Washington County (Pennsylvania), all of whom arrived in 1833 (Beardsley 1881).

The township's abundant timber and rich, loamy soil fostered economic incentive, thus further migration. Like most industries of the era, the first and largest establishments were mills: the first was a sawmill on Algire's Run, 1841; a grist mill on Picken's Run, 1845; the first steam-powered sawmill, 1850; and the first steam-powered grist mill, 1857. Pleasant Township was among Hancock County's most prosperous and populated townships thanks to the combination of lucrative farming and timber harvesting. Shortly after organization, Pleasant Township's first

religious organization (Methodists) was founded; services were held in private homes and the schoolhouse (built in 1838) until 1850 with the construction of a church (Beardsley 1881).

Pleasant Township contains two villages: McComb and Shawtown. McComb, platted in 1847 by Franklin County native Benjamin Todd as "Pleasantville," is located approximately 10 miles from Findlay and was renamed in 1858 upon incorporation. The community benefitted from two railroads, the McComb and Deshler Branch of the Dayton and Michigan Railroad, and the New York, Chicago & St. Louis Railroad, previously the Continental Railway. McComb was a bustling economic center comprised of numerous stores, shops, and churches (Beardsley 1881). Shawtown, much smaller than McComb, was platted in 1882 by E.T. Cummins along the abovementioned railroad, preceded a year earlier by a post office. The community's economy was limited to two general stores, a wagon shop, a blacksmith shop, a hoop factory, and a sawmill (Warner, Beers & Co. 1886). Olney was platted by Isaac Fairchild in 1857, however it did not advance beyond this stage (Beardsley 1881).

Literature Review

The literature review for this project utilized a 305 m (1,000 ft) study area to ensure the identification of all previously recorded resources that may be within the Area of Potential Effect (APE). The literature review inspected SHPO files including Ohio Historic Property Inventory (OHI), National Register of Historic Places (NRHP), Determinations of Eligibility (DOE), Ohio Genealogical Society (OGS) cemeteries, historic atlases, topographic maps, and previously conducted history/architecture surveys to determine the presence of resources located within the APE.

A review of SHPO contract files did not identify any OHIs, NRHP listings, DOEs, OGS cemeteries, nor any previously conducted professional surveys with an architectural component.

Atlas & Cartographic Review

Cartographic/atlas resources were reviewed for the project. Atlas review for Putnam and Hancock Counties noted the area is in a rural and sparsely populated setting; there are no communities involved but it does appear that there are several buildings within and adjacent to the project corridor (Figures 6 and 7). There are houses and/or farmsteads scattered sparsely through this area (Hardesty 1875, Hardesty 1880, Seitz 1895). No early USGS 15 *Minute Series (Topographic)* maps of this area could be located.

APE Definition and Justification

The Area of Potential Effect (APE) is a term that must be applied on an individual project basis. The nature of the project or undertaking is considered when determining the APE. This may include areas containing resources with a direct line of site of the project to determine

possible visual impacts. When construction is limited to underground activity, the APE may be contained within the footprint of the project.

The architectural APE for this project is considered what is in view of the transmission line within a 306 m (1,000 ft) intensive survey area but extending to any areas containing significant or potentially eligible resources within view of the project area. Resources slightly outside the intensive survey area were sometimes included when study area boundary divided parcels or buildings under same ownership. Any previously recorded resources within the viewshed were also be included in the field survey results. The APE is limited primarily by arboreal shields, topography, and distance.

Architectural Survey Results

Fieldwork confirmed that the corridor extends through what is largely very flat, upland lake plain conditions with little to no relief/topography and travels generally in an east-west direction from the Pro-Tec Coating Company located to the northeast of the town of Leipsic to the Radar Road Station at McComb. The area is generally comprised of agricultural land except in the outskirts of Leipsic and McComb and the viewshed is limited primarily by distance, arboreal shields, and buildings (Figures 8-78).

A total of 41 architectural resources 50 years of age or older were identified in the APE (Figures 8-47 and 79-119; Table 1). Building types and styles are consistent with patterns of settlement in the area and most of the resources are vernacular exhibiting no academic style. The resources are primarily single-family residences and barns dating from the late-19th century to 1972. Outbuildings, sheds, and other dependencies were not included in the field survey results unless they exhibited potential for listing in the NRHP.

None of the resources in the APE were found to be associated with significant events, patterns of events, or individuals in a manner necessary for inclusion in the NRHP under Criterion A or B. The buildings are typical of others in the area and throughout Ohio, are not the works of a master, and do not exhibit distinctive character-defining features; therefore, the resources are not eligible for inclusion in the NRHP under Criterion C.

Table 1. Field Survey Results.

Resource	County	Figure #	Location	Date	Style	Type	NRHP Status
S-1	Putnam	16, 79	5700 Road 4, Leipsic	c. 1900	Vernacular	Barn	Not Eligible
S-2	Putnam	16, 17, 80	5451 Road 4, Leipsic	c. 1890	Queen Anne Elements	Hipped w/ lower gables	Not Eligible
S-3	Putnam	22, 81	4878 Road 3, Leipsic	1956	Vernacular	Ranch	Not Eligible
S-4	Putnam	22, 82	4878 Road 3, Leipsic	1962	Vernacular	Barn	Not Eligible
S-5	Putnam	22, 83	4880 Road 3, Leipsic	1970	Vernacular	Barn	Not Eligible
S-6	Putnam	22, 84	4880 Road 3, Leipsic	1966	Vernacular	Barn	Not Eligible
S-7	Putnam	25, 85	2429 Road E, Leipsic	1885	Vernacular	Gabled Ell	Not Eligible
S-8	Putnam	25, 86	2232 Road E, Leipsic	c. 1900	Vernacular	Barn	Not Eligible
S-9	Putnam	27, 87	5045 Road 2, Leipsic	c. 1940	Vernacular	Front-Gable	Not Eligible
S-10	Putnam	27, 88	Road 2 at Center Drive, Leipsic	c. 1900	Vernacular	Church	Not Eligible
S-11	Putnam	27, 89	5035 Road 2, Leipsic	c. 1890	Vernacular	Gabled Ell	Not Eligible
S-12	Putnam	26, 90	2072 Road E, Leipsic	c. 1890	Vernacular	Upright w/ wing	Not Eligible

S-13	Putnam	26, 91	2020 Road E, Leipsic	c. 1920	Vernacular	T-Plan	Not Eligible
S-14	Putnam	26, 92	4483 Road 2, Leipsic	c. 1940	Vernacular	Barn	Not Eligible
S-15	Putnam	26, 93	4483 Road 2, Leipsic	1968	Vernacular	Ranch	Not Eligible
S-16	Hancock	30, 94	4180 TR-115, McComb	c. 1880	Vernacular	Front-Gable	Not Eligible
S-17	Hancock	30, 95	4066 TR-115, McComb	c. 1920	Vernacular	Front-Gable	Not Eligible
S-18	Hancock	30, 96	4150 TR-115, McComb	c. 1880	Vernacular	Side-Gable	Not Eligible
S-19	Hancock	30, 97	4180 TR-115, McComb	c. 1910	Vernacular	Gabled Ell	Not Eligible
S-20	Hancock	30, 98	4151 TR-115, McComb	c. 1920	Vernacular	T-Plan	Not Eligible
S-21	Hancock	30, 31, 99	TR-103 at TR-115	c. 1920	Vernacular	Barn	Not Eligible
S-22	Hancock	35, 100	3858 TR-118, McComb	c. 1900	Vernacular	Barn	Not Eligible
S-23	Hancock	35, 101	3858 TR-118, McComb	c. 1890	Vernacular	Upright w/ wing	Not Eligible
S-24	Hancock	38, 102	3320 CR-53, McComb	c. 1900	Vernacular	Barn	Not Eligible
S-25	Hancock	38, 103	3320 CR-53, McComb	c. 1900	Vernacular	Indiscernible	Not Eligible
S-26	Hancock	41, 42, 104	3232 TR-104, McComb	c. 1900	Vernacular	Barn	Not Eligible
S-27	Hancock	41, 42, 105	3232 TR-104, McComb	c. 1880	Vernacular	Gabled Ell	Not Eligible
S-28	Hancock	42, 106	3392 TR-123. McComb	c. 1880	Vernacular	Gabled Ell	Not Eligible
S-29	Hancock	42, 107	3392 TR-123, McComb	c. 1900	Vernacular	Barn	Not Eligible
S-30	Hancock	44, 108	3632 TR-123, McComb	c. 1900	Vernacular	Barn	Not Eligible
S-31	Hancock	44, 109	3632 TR-123, McComb	c. 1890	Vernacular	Gabled Ell	Not Eligible
S-32	Hancock	46, 110	3536 CR-126, McComb	c. 1890	Queen Anne Elements	Irregular	Not Eligible
S-33	Hancock	46, 111	3487 CR-126, McComb	c. 1890	Vernacular	Upright w/ wing	Not Eligible
S-34	Hancock	47, 112	3655 CR-126, McComb	1963	Vernacular	Ranch	Not Eligible
S-35	Hancock	47, 113	3673 CR-126, McComb	1957	Vernacular	Ranch	Not Eligible
S-36	Hancock	47, 114	312 Rader Road, McComb	1972	International Elements	Commercial	Not Eligible
S-37	Hancock	47, 115	432 Maple Street, McComb	c. 1890	Vernacular	Side-Gable	Not Eligible
S-38	Hancock	47, 116	432 Maple Street, McComb	c. 1890	Vernacular	Upright w/ wing	Not Eligible
S-39	Hancock	47, 117	436 Maple Street, McComb	c. 1890	Vernacular	Front-Gable	Not Eligible
S-40	Hancock	47, 118	0 Maple Stret, McComb	c. 1950	Vernacular	Garage	Not Eligible
S-41	Hancock	47, 119	0 Maple Street, McComb	1969	Vernacular	Garage	Not Eligible

Conclusions

In March of 2022, Weller & Associates, Inc. conducted History/Architecture Investigations for the 17.7 km (11 mi) East Leipsic-Rader Road 69kV to a 138kV Conversion/ Rebuild Project in Van Buren Township, Putnam County and Pleasant Township, Hancock, Ohio. The work was conducted under contract with American Electric Power (AEP) for submittal to the Ohio Power Siting Board (OPSB) and will be coordinated for Ohio History Connection (OHC) review. The report was conducted in accordance with the Ohio Historic Preservation Office (OHPO) History/Architecture Guidelines (2014) and prepared in a manner that is suitable for review regarding Section 106 of the National Historic Preservation Act of 1966, as amended (54 U.S.C. 306108 [36 CFR 800]).

The archival and literature review did not identify any OHIs, NRHP listings, DOEs, OGS cemeteries, nor any previously conducted professional surveys with an architectural component.

A total of 41 architectural resources 50 years of age or older were identified in the APE. Building types and styles are consistent with patterns of settlement in the area and most of the resources are vernacular exhibiting no academic style. The resources are primarily single-family residences and barns dating from the late-19th century to 1972.

None of the resources in the APE were found to be significant in a manner necessary for inclusion in the NRHP. Weller concludes a finding of 'no historic properties affected.' No further architectural work is considered necessary.

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Figures

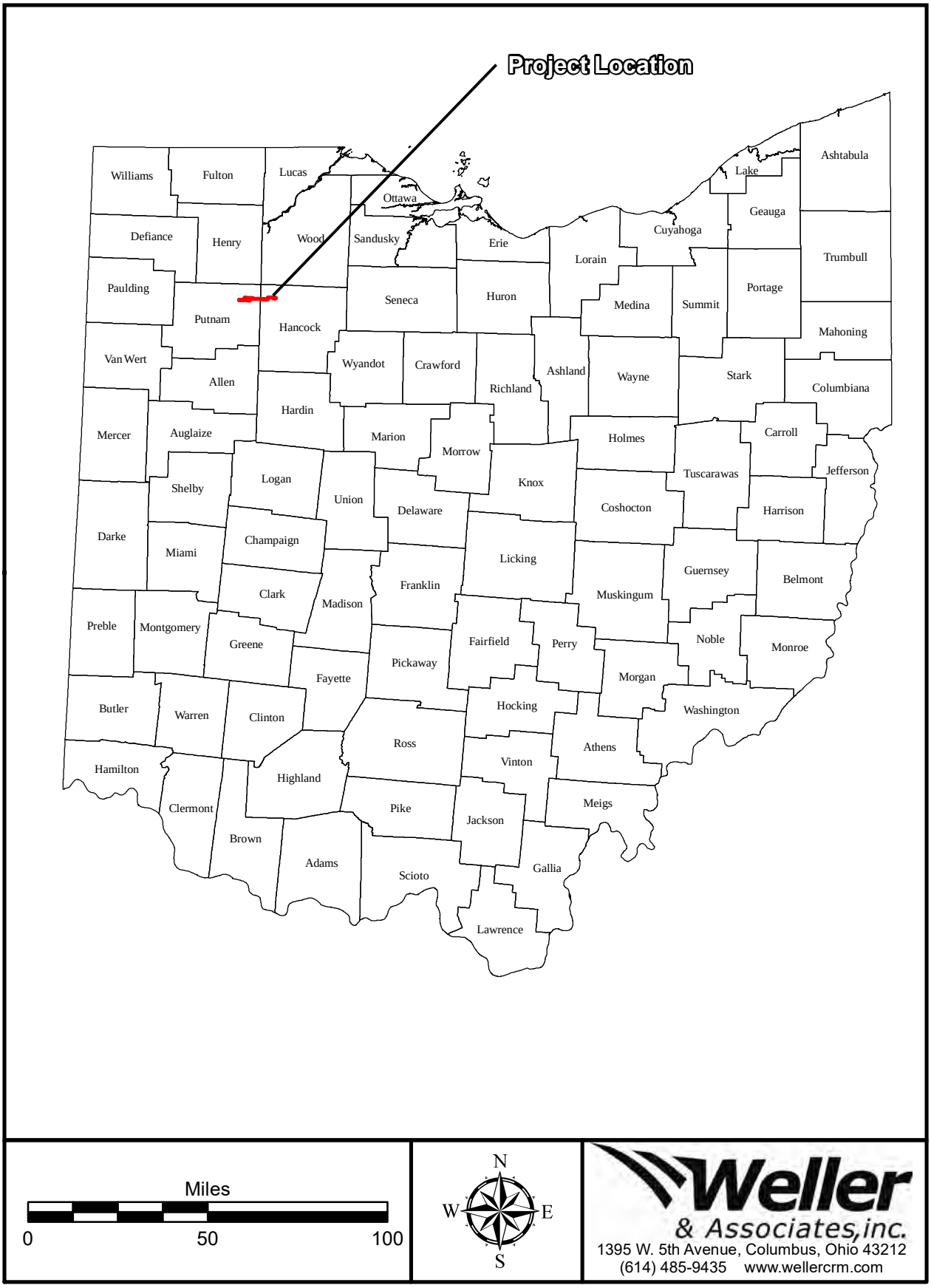


Figure 1. Political map of Ohio showing the approximate location of the project.

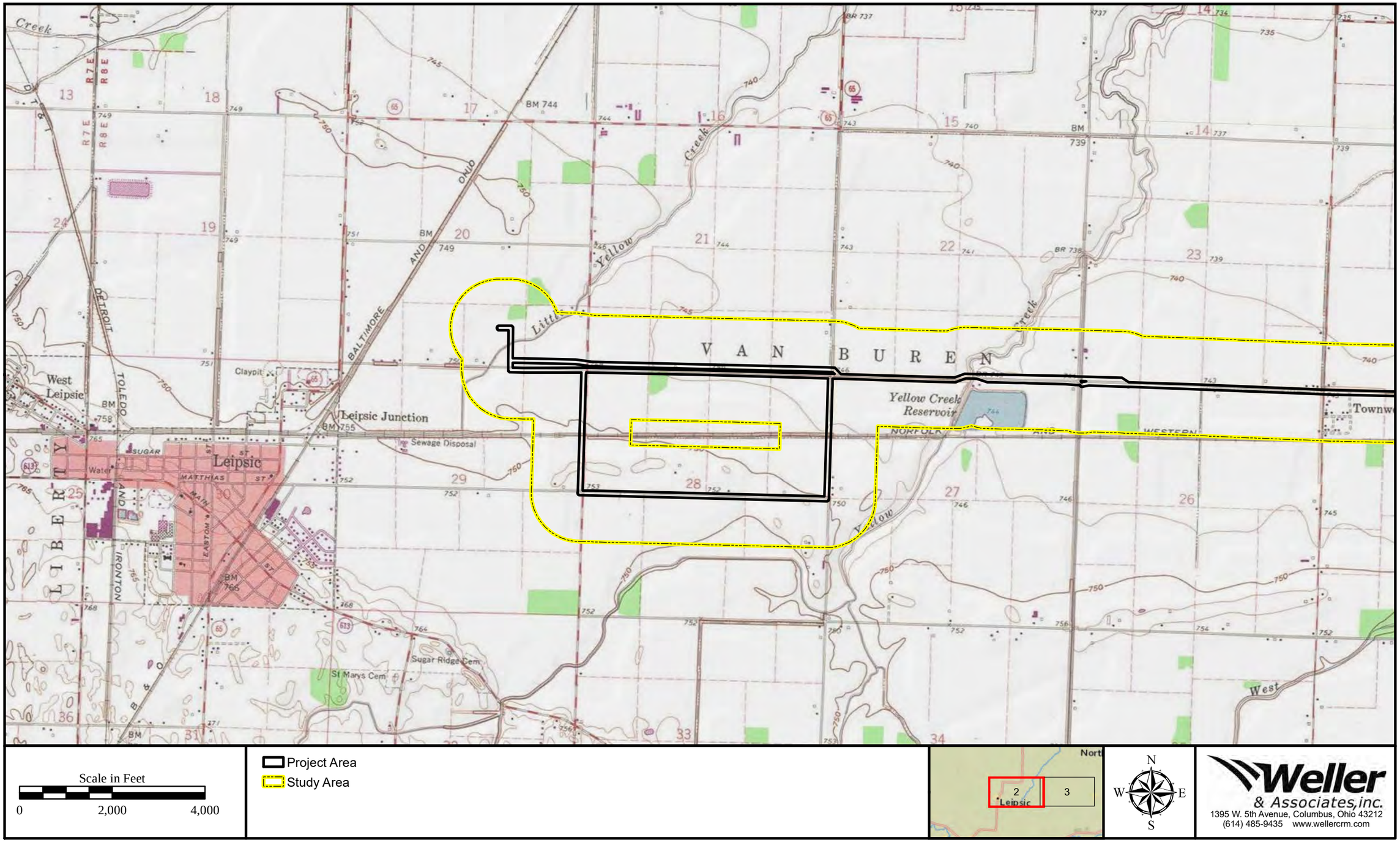


Figure 2. Portions of the USGS *1973 Leipsic and 1974 McComb, Ohio 7.5 Minute Series (Topographic)* maps indicating the location of the project and recorded resources within the study area.

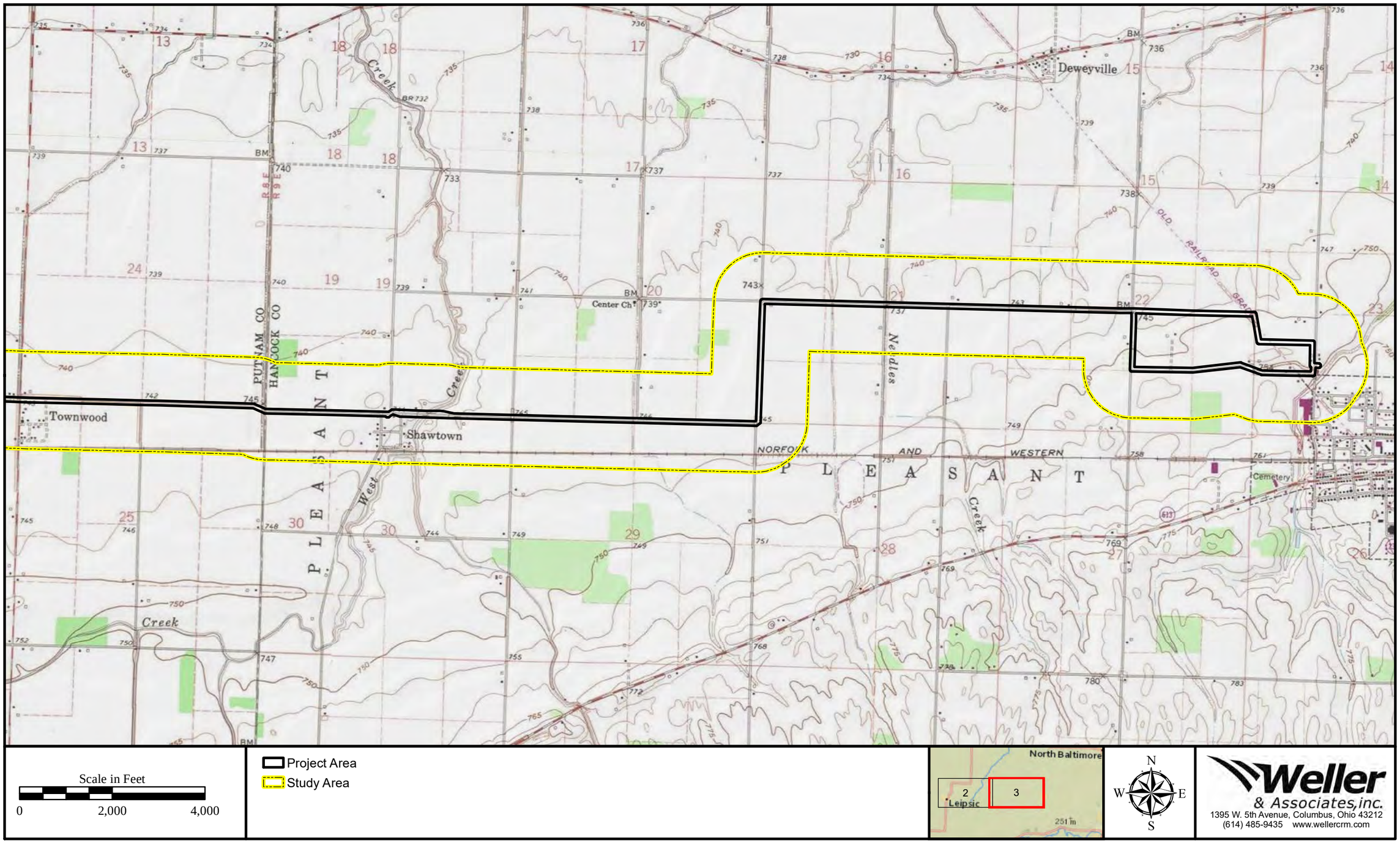


Figure 3. Portions of the USGS *1973 Leipsic and 1974 McComb, Ohio 7.5 Minute Series (Topographic)* maps indicating the location of the project and recorded resources within the study area.

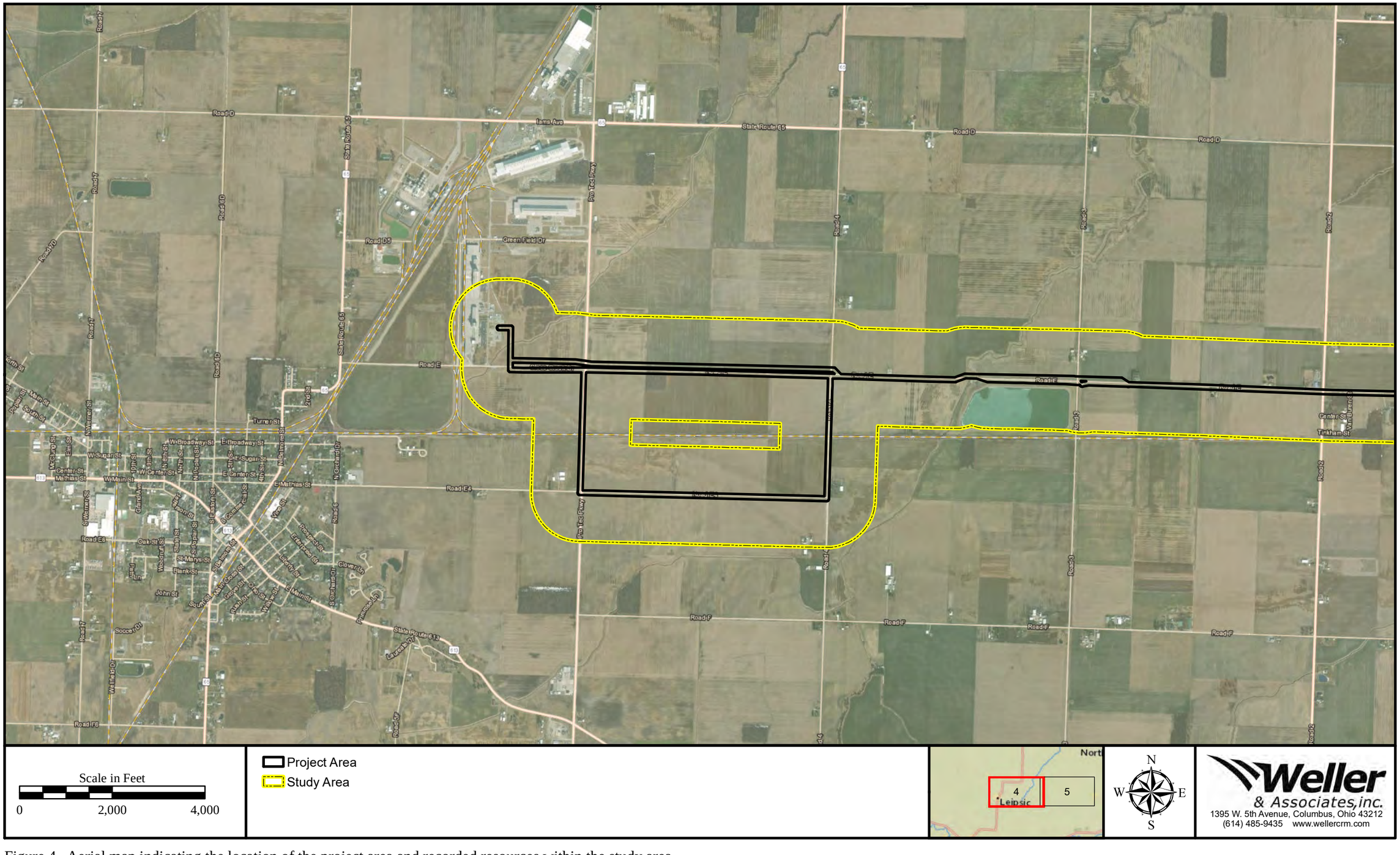


Figure 4. Aerial map indicating the location of the project area and recorded resources within the study area.

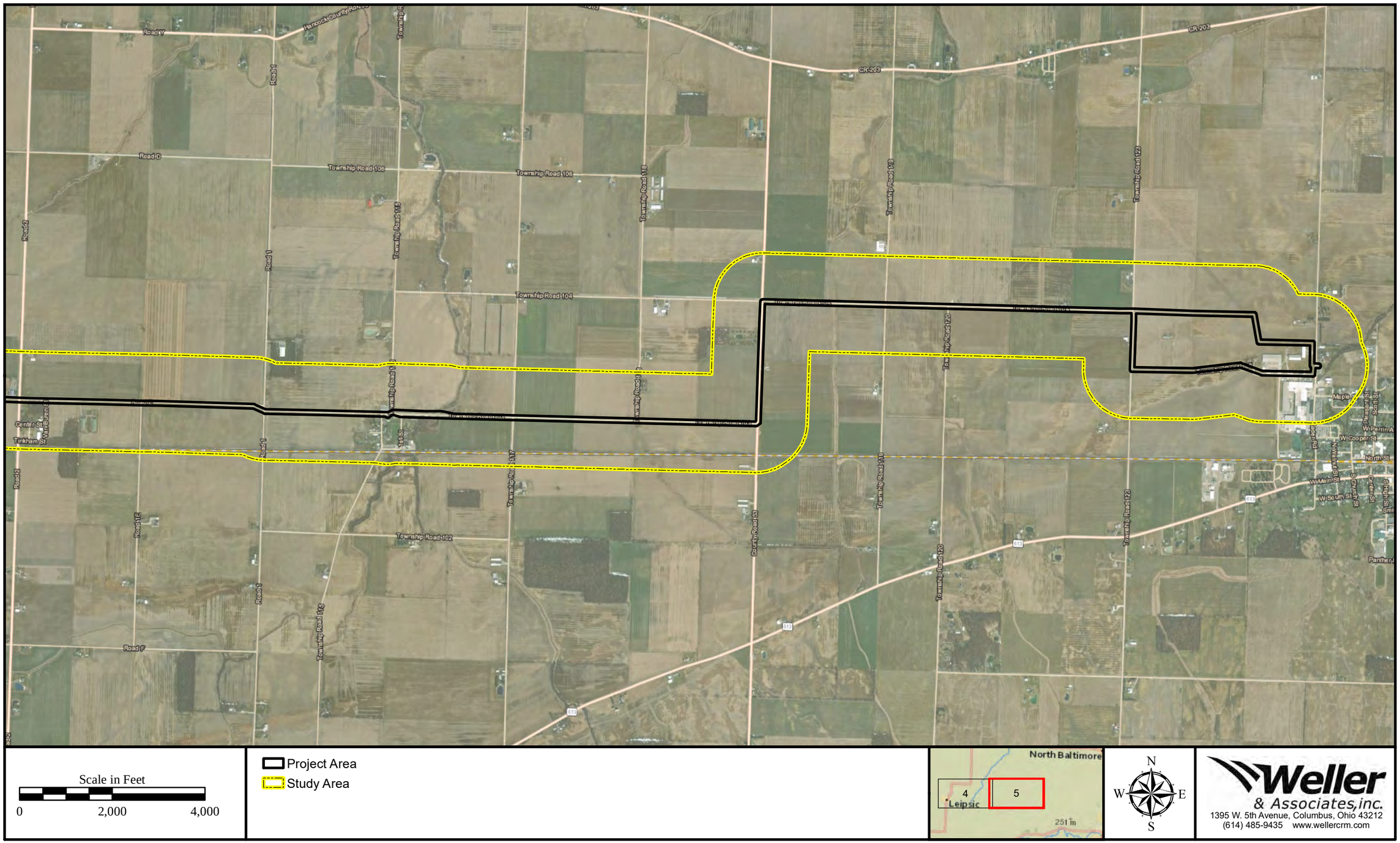


Figure 5. Aerial map indicating the location of the project area and recorded resources within the study area.

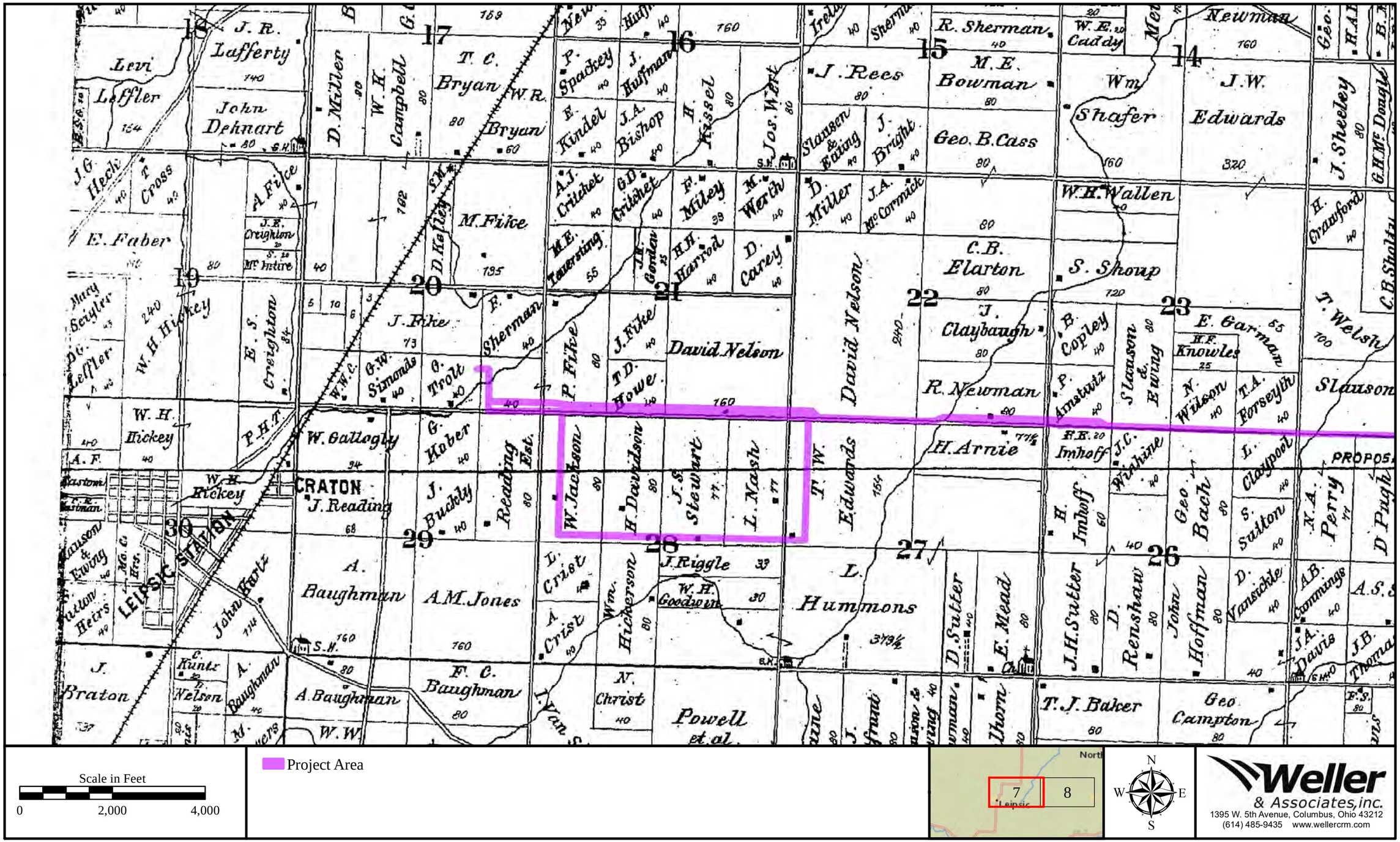


Figure 7. Portions of the *Atlas of Putnam County, Ohio and Atlas of Hancock County, Ohio* (Hardesty 1875, 1880) indicating the approximate location of the project.

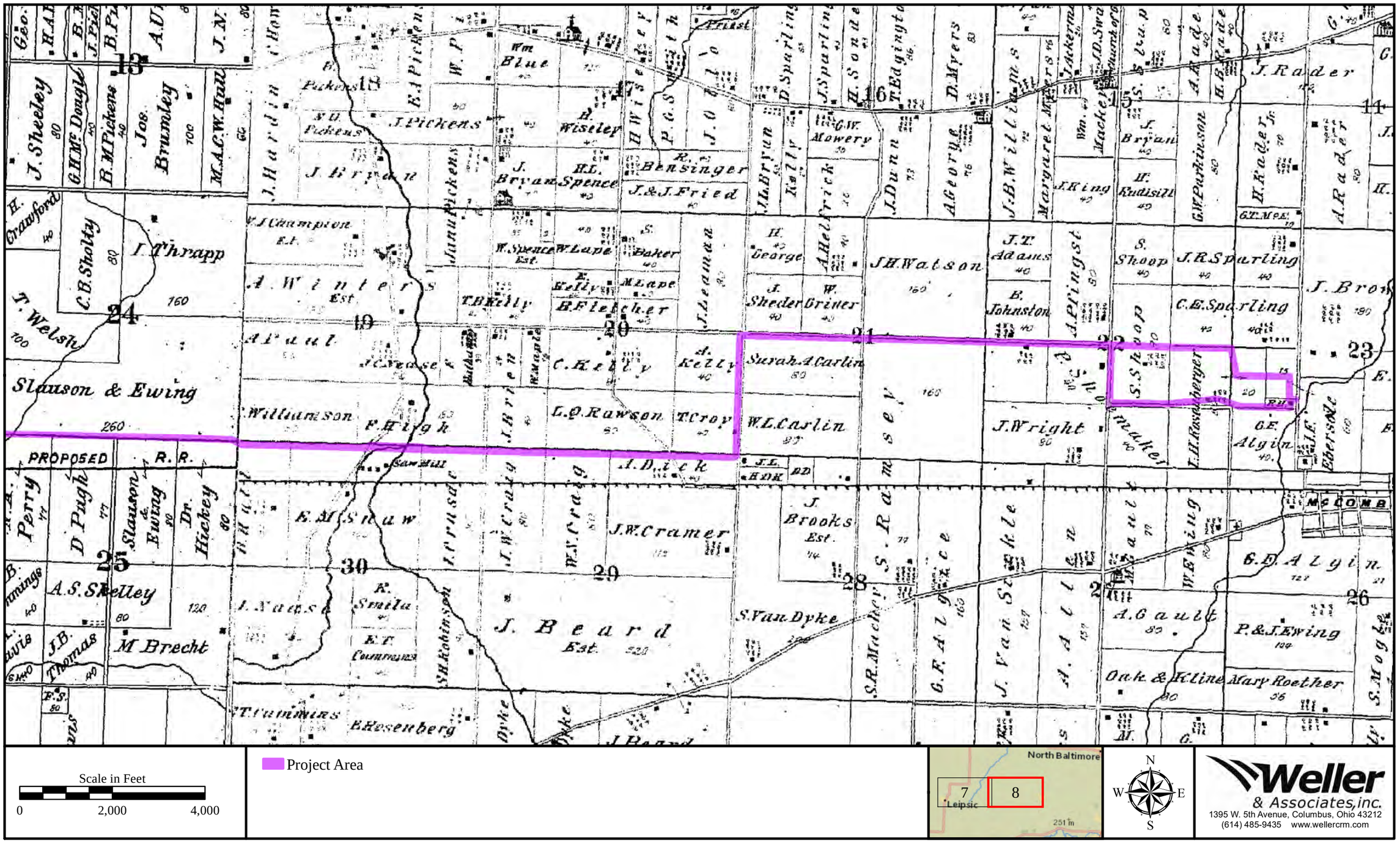


Figure 8. Portions of the *Atlas of Putnam County, Ohio and Atlas of Hancock County, Ohio* (Hardesty 1875, 1880) indicating the approximate location of the project.

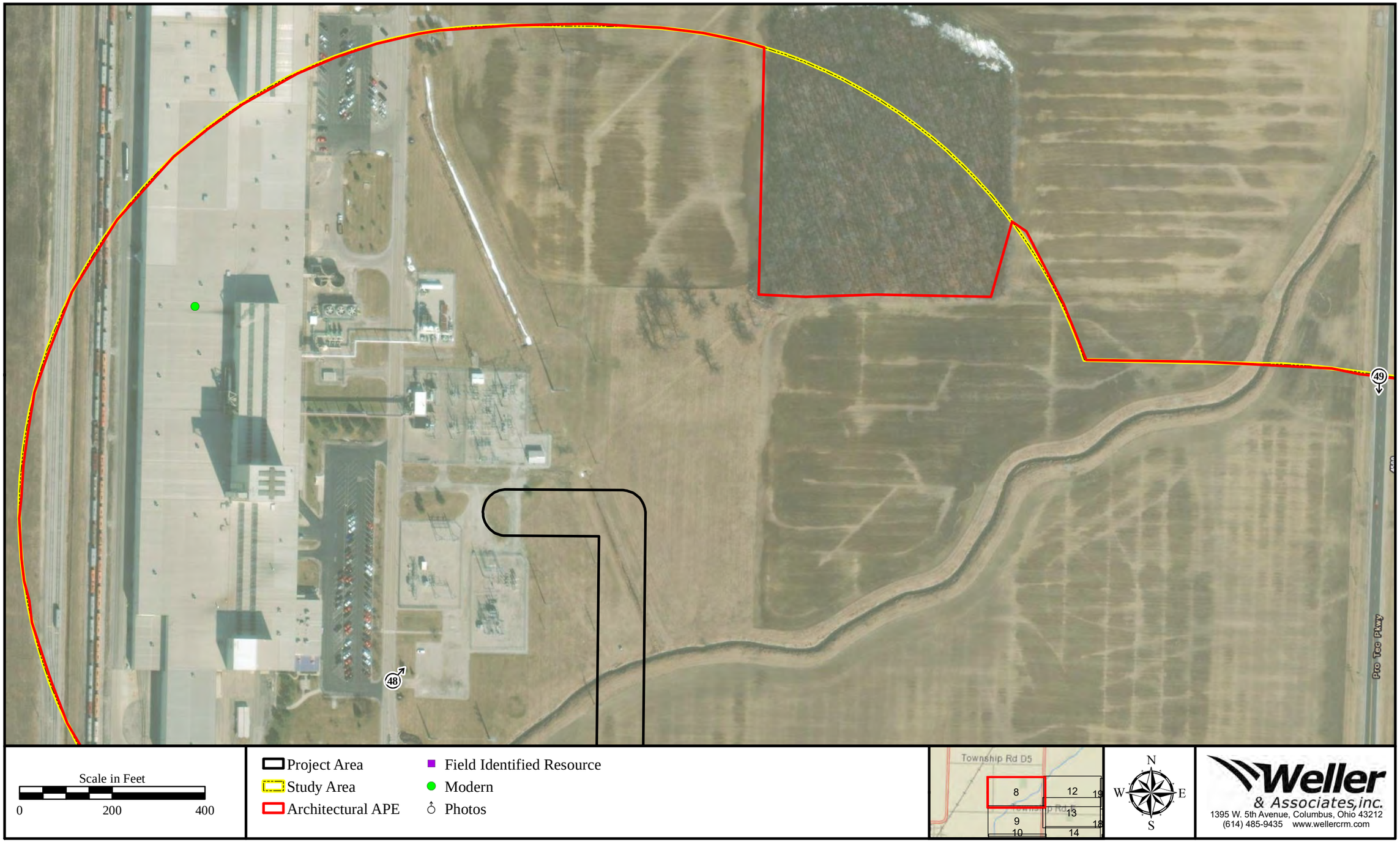
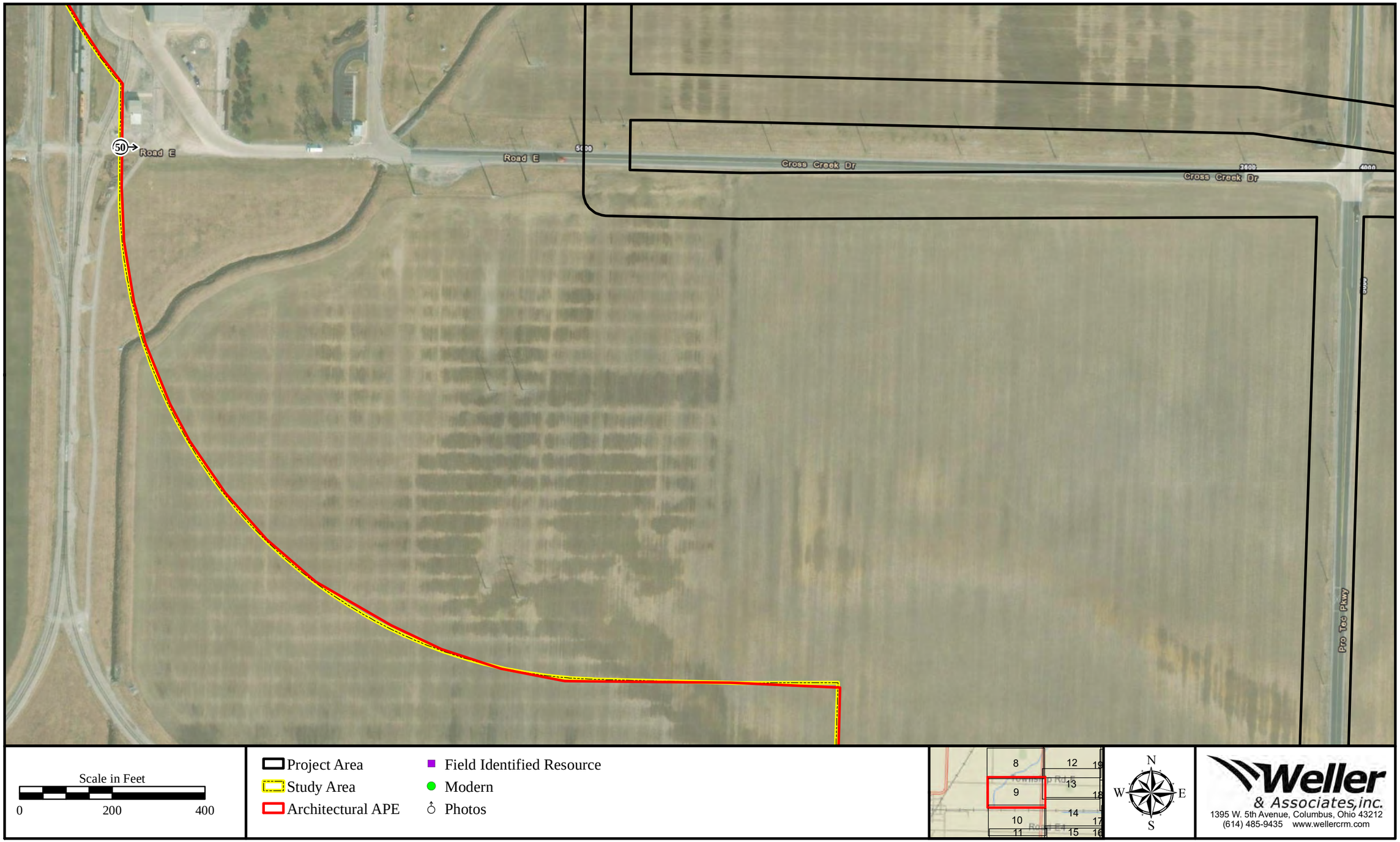


Figure 8. Architectural fieldwork results and photo orientation map.



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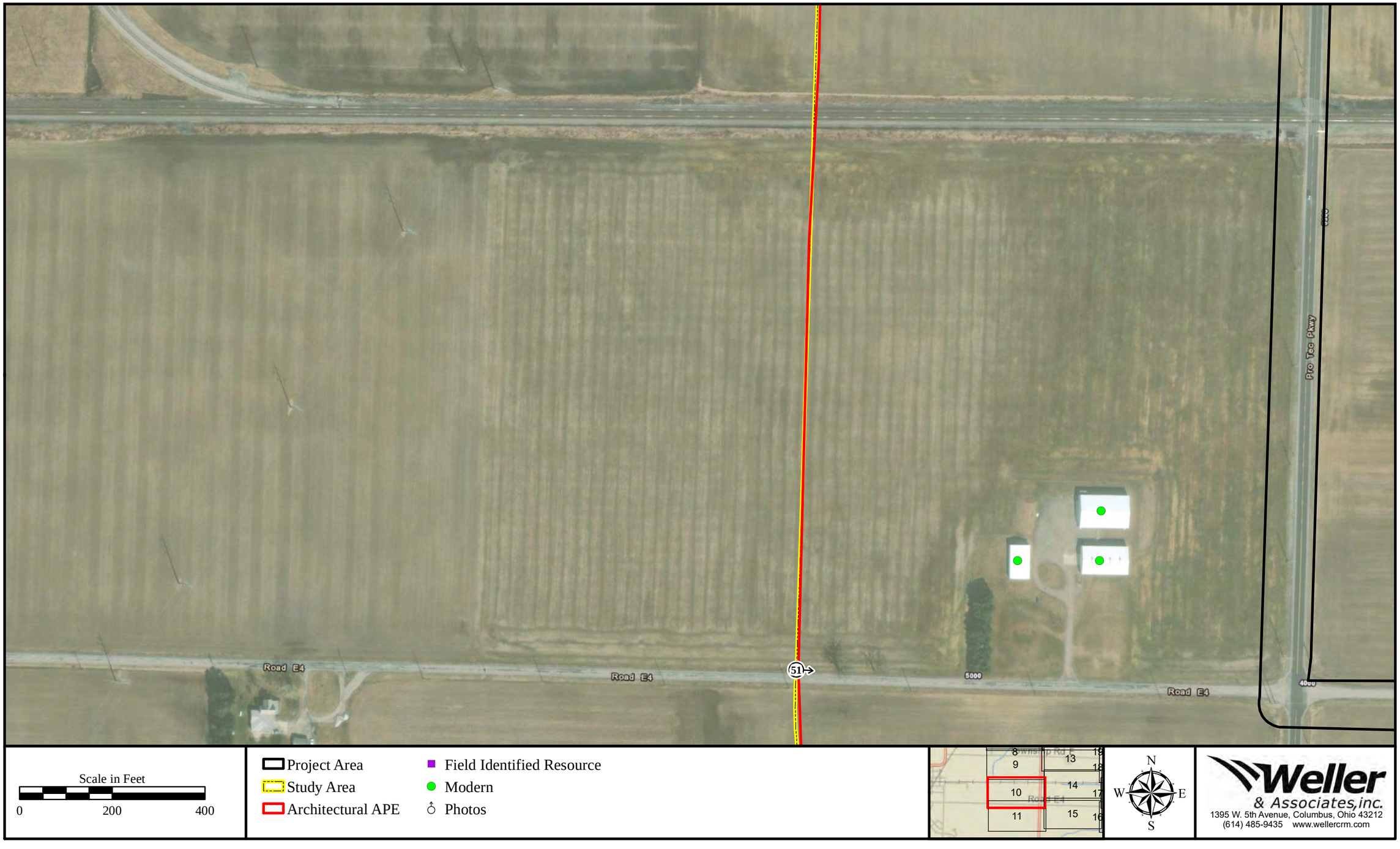

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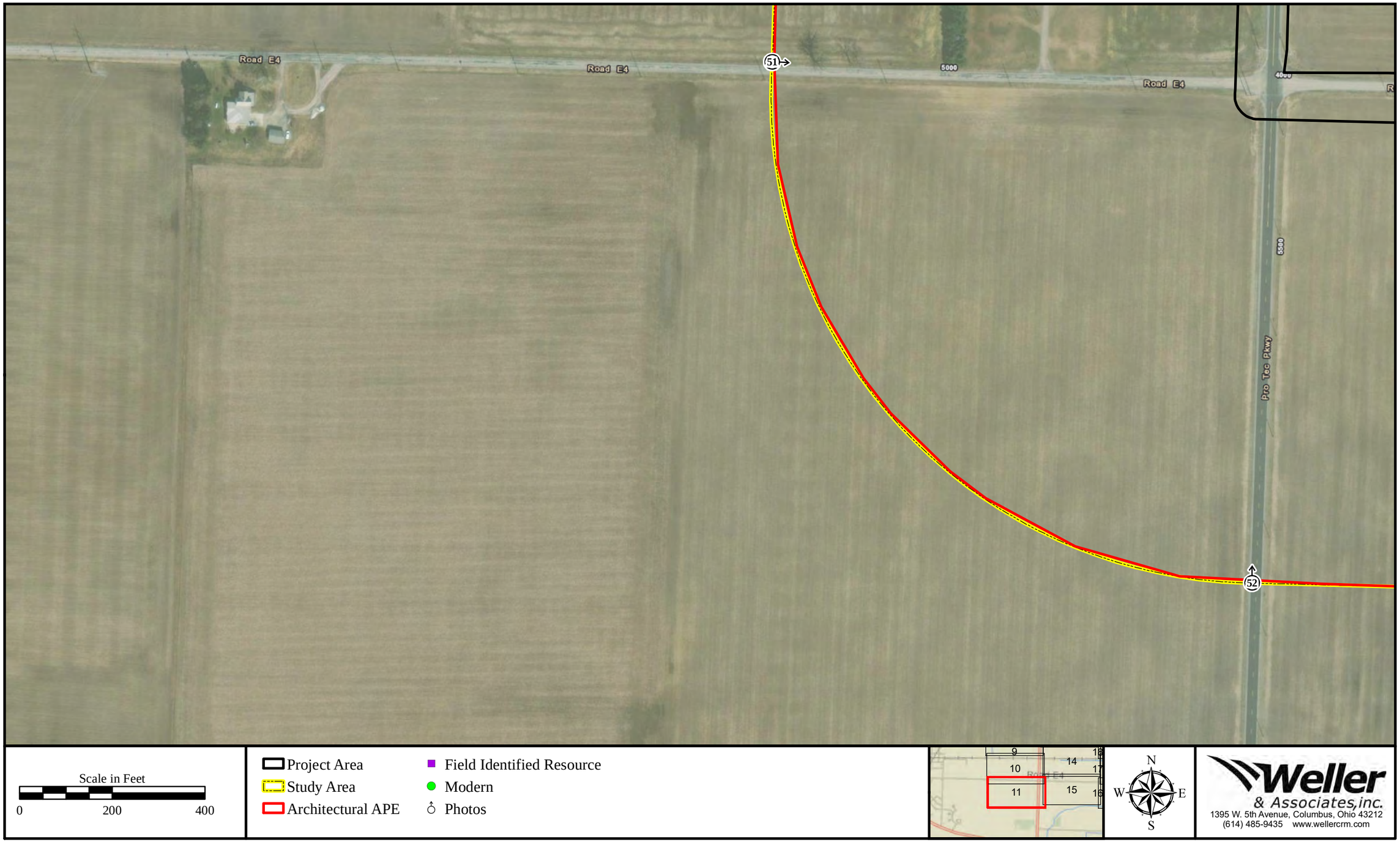
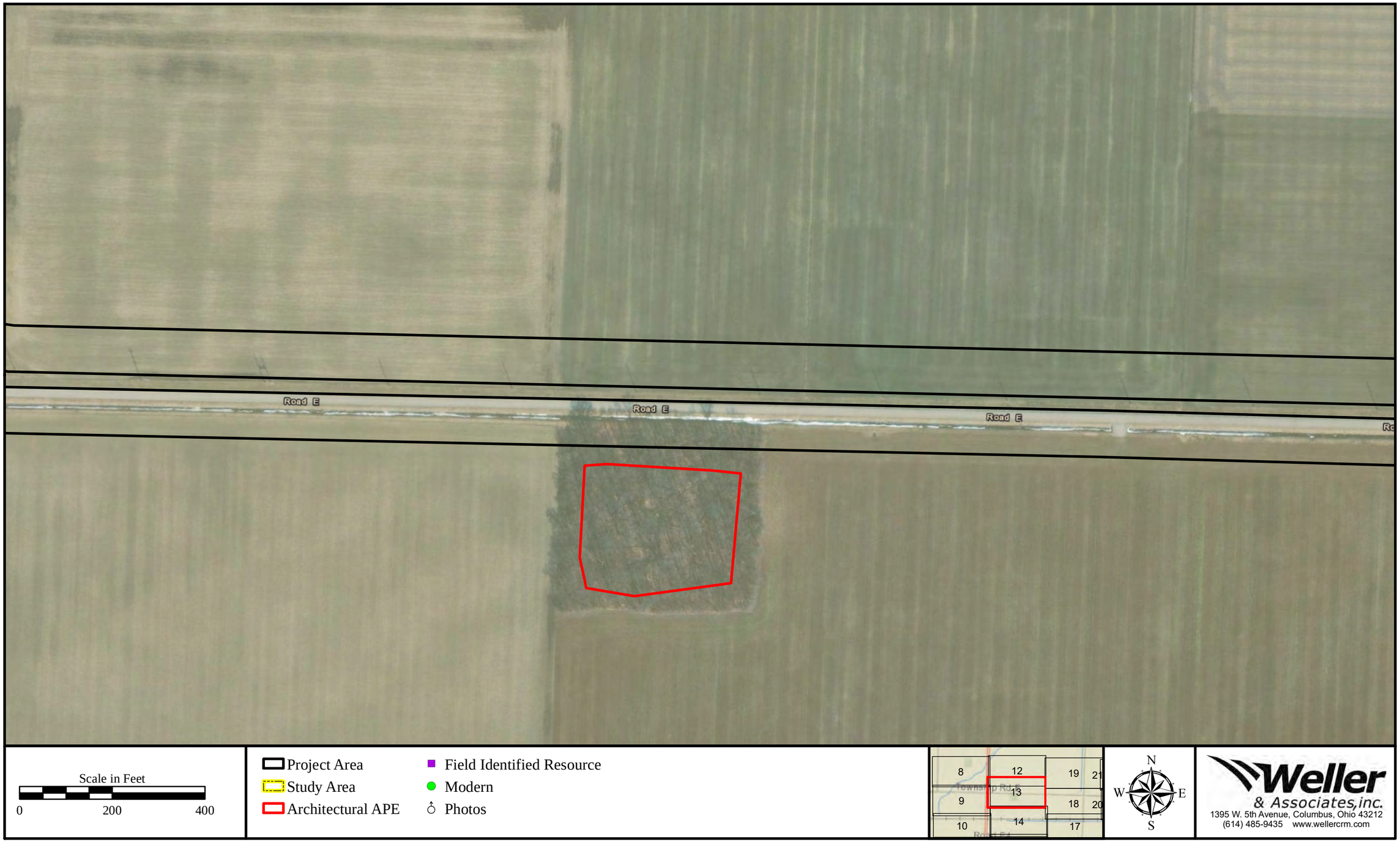


Figure 11. Architectural fieldwork results and photo orientation map.

Figure 12. Architectural fieldwork results and photo orientation map.



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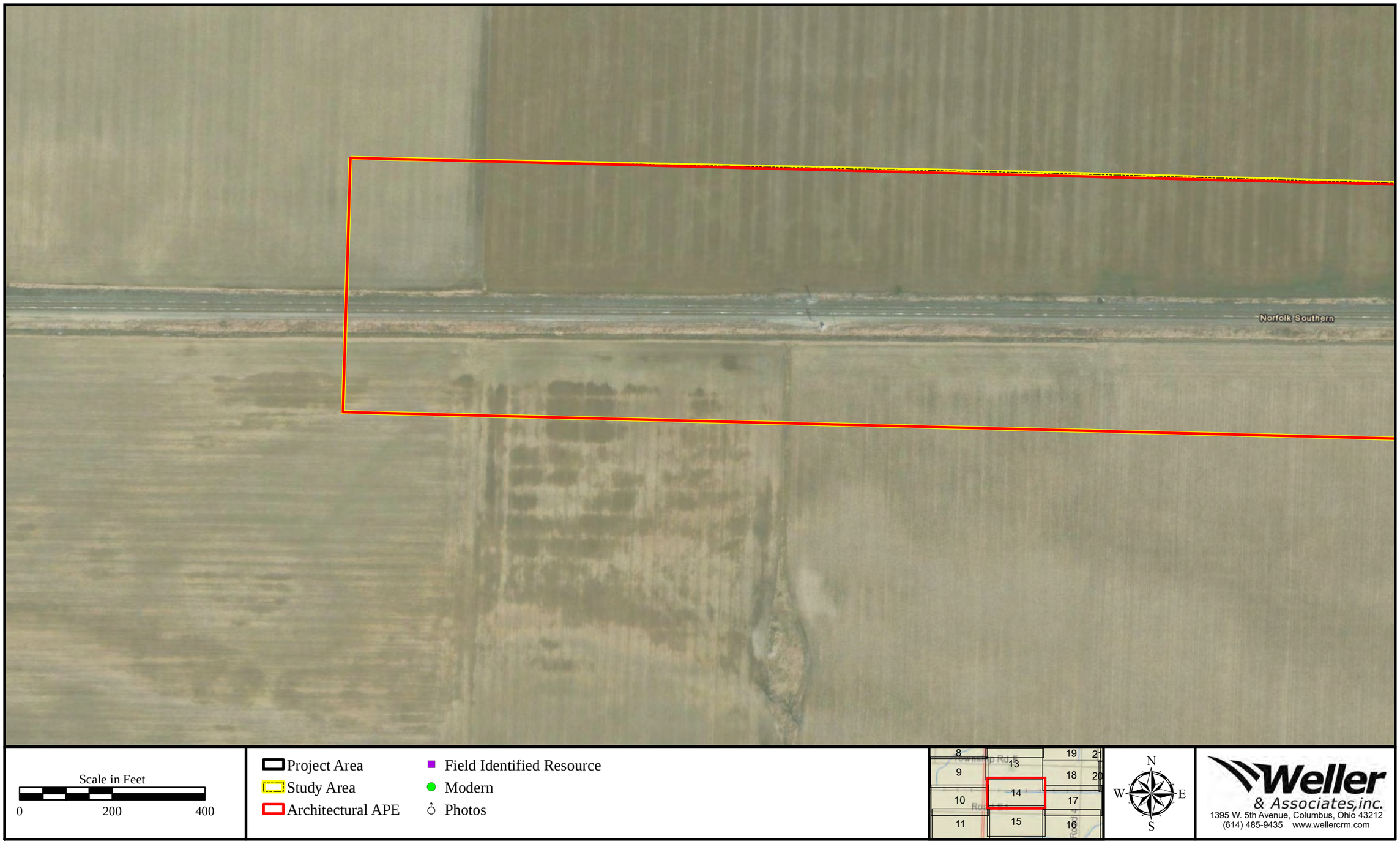

Figure 14. Architectural fieldwork results and photo orientation map.

Figure 15. Architectural fieldwork results and photo orientation map.

Figure 16. Architectural fieldwork results and photo orientation map.

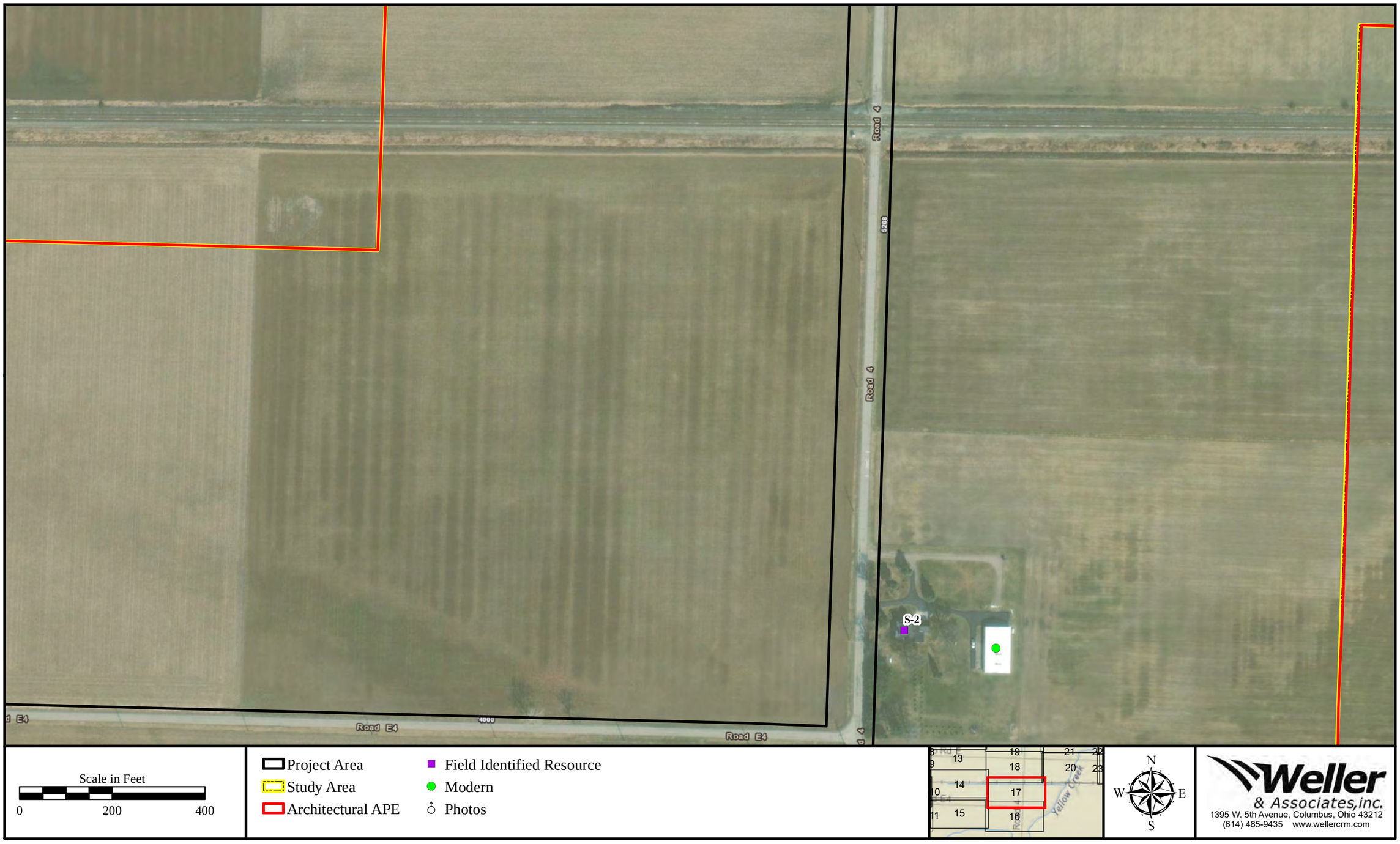

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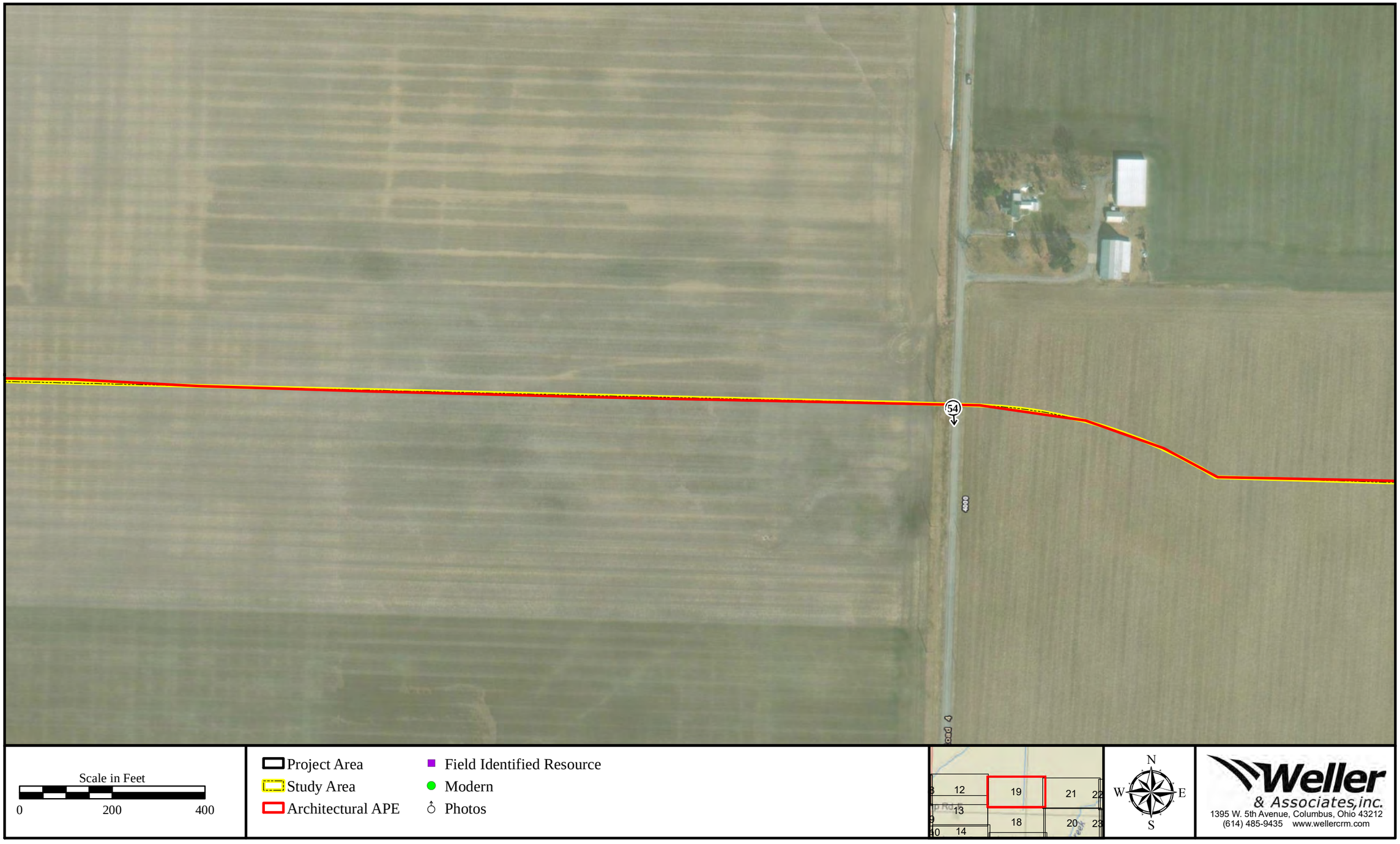
Figure 18. Architectural fieldwork results and photo orientation map.



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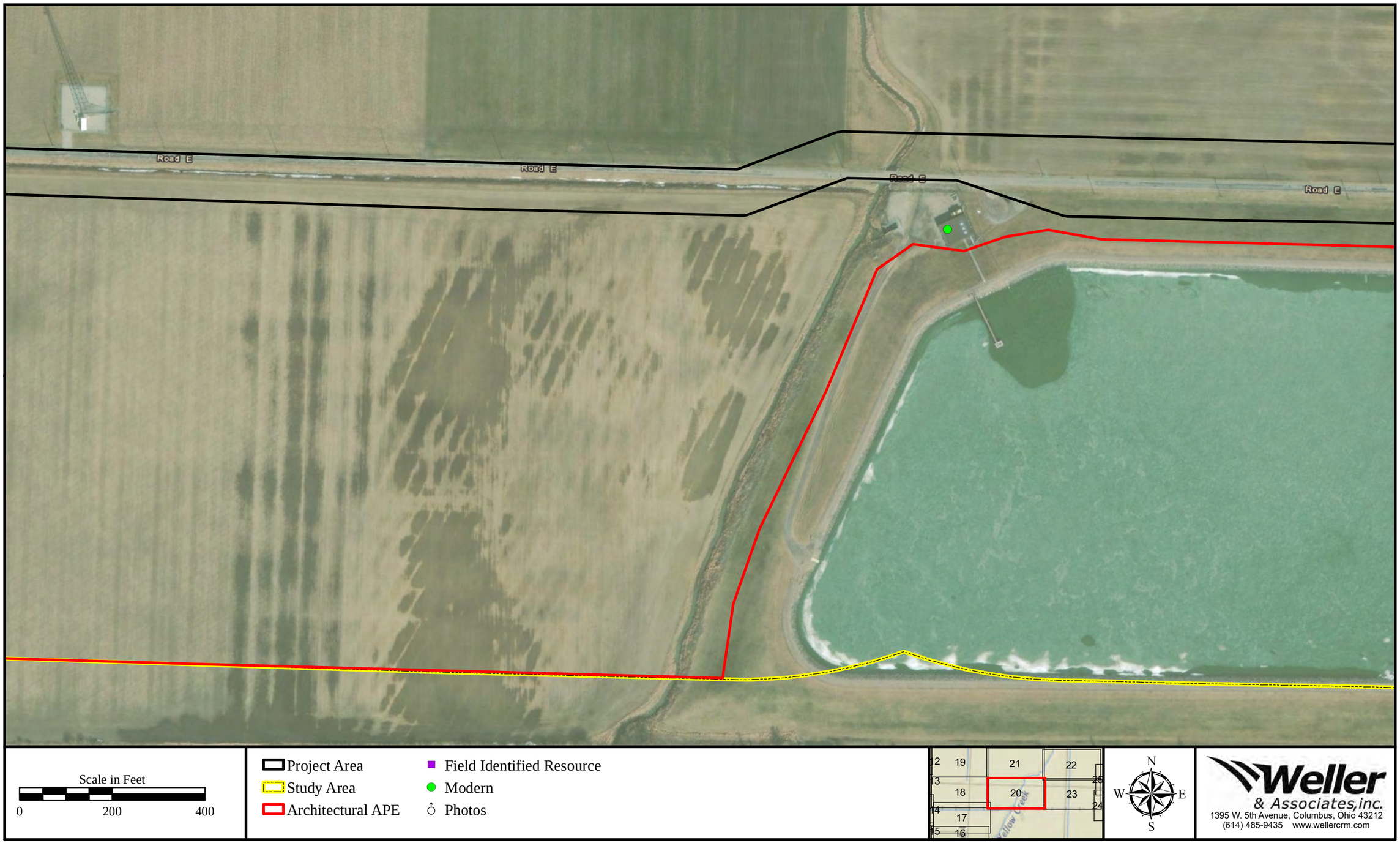

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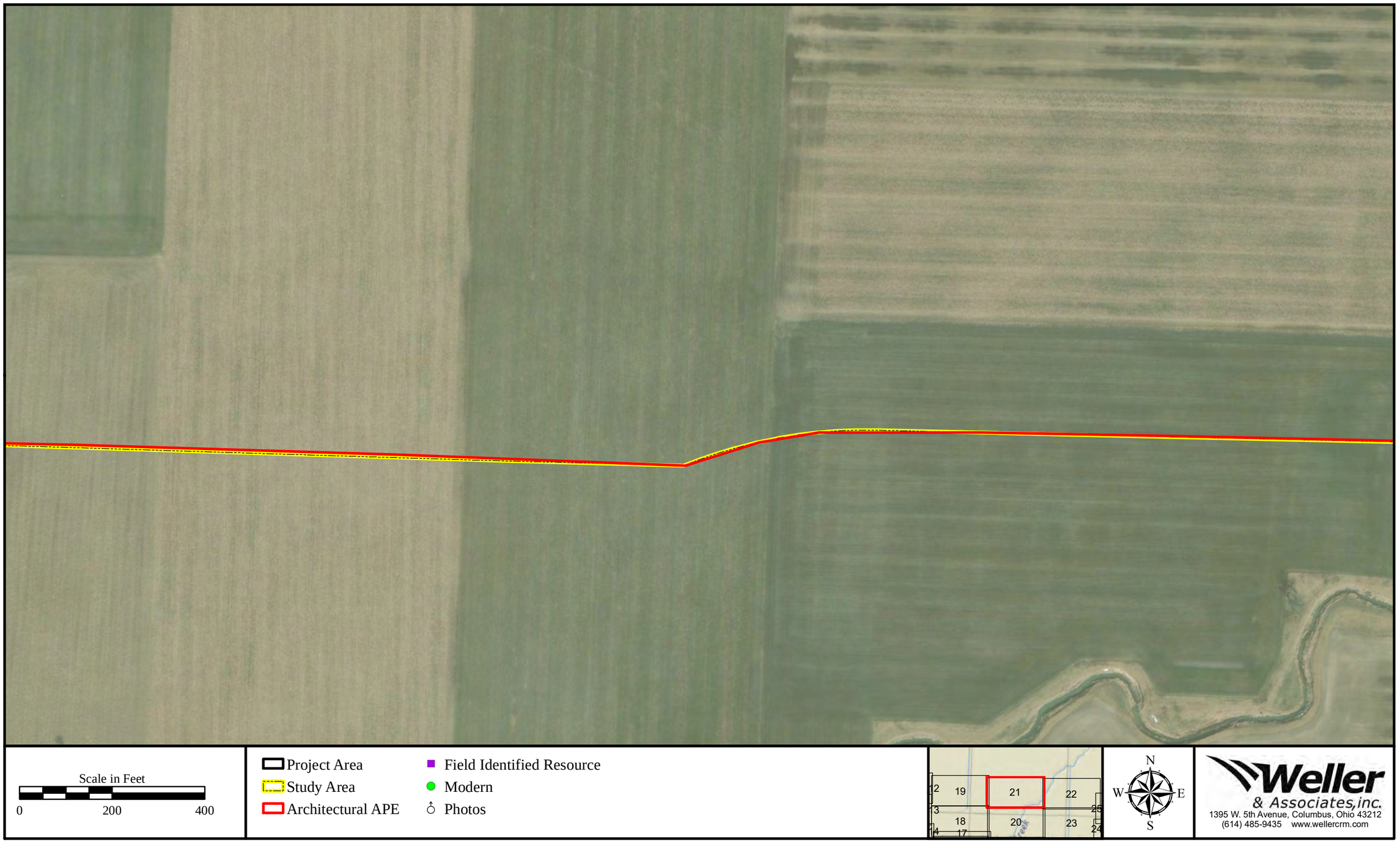

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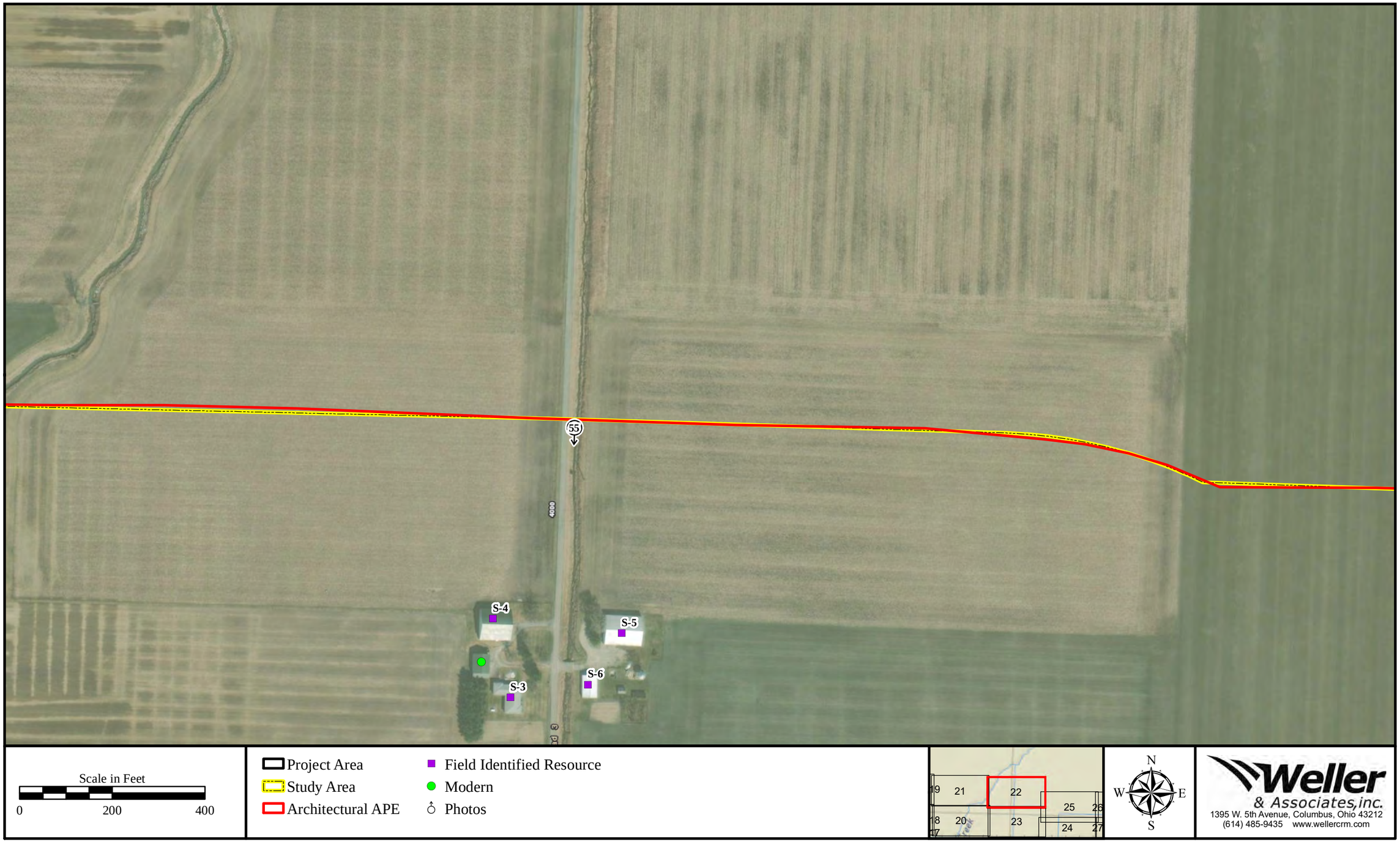

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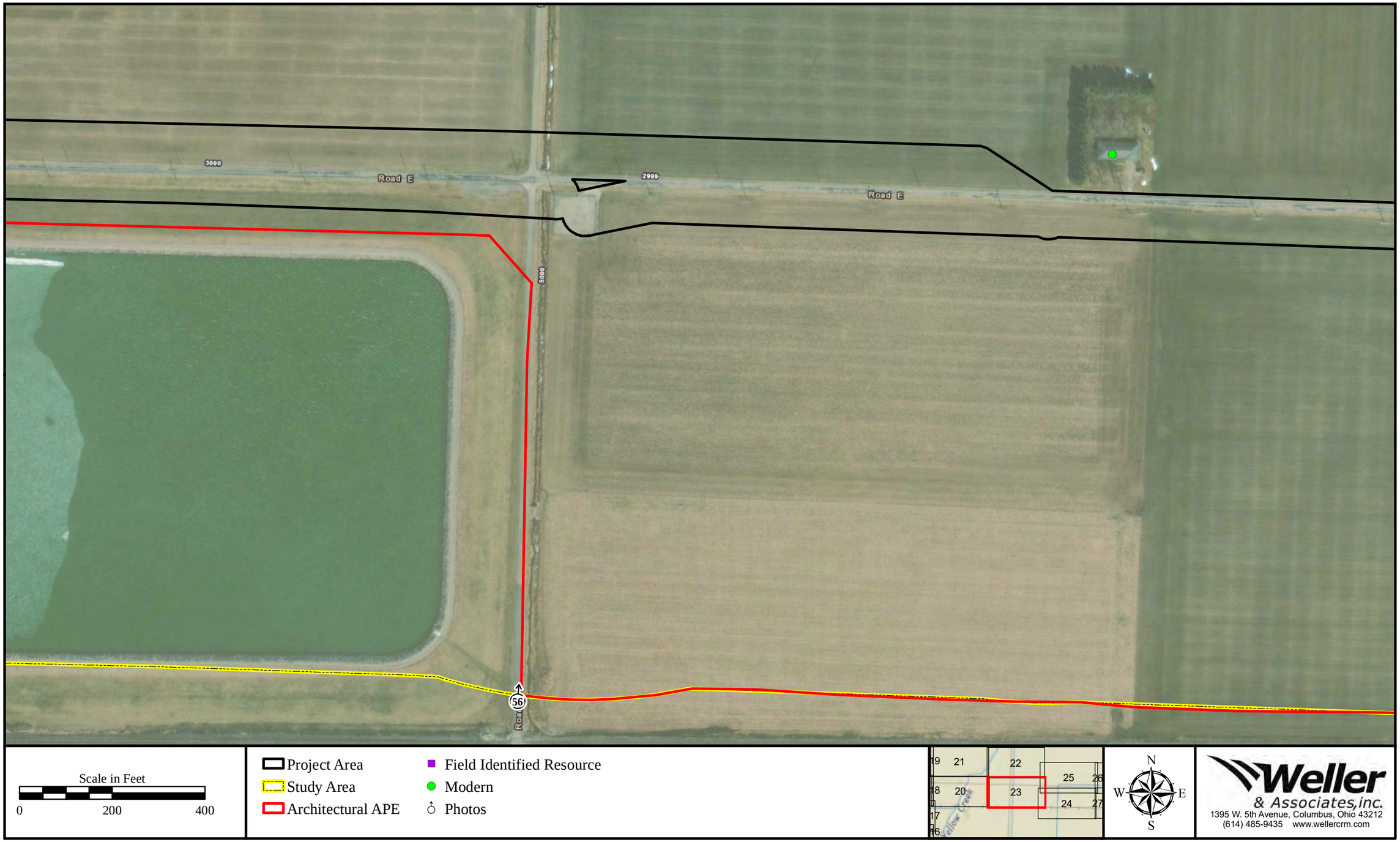

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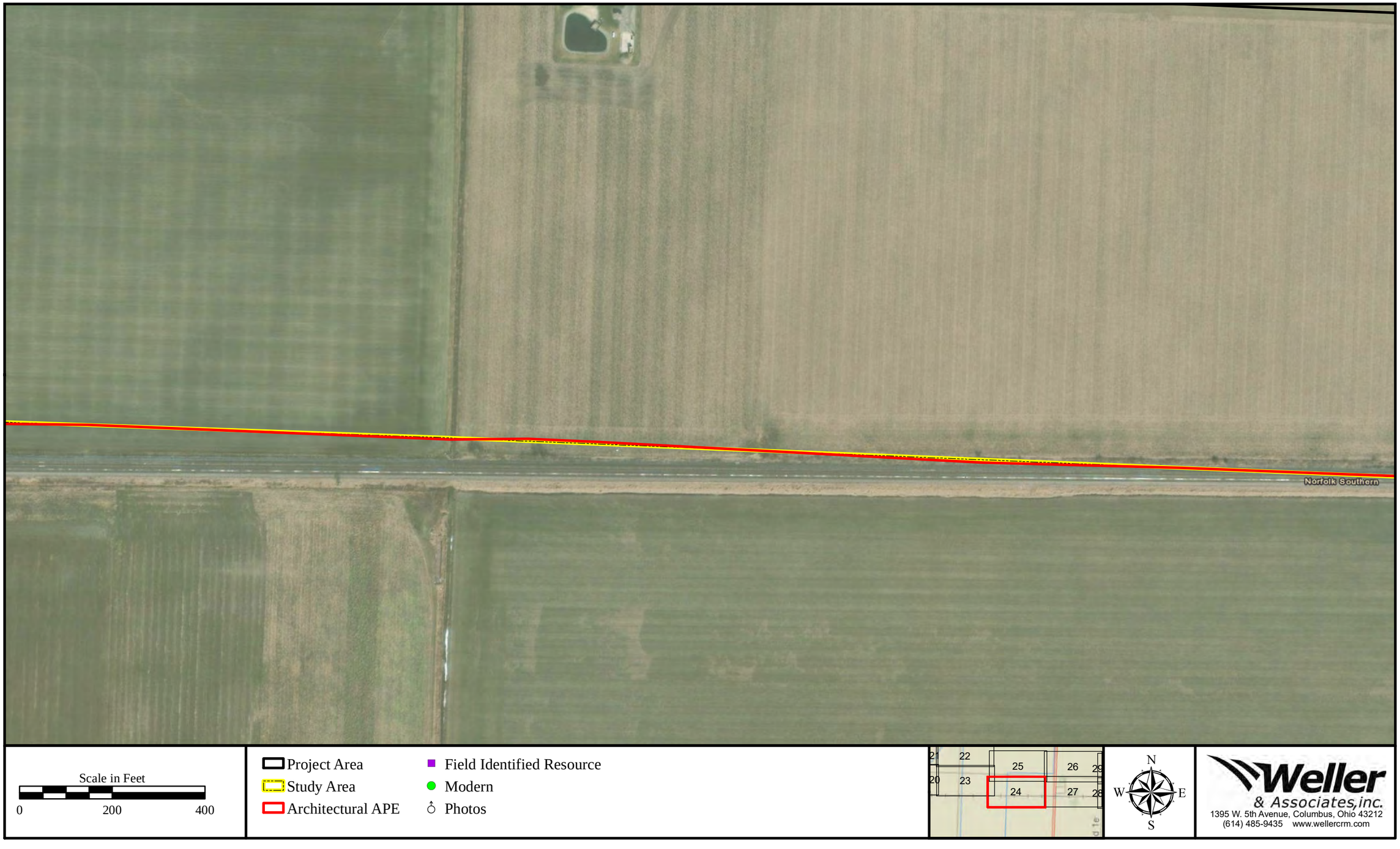

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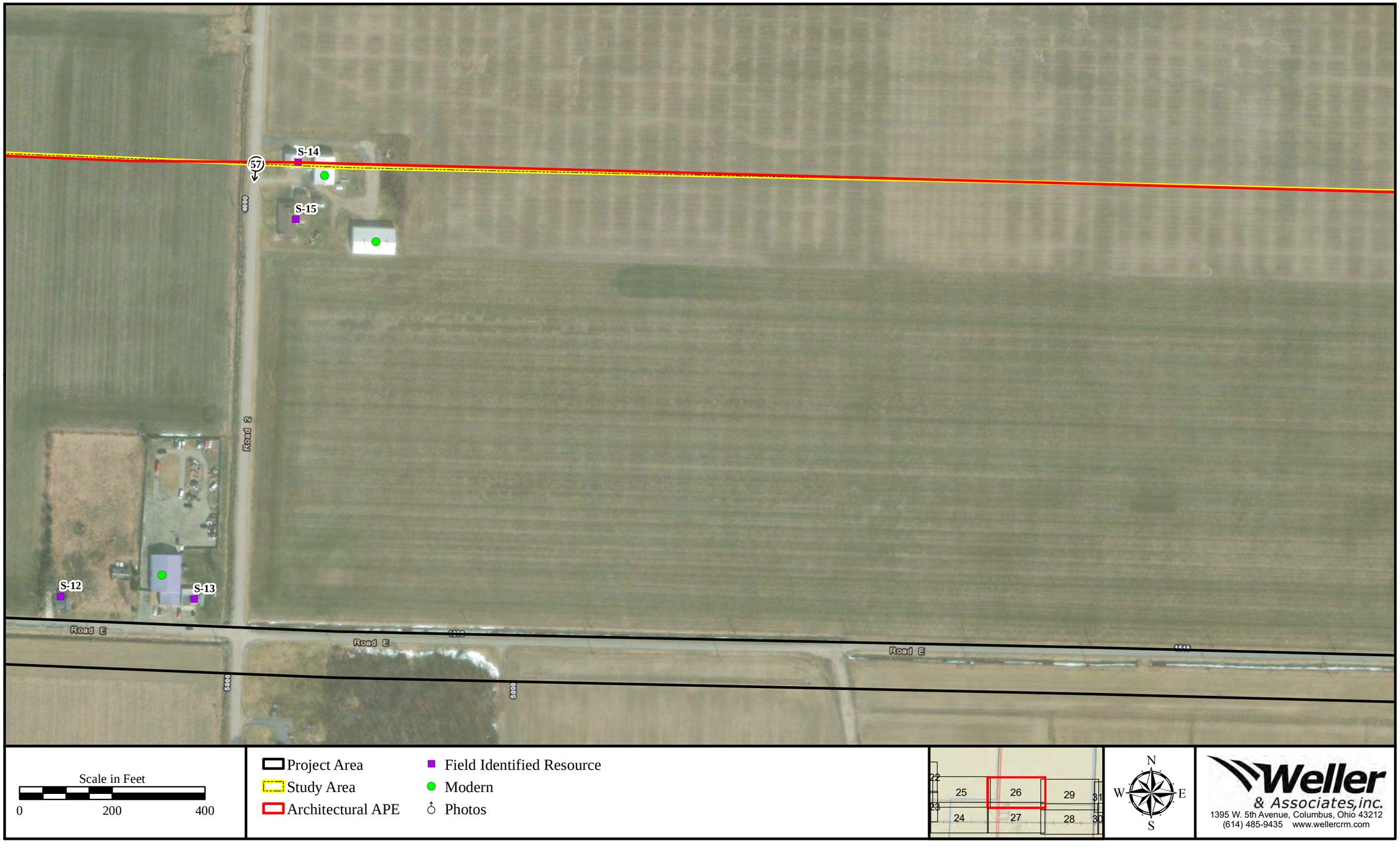

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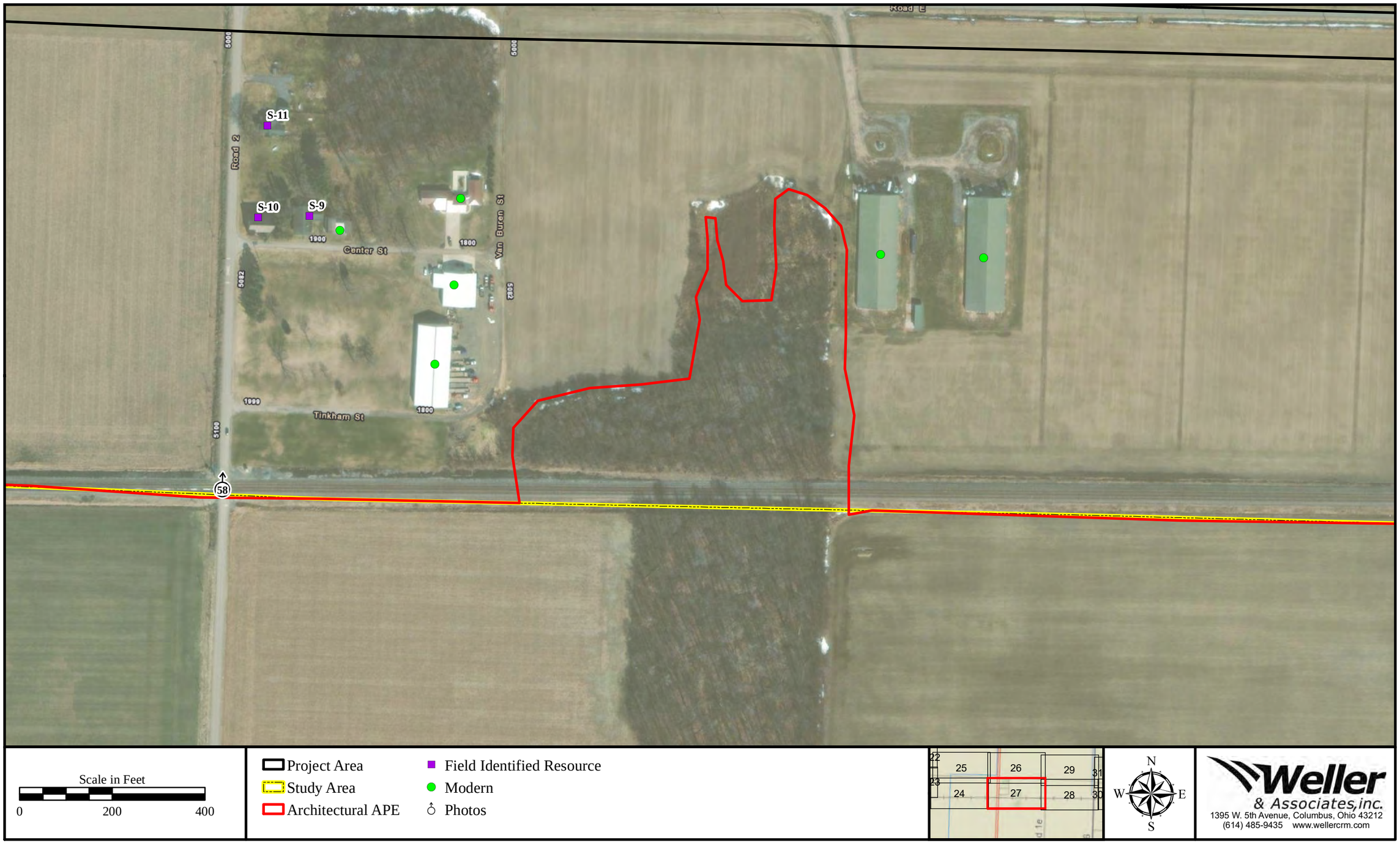

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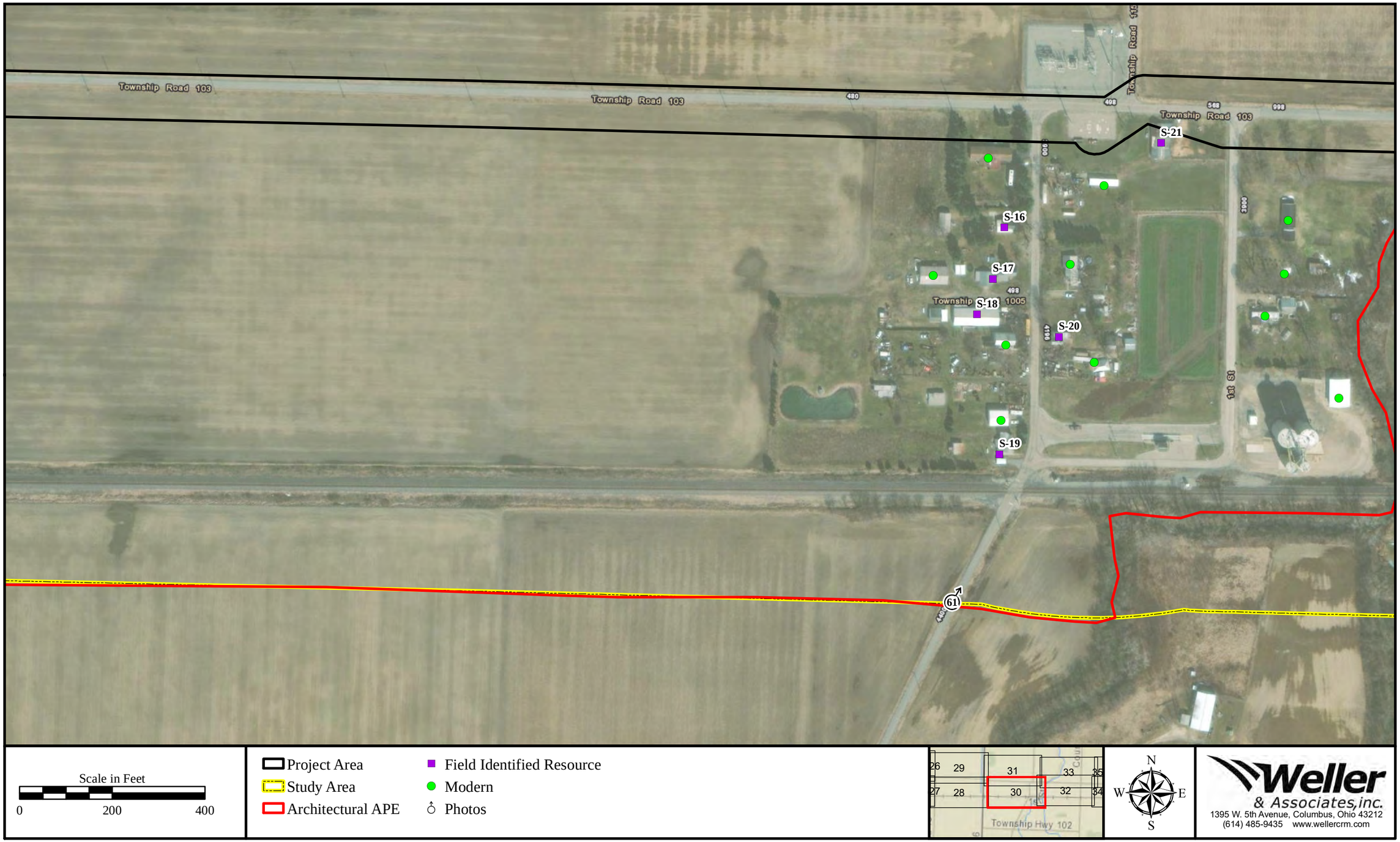

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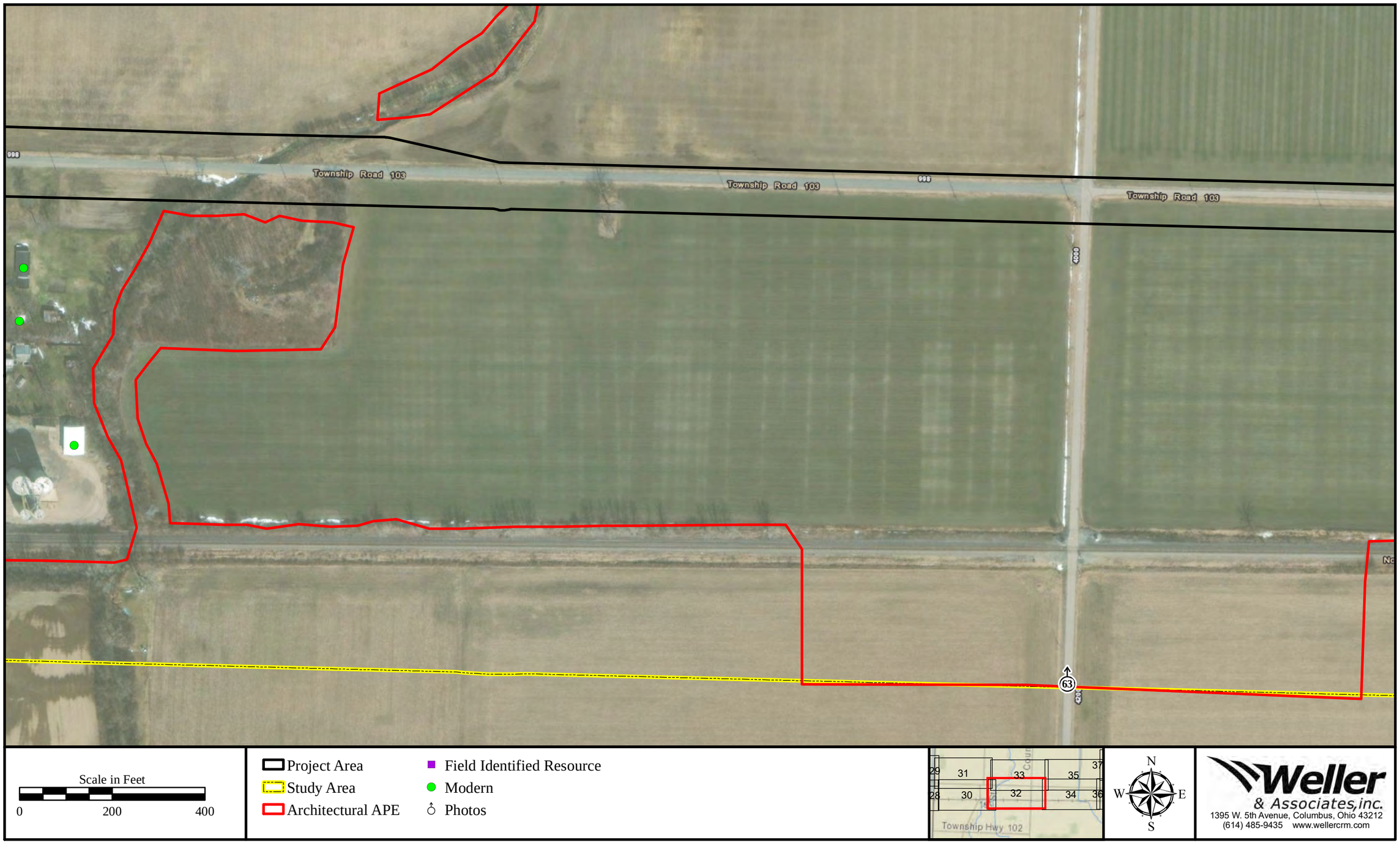

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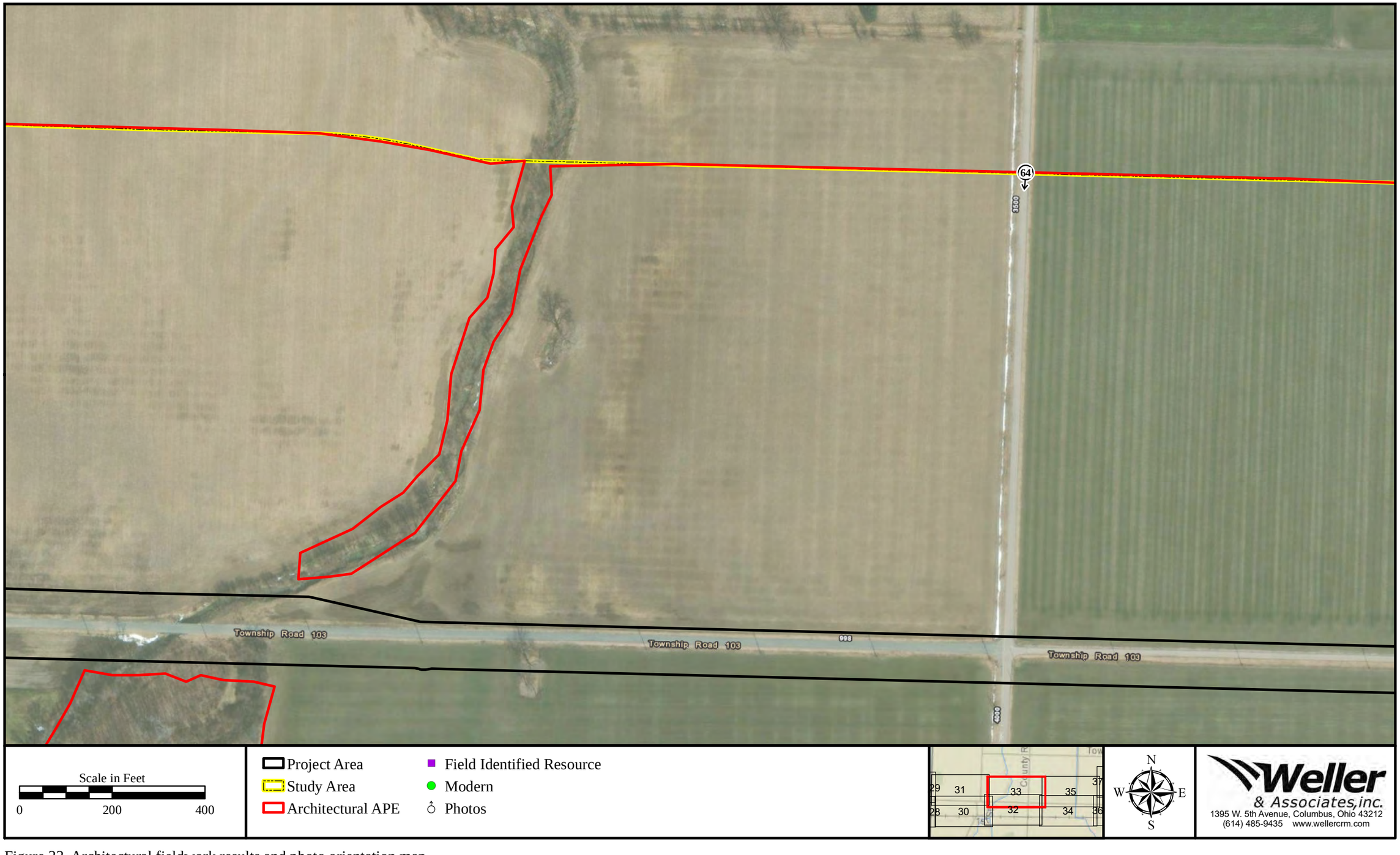

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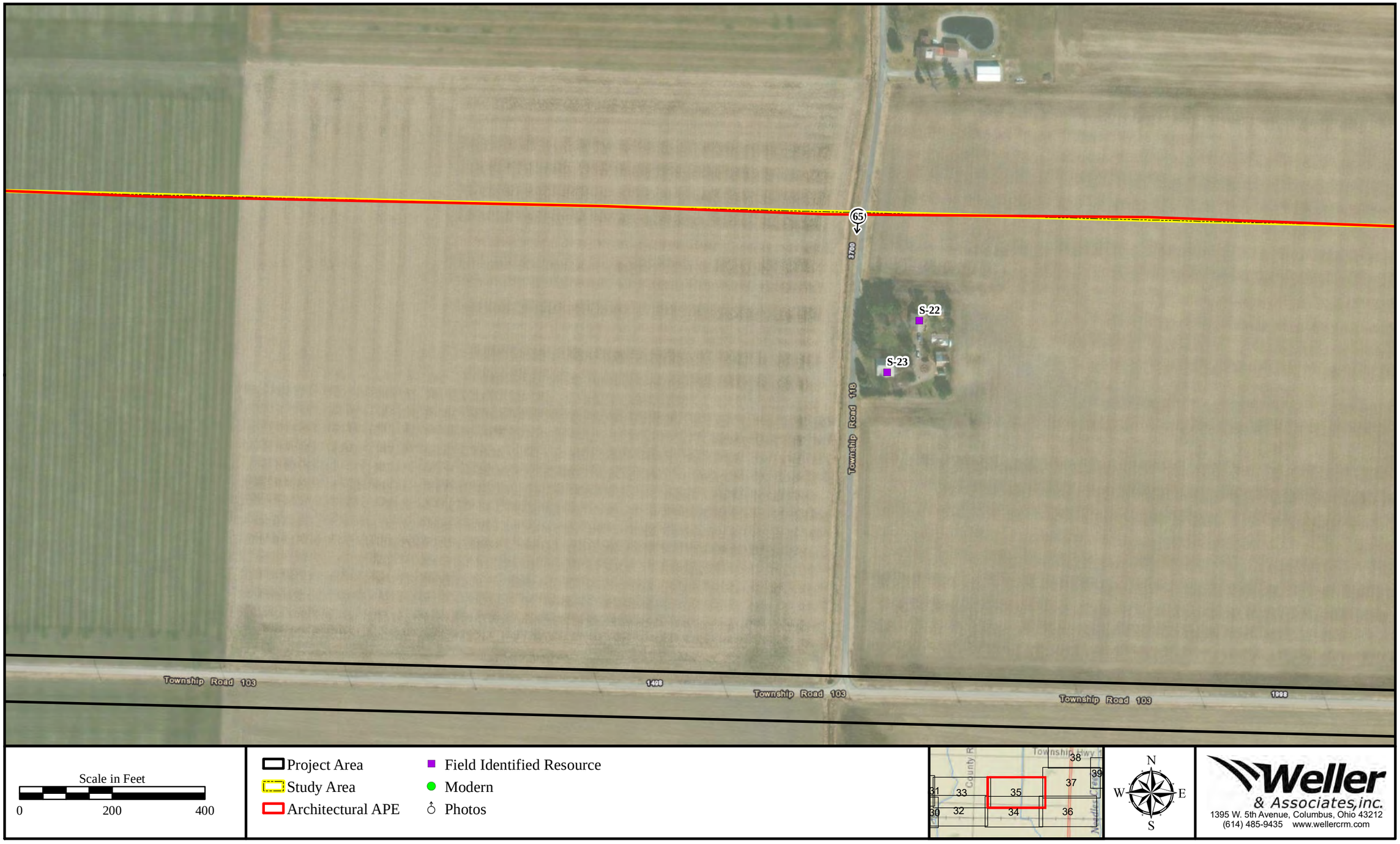

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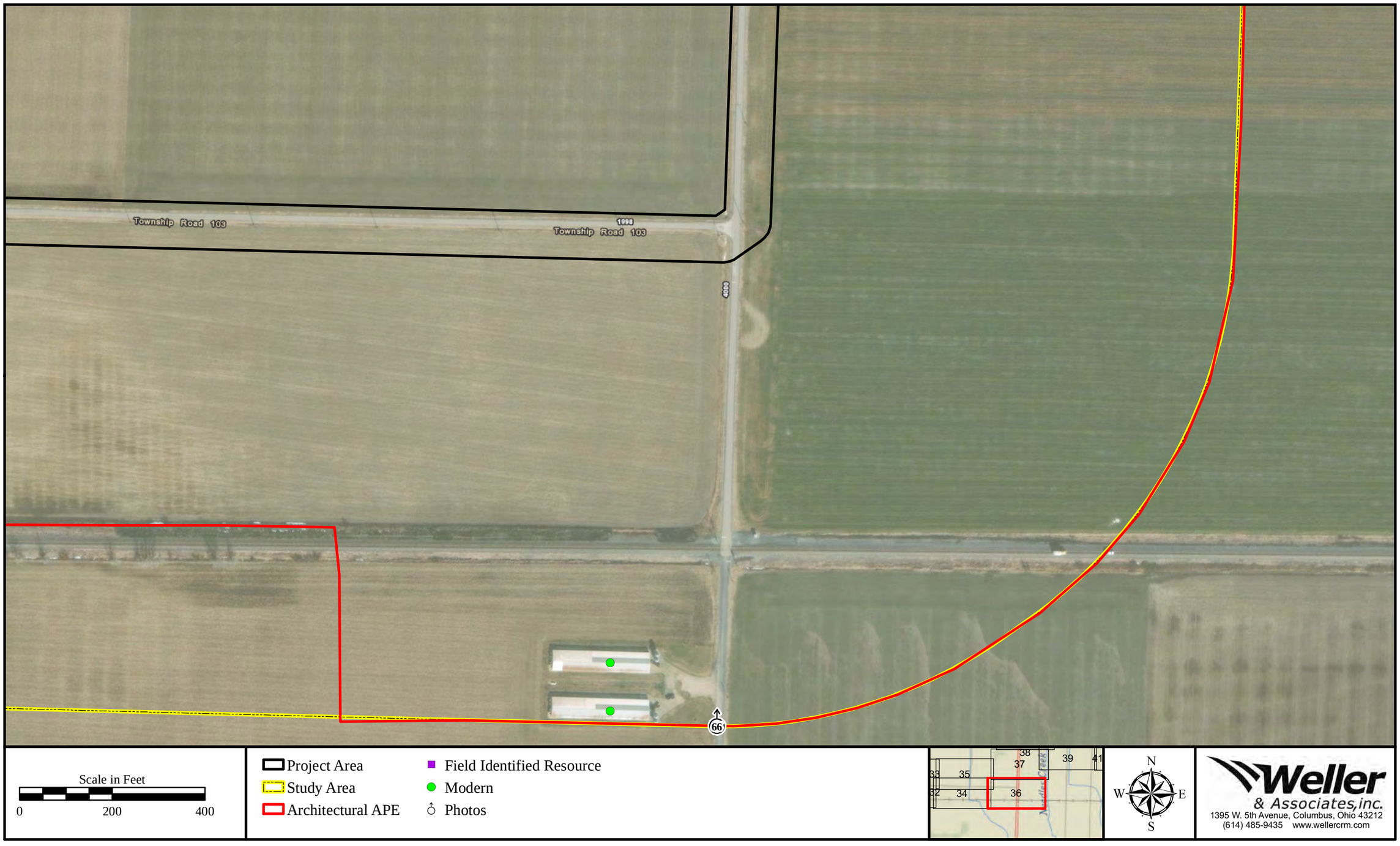

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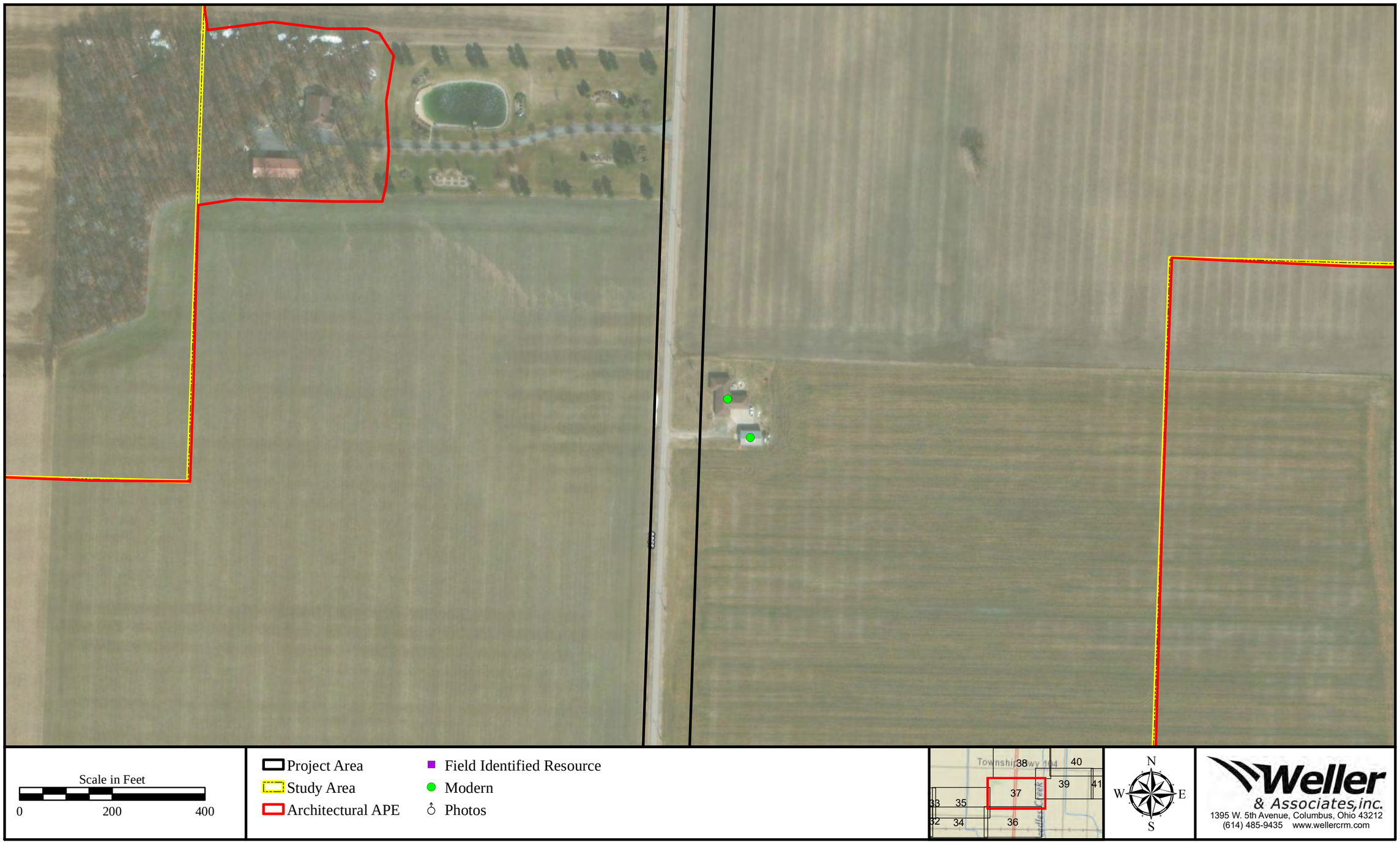

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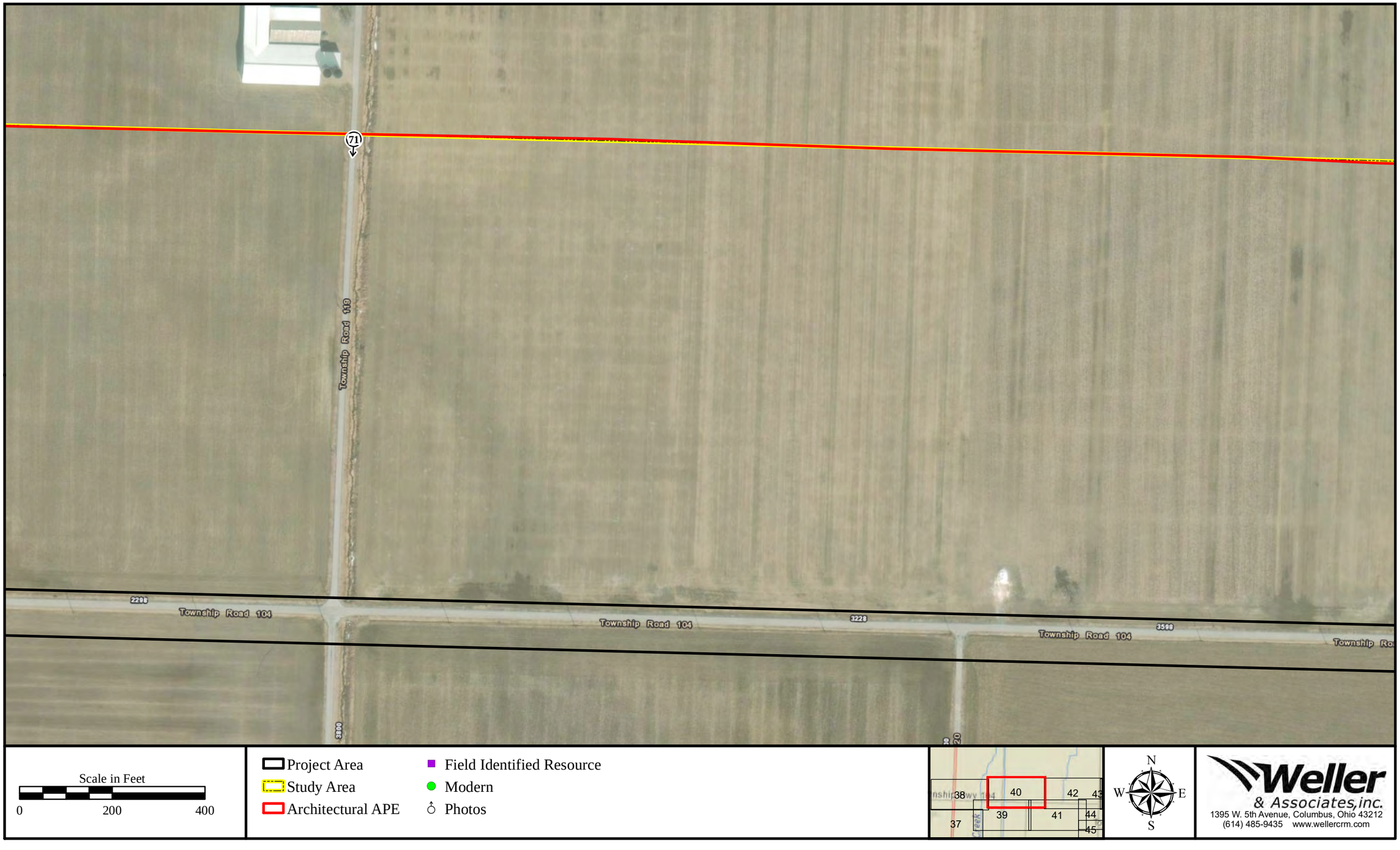

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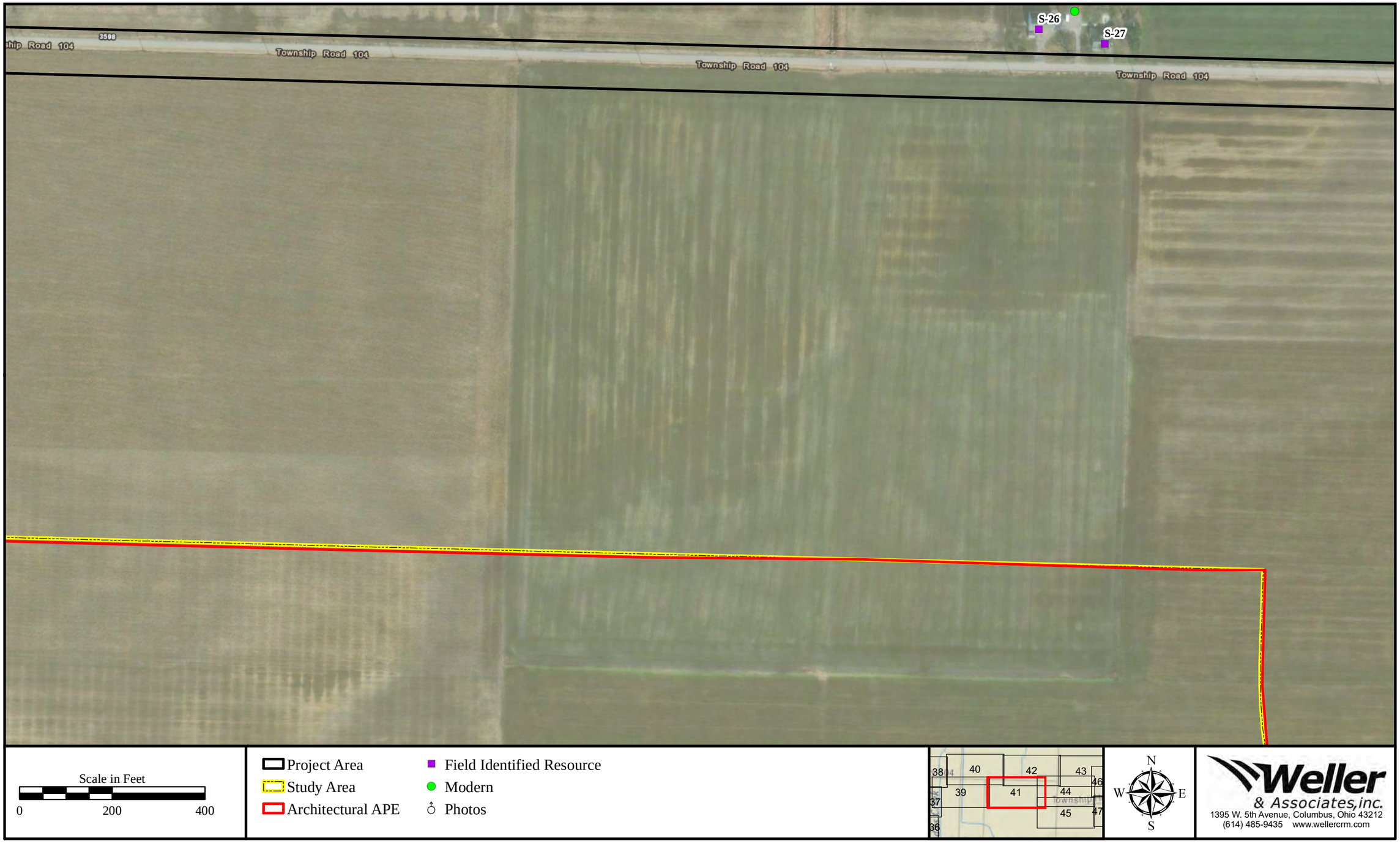

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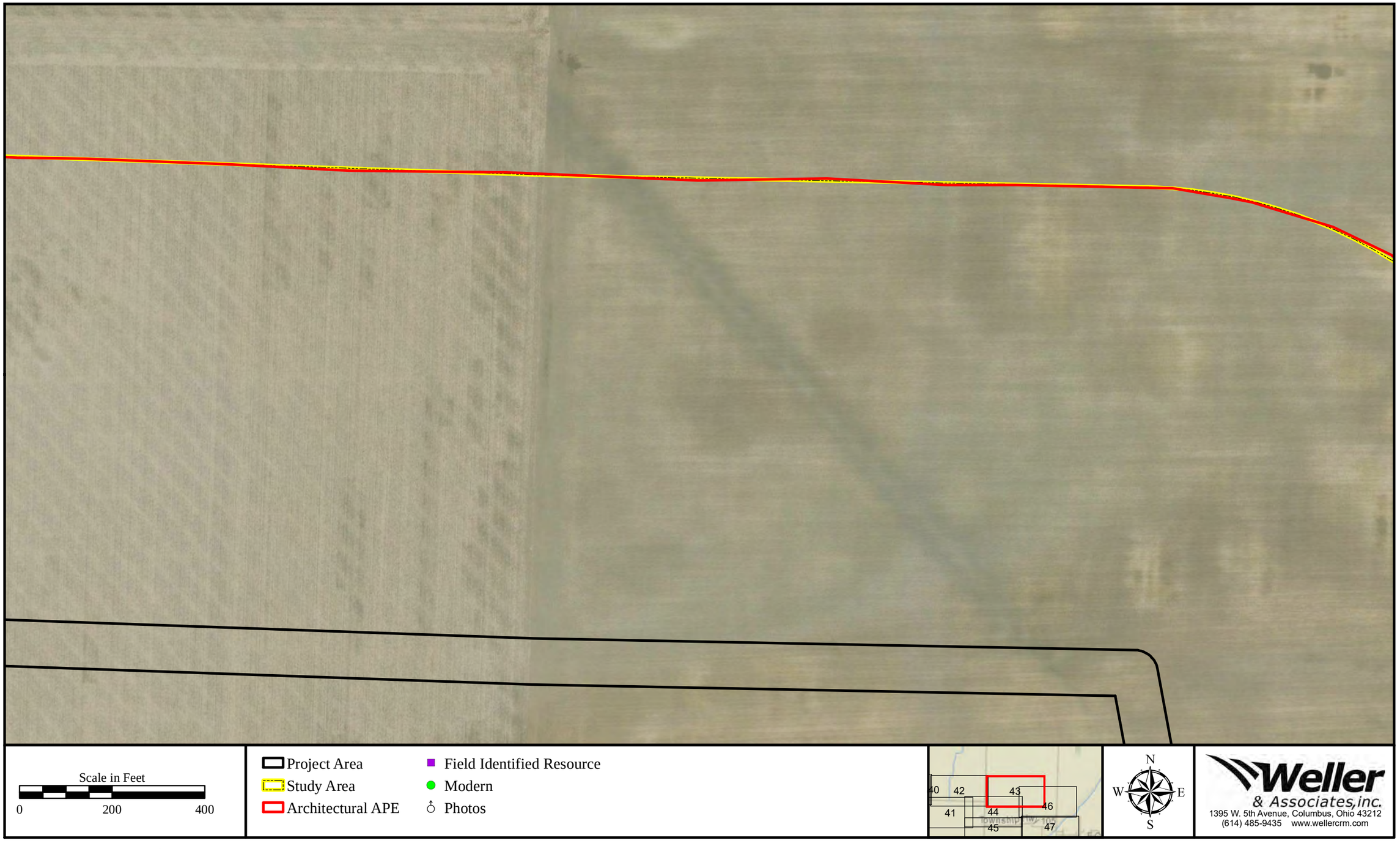
Figure 42. Architectural fieldwork results and photo orientation map.



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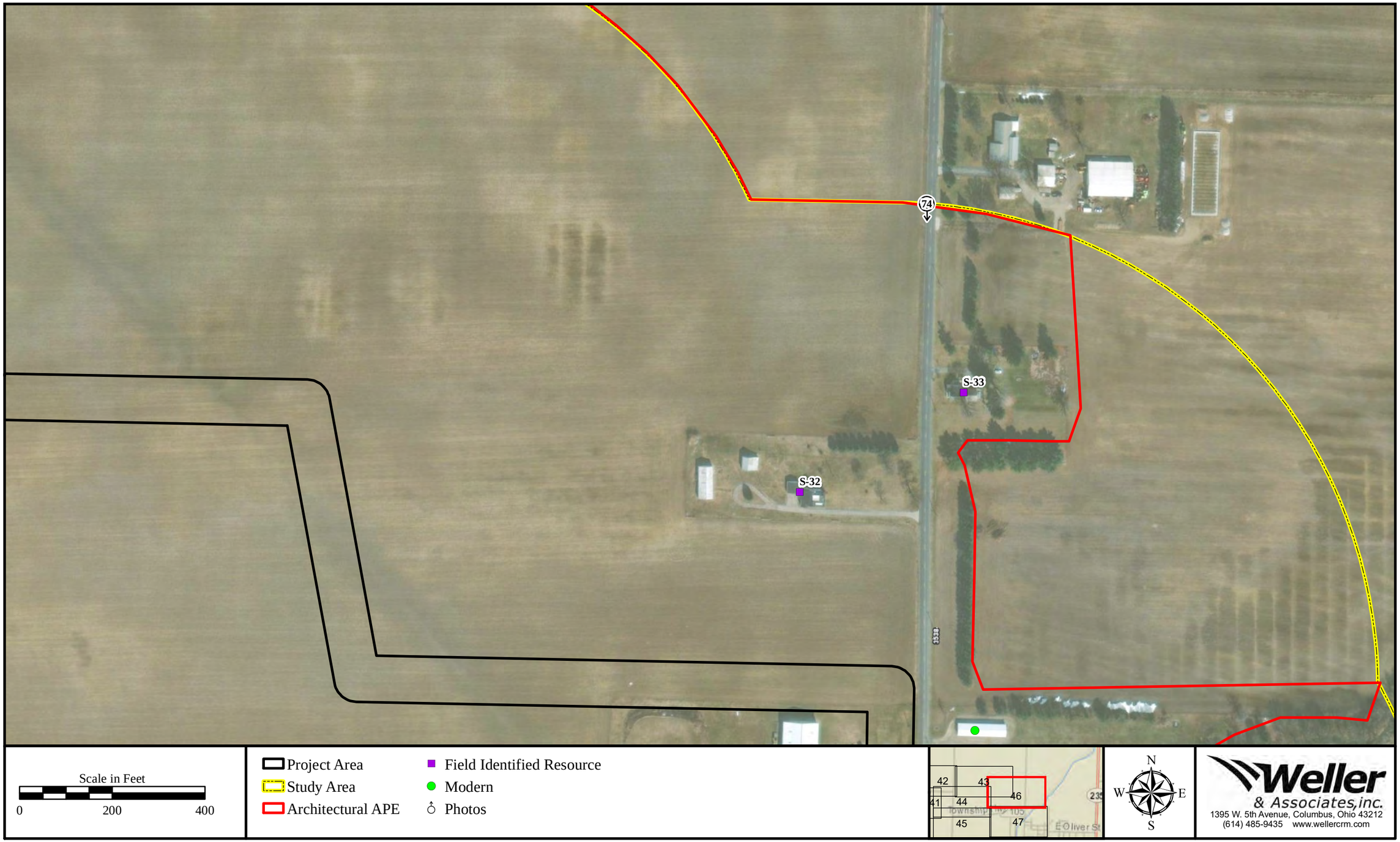

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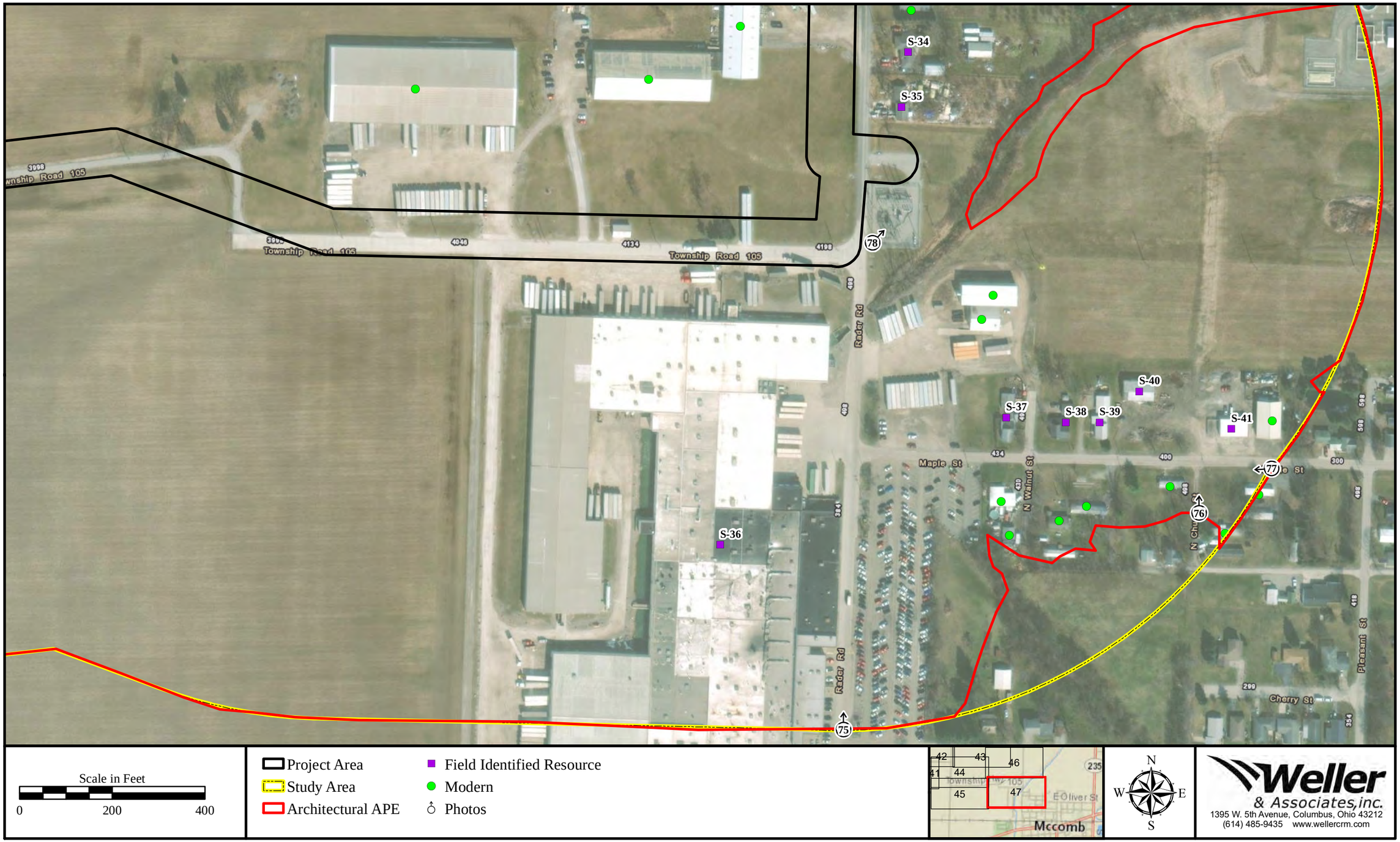

Figure 47. Architectural fieldwork results and photo orientation map.

Figure 48. Northeast view of the northern terminus near Road E, Leipsic, Putnam County, Ohio.

Figure 49. South view toward the project area from the Architectural APE boundary at Pro Tac Parkway, Leipsic, Putnam County, Ohio.

Figure 50. East view toward the project area from the Architectural APE boundary at Road E, Leipsic, Putnam County, Ohio.

Figure 51. East view toward the project area from the Architectural APE boundary at Road E4, Leipsic, Putnam County, Ohio.

Figure 52. North view toward the project area from the Architectural APE boundary at Pro Tac Parkway, Leipsic, Putnam County, Ohio.

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History/Architecture Investigations for the 11.3 km (7 mi) Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio

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April 13, 2022

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History/Architecture Investigations for the 11.3 km (7 mi) Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio

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April 13, 2022

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W-3071

Abstract

In March and April of 2022, Weller & Associates, Inc. conducted History/Architecture Investigations for the 11.3 km (7 mi) Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio. The work was conducted under contract with American Electric Power (AEP) for submittal to the Ohio Power Siting Board (OPSB) and will be coordinated for Ohio History Connection (OHC) review. The report was conducted in accordance with the Ohio Historic Preservation Office (OHPO) History/Architecture Guidelines (2014) and prepared in a manner that is suitable for review regarding Section 106 of the National Historic Preservation Act of 1966, as amended (54 U.S.C. 306108 [36 CFR 800]).

The archival and literature review did not identify any OHIs, NRHP listings, DOEs, OGS cemeteries, nor any previously conducted professional surveys with an architectural component.

A total of 75 architectural resources 50 years of age or older were identified in the APE. Building types and styles are consistent with patterns of settlement in the area. Most of the resources are vernacular exhibiting no academic style. The resources are primarily single-family residences dating from the mid-to-late-19th century to 1972.

None of the resources in the APE were found to significant in a manner necessary for inclusion in the NRHP. Weller concludes a finding of 'no historic properties affected.' No further architectural work is considered necessary.

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Introduction

In March and April of 2022, Weller & Associates, Inc. conducted History/Architecture Investigations for the 11.3 km (7 mi) Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio (Figures 1-5). The work was conducted under contract with American Electric Power (AEP) for submittal to the Ohio Power Siting Board (OPSB) and will be coordinated for Ohio History Connection (OHC) review. The report was conducted in accordance with the Ohio Historic Preservation Office (OHPO) History/Architecture Guidelines (2014) and prepared in a manner that is suitable for review regarding Section 106 of the National Historic Preservation Act of 1966, as amended (54 U.S.C. 306108 [36 CFR 800]).

The investigations were conducted in two parts: a history/architecture survey and an archaeological investigation. This report covers the results of the history/architecture survey of the entire area that may be affected by the proposed development of the project. The history/architecture investigations consisted of a survey focusing on potentially significant properties 50 years of age or older that are situated within 1000 ft (305 m) on either side of the proposed project area. The results of the archaeological investigations will be presented in a separate report.

The documentation of properties in the field and report authoring were conducted by Scott McIntosh. Mapping and figures for the project were generated by John Sidor who also assisted with documentation of the properties in the field. The archival research was conducted in March 2022 and the field survey was conducted on April 1, 2022.

Project Description

The corridor extends through what is largely very flat, upland lake plain conditions with little to know relief/topography. The corridor is mostly located in farm field situations and occasionally along various road rights-of-way. The project corridor extends in a basically northwest to southeast manner from the Rader Road Station to the New Liberty Station in northwestern Hancock County. The corridor does not cross through any densely populated communities and is mostly situated in rural, upland agricultural settings. The northern part of the corridor is within flat, lake plain conditions while the remainder and majority are positioned on the Defiance end moraine. The north part of the corridor extends around the Village of McComb. The purpose of the project is to upgrade the extant 69kV transmission line to a 138kV transmission line.

Research Design

Architectural Field Methods

This survey was conducted following the guidelines established in *Archeology and Preservation: Secretary of the Interior's Standards and Guidelines* (National Park Service 1983)

and *Guidelines for Local Surveys: A Basis for Preservation Planning. National Register Bulletin No. 24* (National Park Service 1997). When properties are identified, they are subjected to the guidelines outlined in *National Register Bulletin 15, How to Apply the National Register Criteria for Evaluation* (National Park Service 1996).

There are four criteria for eligibility to be listed in the National Register of Historic Places (NRHP). Only one of these criteria must be met to be considered eligible for listing; however, oftentimes more than one of the criteria is met. The criteria for significance include:

A. Association with historic events or patterns of events;
B. Association with persons important to our past;
C. Exceptional or important architectural characteristics; and/or
D. Data potential.

Architectural properties typically qualify under Criteria A, B, or C. Criterion D is typically reserved for archaeological sites.

In addition to meeting at least one of the established criteria, the appropriate integrity must also be retained by the resource. There must be integrity of location, design, workmanship, setting, materials, feeling, and association.

Prior to commencing fieldwork, a literature review was conducted to determine if any previously recorded architectural properties, NRHP properties, or Ohio Genealogical Society cemeteries were present within the project survey area. Historic maps were also reviewed to aid in guiding the fieldwork and detecting the possible presence of significant within the survey area. Background research was also conducted to establish a historic context of the region. The context was compiled by utilizing materials from the State Historic Preservation Office (SHPO), archival materials at the respective county courthouses, local libraries, and several online resources. The establishment of the historic context helped to guide the interpretation of the field survey results.

The field survey included a systematic approach to identifying all properties that have potential significance for inclusion within the NRHP, within the survey area (1000-feet from either side) of the proposed project but extending to any areas containing significant or potentially eligible resources within view of the project area. Some areas will be blocked from having a direct line-of-sight to the proposed project by topography and forested areas. The areas that did not have a direct line-of-sight to the project were visually verified in the field and the survey did not include all of these areas. Each property identified within the survey area was photographed and annotated on appropriate mapping and included in the report. The approach was to identify those properties with NRHP potential, followed by a more intensive documentation and evaluation of those potentially eligible aboveground resources. The comprehensive survey involved recording of each property with potential historic significance to a baseline level of documentation.

Weller focused on the ground plan, the height, and the roof configuration of each structure, noting all visible materials, appendages, extensions, or other alterations. Housing

types and structural details within the report and utilized on Ohio Historic Inventory (OHI) forms follow the terminology used by architectural historians McAlester (2013), and Gordon (1992). Weller then supplemented the field survey data with an examination of available tax records, aerial photographs, and cartographic sources.

Definitions

Within this report, an *architectural resource* is defined as aboveground buildings or structures that are 50 years of age or older. A *historic property* is defined as a building, structure, object, or site that is listed in, or considered eligible for listing in, the NRHP. An *effect* is defined as an activity associated with the project that alters a characteristic of a historic property that qualified it for inclusion in the NRHP.

Historic Context

Hancock County History

Hancock County was originally part of the Northwestern Territory ceded by Virginia to the United States Government and was organized in 1828. Its namesake is John Hancock, signer of the Declaration of Independence and person of political significance during the Revolutionary War. The county is located in northwestern Ohio and includes comparably diverse terrain. The Defiance Moraine is the dominant landform that bisects the county from east to west and through its central part. The southern part of the county is Till Plain while the northern part is in the Lake Plain (Brockman 1998). The Blanchard River and its tributaries drain the southern majority of the county. This drainage runs along the Defiance Moraine and is the source of occasional inundations. The northern part of the county is drained by streams that flow to Lake Erie, including Middle Branch Portage River. Immigrants to the county were primarily arriving to till the soil.

Early inhabitants of the county were generally focused along the drainages and particularly the Blanchard River. Initially, settlement was at Fort Findlay, a War of 1812 stockade. Native American groups were occupying the area at this time as well including those from the Wyandot Tribe and Ottawa further down river. Shawnee were known to the area as well. One of the first inhabitants of the county and the region was that of Jean Jacques Blanchard who immigrated to the area in 1769. He was a Frenchman that originated from New Orleans and settled along the river of his namesake after marrying a Native American woman (Beardsley 1881; Brown 1886; Spaythe 1903).

Some of the early activity in the county was during the War of 1812. It was in that year that General Hull's campaign passed through the county leaving a path referred to as "Hull's Trail". Hull ordered the construction of Fort Findlay and it was located on the Blanchard River. It was constructed and named for Colonel James Findlay. This would become the site of the first Euro-American occupant of the county by a soldier named Thorp or Tharp who resided in Fort Findlay in the War of 1812 and remained there after its evacuation (Beardsley 1881). The first family to settle was the Benjamin Cox family.

The influx of settlers to the county was happening just after the War of 1812 and into the 1820s. These settlers inhabited the area around Findlay and the river and were primarily focused on agriculture. Log cabins would often have double functions as taverns or for trades such as blacksmith or farrier. Grist and sawmills soon followed to serve the growing agricultural community.

The transportation of good and travel routes in the county was originally via pirogues that navigated the Blanchard to the Auglaize and eventually to the Maumee. Cross country trade was usually made by travel to Sandusky City to access markets such as New York. The early road systems were tethered to the various ridges and elevations in the county, which served as natural corridors. The growth of the county was furthered by the construction of various railroads starting in 1839 with the Bellefontaine & Perrysburg. Numerous other railroads would spring up and continue to be constructed to about 1900. Many of these were local lines but were significant in the economic development and prosperity of the county. The connection to the eastern market economies for the sale and transport of the agricultural products is typically what the smaller communities relied upon. Still, the communities of Findlay and Bluffton tended to be the center of attention and activity. Findlay, being centrally located was an easy choice for the county seat (Beardsley 1881; Brown 1886; Spaythe 1903).

The exploitation of mineral resources in the county happened amidst the Industrial Revolution. It was in the 1880s that oil and gas were discovered, and it has been valuable to the local economy ever since. Agriculture remains a vital source of the local economy to the area. There has been an increase in the development of industrial and business economy throughout the central part of the county and extending to Bluffton due to the accessibility to I-75. This is particularly pronounced around Findlay, Bluffton, and increasingly more to the north. According to the most recent census, the county has over 74,000 inhabitants. There are two primary colleges in the county including Bluffton and Findlay, which contribute to the demographics.

Pleasant Township History

Pleasant Township, originally part of Blanchard Township, was organized on March 2nd, 1835. Located in the northwest corner of Hancock County, the township borders Putnam County to the west, Portage Township, Hancock County, to the east, Blanchard Township, Hancock County, to the south, Liberty Township, Hancock County, to the southeast, Wood County to the north, and Henry County to the northwest (U.S. Census Bureau 2010). Pleasant Township's first Euro-American settlers were men from Fairfield, Hardin, and Franklin Counties, and Washington County (Pennsylvania), all of whom arrived in 1833 (Beardsley 1881).

The township's abundant timber and rich, loamy soil fostered economic incentive, thus further migration. Like most industries of the era, the first and largest establishments were mills: the first was a sawmill on Algire's Run, 1841; a grist mill on Picken's Run, 1845; the first steam-powered sawmill, 1850; and the first steam-powered grist mill, 1857. Pleasant Township was among Hancock County's most prosperous and populated townships thanks to the combination of lucrative farming and timber harvesting. Shortly after organization, Pleasant Township's first

religious organization (Methodists) was founded; services were held in private homes and the schoolhouse (built in 1838) until 1850 with the construction of a church (Beardsley 1881).

Pleasant Township contains two villages: McComb and Shawtown. McComb, platted in 1847 by Franklin County native Benjamin Todd as "Pleasantville," is located approximately 10 miles from Findlay and was renamed in 1858 upon incorporation. The community benefitted from two railroads, the McComb and Deshler Branch of the Dayton and Michigan Railroad, and the New York, Chicago & St. Louis Railroad, previously the Continental Railway. McComb was a bustling economic center comprised of numerous stores, shops, and churches (Beardsley 1881). Shawtown, much smaller than McComb, was platted in 1882 by E.T. Cummins along the abovementioned railroad, preceded a year earlier by a post office. The community's economy was limited to two general stores, a wagon shop, a blacksmith shop, a hoop factory, and a sawmill (Warner, Beers & Co. 1886). Olney was platted by Isaac Fairchild in 1857, however it did not advance beyond this stage (Beardsley 1881).

Portage Township History

Portage Township is located in the northern part of Hancock County. Originally a part of Findlay Township, Portage was officially organized in April of 1833. It was named after Portage River, which flows through the southwest portion of the township. In 1840, its population was 675; 1850, 614; 1860, 835; 1879, 899; and 1880, 914 (Warner, Beers, & Co. 1886).

John Thompson is thought to be the first European settler of Portage, with July 24, 1832, listed as the date he arrived (Warner, Beers, & Co. 1886). A man named Robert Walters shortly followed in the fall of 1833. Before these two men arrived, it is documented that the land was not heavily populated, even as it resided as part of Findlay Township. However, after its organization, Portage saw a swift increase in residence. In 1837, Jacob Andre laid out a village, which he named Lafayette, but according to its history, never grew into a standard village with mills, grocers, and shops. In fact, there is no mention of any of those businesses existing in Portage or if anyone in the township owned and operated such things. In general, it seems that Portage relied on farming and personal trade for sustenance and traveled to nearby townships for other necessities. It is documented that the first school was taught in Benoni Culp's wagon shop. As of 1886, Portage contained six proper school buildings and no other personal shops were mentioned as makeshift gathering centers. Interestingly, it is noted that many of the property-owning men within the township served in positions of power through county government seats (Warner, Beers, & Co. 1886) and in 1857, Portage Centre Post Office was established. As for denominations, there were the Regular Baptists Society; Pleasant Hill Society, for Presbyterians; Ebenezer Society, which blended together with Pleasant Hill Society and became West Union Church of van Buren; United Brethren; and Central Methodist Episcopal Chapel (Warner, Beers, & Co. 1886).

There is little information regarding Portage post-nineteenth century. As of 2010, the population was 692, which was up from 604 in 2000 (U.S. Census Bureau).

Liberty Township History

Liberty Township was established in the year 1823. It is located in the north-central portion of Hancock County. Neighboring townships include Portage to the north, Marion to the east, Eagle to the south and Blanchard to the west. The terrain of Liberty Township is flat. The soil is very fertile and produces an excellent crop. Corn, wheat, pork and oats were the common products (Brown 1886).

Before the arrival of European influence Liberty was populated by dense forests. These were later removed by early pioneers for agricultural and construction purposes. Timber was used to build homes, schools, churches and other various works. The Blanchard River which courses east and west across the township was of great importance. It was a vital resource for not only water but for trade and transportation as well. It wasn't until the year 1830 when a large people immigrated to Liberty Township and populated the area (Brown 1886).

Findlay, the county seat was at the center of progress in Liberty Township. Named after Colonel James Findlay who previously occupied a fort in the area. It celebrated economic success due to its location alongside the Blanchard River, its multitude of professions and fertile soils. Residents found work on farms, mills, a general store and a foundry (Howe 1854).

Religion played an important role in Liberty. The primary form of practice was Presbyterian. Gatherings in the churches allowed for residents to organize community events, discuss local politics and seek spiritual solace. These gatherings were typically held in the homes of residents prior to 1831. The teachings of the church were integrated into school curriculum of the day and public policy (Brown 1886).

Literature Review

The literature review for this project utilized a 305 m (1,000 ft) study area to ensure the identification of all previously recorded resources that may be within the Area of Potential Effect (APE). The literature review inspected SHPO files including Ohio Historic Property Inventory (OHI), National Register of Historic Places (NRHP), Determinations of Eligibility (DOE), Ohio Genealogical Society (OGS) cemeteries, historic atlases, topographic maps, and previously conducted history/architecture surveys to determine the presence of resources located within the APE.

The archival and literature review did not identify any OHIs, NRHP listings, DOEs, OGS cemeteries, nor any previously conducted professional surveys with an architectural component.

Atlas & Cartographic Review

Cartographic/atlas resources were reviewed for the project. Atlas review of Hancock County noted the area is in a rural and sparsely populated setting; there are no communities involved and it does not appear that there are any buildings within or adjacent to the project corridor (Figure 6-7). There are houses and/or farmsteads scattered sparsely through this area (Hardesty 1875). No early USGS 1*5 Minute Series (Topographic)* maps of this area could be located.

APE Definition and Justification

The Area of Potential Effect (APE) is a term that must be applied on an individual project basis. The nature of the project or undertaking is considered when determining the APE. This may include areas containing resources with a direct line of site of the project to determine possible visual impacts. When construction is limited to underground activity, the APE may be contained within the footprint of the project.

The architectural APE for this project is considered what is in view of the transmission line within a 306 m (1,000 ft) intensive survey area but extending to any areas containing significant or potentially eligible resources within view of the project area. Resources slightly outside the intensive survey area were sometimes included when study area boundary divided parcels or buildings under same ownership. Any previously recorded resources within the viewshed were also be included in the field survey results. The APE is limited primarily by arboreal shields and distance.

Architectural Survey Results

Fieldwork confirmed that corridor extends through what is largely very flat, upland lake plain conditions with little to no relief/topography and travels generally in a southwest direction from the Radar Road Station at McComb to the New Liberty Station located to the northwest of the city of Findlay. The area is generally comprised of agricultural land except in the outskirts of McComb and the viewshed is limited primarily by distance, arboreal shields, and buildings (Figures 8-69).

A total of 75 architectural resources 50 years of age or older were identified in the APE (Figures 8-40 and 70-144 Table 1; Appendix A). Building types and styles are consistent with patterns of settlement in the area. Most of the resources are vernacular exhibiting no academic style. The resources are primarily single-family residences dating from the mid-to-late-19th century to 1972. Outbuildings, sheds, and other dependencies were not included in the field survey results unless they exhibited potential for listing in the NRHP.

Three of the resources were sufficiently inside the project area so they were recorded and entered into the Ohio Historic Inventory (Figures 10-11, 15, 22-24, 92, 119, 127; Table 1; Appendix A).

None of the resources in the APE were found to be associated with significant events, patterns of events, or individuals in a manner necessary for inclusion in the NRHP under Criterion A or B. The buildings are typical of others in the area and throughout Ohio, are not the works of a master, and do not exhibit distinctive character-defining features; therefore, the resources are not eligible for inclusion in the NRHP under Criterion C.

Table 1. Field Survey Results

Resource	County	Figure #	Location	Date	Style	Type	NRHP Status
S-1	Hancock	8, 70	3536 CR-126, McComb	c. 1890	Queen Anne	Irregular	Not Eligible
S-2	Hancock	8, 71	3655 CR-126, McComb	1963	Vernacular	Ranch	Not Eligible
S-3	Hancock	8-9, 72	3673 CR-126, McComb	1957	Vernacular	Ranch	Not Eligible

S-4	Hancock	9, 73	312 Rader Road, McComb	1972	International Elements	Commercial	Not Eligible
S-5	Hancock	9, 74	432 Maple Street, McComb	c. 1890	Vernacular	Side-Gable	Not Eligible
S-6	Hancock	9-10, 75	432 Maple Street, McComb	c. 1890	Vernacular	Upright w/ wing	Not Eligible
S-7	Hancock	9-10, 76	0 Maple Street, McComb	c. 1950	Vernacular	Garage	Not Eligible
S-8	Hancock	9-10, 77	436 Maple Street, McComb	c. 1890	Vernacular	Front-Gable	Not Eligible
S-9	Hancock	9-10, 78	0 Maple Street, McComb	1969	Vernacular	Garage	Not Eligible
S-10	Hancock	9-10, 79	504 Maple Street, McComb	c. 1890	Vernacular	Gabled Ell	Not Eligible
S-11	Hancock	9-10, 80	419 Pleasant Street, McComb	c. 1920	Vernacular	T-Plan	Not Eligible
S-12	Hancock	9-10, 81	413 Scott Street, McComb	1950	Vernacular	Ranch	Not Eligible
S-13	Hancock	9-10, 82	405 Scott Street, McComb	1954	Vernacular	Ranch	Not Eligible
S-14	Hancock	9-10, 83	136 W. Oliver Street, McComb	1965	Vernacular	Minimal Traditional	Not Eligible
S-15	Hancock	9-10, 84	140 W. Oliver Street, McComb	1962	Vernacular	Ranch	Not Eligible
S-16	Hancock	9-10, 85	203 Scott Street, McComb	1930	Vernacular	Front-Gable	Not Eligible
S-17	Hancock	10, 86	318 N. Todd Street, McComb	1971	Vernacular	Ranch	Not Eligible
S-18	Hancock	10, 87	322 N. Todd Street, McComb	1972	Vernacular	Ranch	Not Eligible
S-19	Hancock	10, 88	326 N. Todd Street, McComb	1972	Vernacular	Ranch	Not Eligible
S-20	Hancock	10-11, 89	330 N. Todd Street, McComb	1972	Vernacular	Ranch	Not Eligible
S-21	Hancock	10-11, 90	334 N. Todd Street, McComb	1972	Vernacular	Ranch	Not Eligible
S-22	Hancock	10-11, 91	338 N. Todd Street, McComb	1972	Vernacular	Ranch	Not Eligible
S-23/ HAN0073301	Hancock	10-11, 92	352 N. Todd Street, McComb	1972	Vernacular	Ranch	Not Eligible
S-24	Hancock	10-11, 93	106 N. Meadow Drive, McComb	1972	Vernacular	Ranch	Not Eligible
S-25	Hancock	10, 94	325 N. Todd Street, McComb	1972	Vernacular	Ranch	Not Eligible
S-26	Hancock	10, 95	333 E. Meadow Drive, McComb	1972	Vernacular	Ranch	Not Eligible
S-27	Hancock	10, 96	319 N. Todd Street, McComb	1972	Vernacular	Ranch	Not Eligible
S-28	Hancock	10, 97	204 E. Oliver Street	c. 1890	Vernacular	Gabled Ell	Not Eligible
S-29	Hancock	10, 98	212 E. Oliver Street	c. 1920	Vernacular	Front-Gable	Not Eligible
S-30	Hancock	10, 99	224 E. Oliver Street	c. 1890	Vernacular	Gabled Ell	Not Eligible
S-31	Hancock	10, 100	304 E. Oliver Street	c. 1890	Vernacular	Gabled Ell	Not Eligible
S-32	Hancock	10, 13,101	316 E. Oliver Street	1904	Vernacular	Front-Gable	Not Eligible
S-33	Hancock	10, 13, 102	336 E. Oliver Street	1966	Vernacular	Raised Ranch	Not Eligible
S-34	Hancock	10, 13, 103	354 E. Oliver Street	1969	Vernacular	Ranch	Not Eligible
S-35	Hancock	10, 13, 104	404 E. Oliver Street	c. 1895	Vernacular	Cross-Hipped	Not Eligible
S-36	Hancock	13, 105	335 Park Drive, McComb	c. 1910	Vernacular	Side-Gable	Not Eligible
S-37	Hancock	13, 106	328 Park Drive, McComb	c. 1890	Vernacular	Upright w/ wing	Not Eligible
S-38	Hancock	13, 107	336 Park Drive, McComb	1964	Vernacular	Ranch	Not Eligible
S-39	Hancock	11, 13,108	344 Park Drive, McComb	1964	Vernacular	Ranch	Not Eligible
S-40	Hancock	13, 109	327 Park Drive, McComb	c. 1910	Vernacular	Massed-plan Hipped	Not Eligible
S-41	Hancock	13, 110	321 Park Drive, McComb	c. 1920	Vernacular	T-Plan	Not Eligible
S-42	Hancock	13, 111	231 Park Drive, McComb	c. 1890	Vernacular	Front-Gable	Not Eligible
S-43	Hancock	13, 112	5081 SR-613, McComb	c. 1950	Vernacular	Commercial	Not Eligible
S-44	Hancock	13, 113	5081 SR-613, McComb	c. 1900	Vernacular	Front-Gable	Not Eligible
S-45	Hancock	13, 114	5092 SR-613, McComb	c. 1960	Vernacular	Front-Gable	Not Eligible
S-46	Hancock	13, 115	5118 SR-613, McComb	1946	Vernacular	False Front	Not Eligible
S-47	Hancock	13, 116	5130 SR-613, McComb	c. 1890	Vernacular	Front-Gable	Not Eligible
S-48	Hancock	13, 117	5164 SR-613, McComb	c. 1890	Vernacular	Massed-plan Hipped	Not Eligible
S-49	Hancock	13-14, 118	5297 SR-613, McComb	1963	Vernacular	Commercial	Not Eligible
S-50/ HAN0073401	Hancock	15, 119	5081 SR-613, McComb	1947	Vernacular	Quonset	Not Eligible
S-51	Hancock	15, 120	5389 SR-613, McComb	c. 1865	Italianate	Hipped	Not Eligible
S-52	Hancock	15, 121	5389 SR-613, McComb	c. 1950	Vernacular	Garage	Not Eligible
S-53	Hancock	15, 122	5582 SR-613, McComb	c. 1940	Vernacular	Minimal Traditional	Not Eligible
S-54	Hancock	15, 123	5582 SR-613, McComb	c. 1955	Vernacular	Side-Gable	Not Eligible
S-55	Hancock	15, 124	5582 SR-613, McComb	c, 1955	Vernacular	Garage	Not Eligible
S-56	Hancock	22, 125	6361 CR-97, McComb	c. 1900	Vernacular	Barn	Not Eligible
S-57	Hancock	22, 126	6361 CR-97, McComb	c. 1920	Vernacular	Bungalow	Not Eligible

S-58/ HAN0073502	Hancock	22-24, 127	6681 CR-97, McComb	c, 1890	Vernacular	Front-Gable	Not Eligible
S-59	Hancock	23, 128	6884 CR-97, McComb	1958	Vernacular	Barn	Not Eligible
S-60	Hancock	23, 129	CR-97 at TR-135, McComb	c. 1840	Vernacular	Schoolhouse	Not Eligible
S-61	Hancock	24, 130	5234 TR-135, McComb	c. 1890	Vernacular	Front-Gable	Not Eligible
S-62	Hancock	34-35, 131	8676 TR-95, Findlay	c. 1910	Vernacular	Hipped	Not Eligible
S-63	Hancock	34-36, 132	8765 TR-95, Findlay	1968	Contemporary Elements	Ranch	Not Eligible
S-64	Hancock	37, 133	6788 CR-139, Findlay	c. 1950	Vernacular	Barn	Not Eligible
S-65	Hancock	37, 134	6788 CR-139, Findlay	1867	Vernacular	Front-Gable	Not Eligible
S-66	Hancock	37, 135	6843 CR-139, Findlay	c. 1890	Vernacular	Gabled Ell	Not Eligible
S-67	Hancock	37-38, 136	8922 TR-94, Findlay	1969	Vernacular	Ranch	Not Eligible
S-68	Hancock	37-38, 137	9250 TR-94, Findlay	c. 1950	Vernacular	Barn Conversion	Not Eligible
S-69	Hancock	38, 138	7037 CR-139, Findlay	1966	Vernacular	Ranch	Not Eligible
S-70	Hancock	38, 139	9147 TR-94, Findlay	1968	Vernacular	Ranch	Not Eligible
S-71	Hancock	38, 140	9257 TR-94, Findlay	1972	Vernacular	Ranch	Not Eligible
S-72	Hancock	38-40, 141	9303 TR-94, Findlay	1964	Vernacular	Ranch	Not Eligible
S-73	Hancock	40, 142	9430 TR-94, Findlay	c. 1950	Vernacular	Massed-plan Hipped	Not Eligible
S-74	Hancock	40, 143	9430 TR-94, Findlay	1960	Vernacular	Garage	Not Eligible
S-75	Hancock	40, 144	9430 TR-94, Findlay	c. 1940	Vernacular	Granary/Crib	Not Eligible

S-23/ HAN0073301

Location: Universal Transverse Mercator (UTM), Zone 17N, 265563 Easting 4554863 Northing, 352 N. Todd Street, McComb, Ohio

Quadrangle: McComb, OH

Construction Date: 1972

Description: The S-11/ SEN0131110 resource is a four-bay, side-gable ranch (Figures 10-11, 92; Table 1; Appendix A). The roof is covered in asphalt shingles and the exterior walls are clad in vinyl siding. The windows are modern replacements and flanked by vinyl shutters. The front door hangs off-center behind a glass storm door. There is an integrated garage at the south end of the building.

The house is situated approximately 35 feet west of N. Todd Street in McComb on a quarter-acre lot facing east.

History: The Hancock County Auditor's Office indicates that the house was built in 1972.

NRHP Evaluation: The S-23/ HAN0073301 resource was not found to be associated with significant events, patterns of events, or individuals in a manner necessary for inclusion in the NRHP under Criterion A or B. The building is typical of others in the area and throughout Ohio, is not the work of a master, and does not exhibit distinctive character-defining features; therefore, the resource is not eligible for inclusion in the NRHP under Criterion C.

S-50/ HAN0073401

Location: Universal Transverse Mercator (UTM), Zone 17N, 266771 Easting 4554667 Northing, 5360 SR-613 (approx), McComb, Ohio

Quadrangle: McComb, OH

Construction Date: 1947

Description: The S-50/ HAN0073401 resource is a metal Quonset hut (Figures 15, 119; Table 1; Appendix A). There are three mushroom vents equally on top of the structure. A man door and a large sliding door are at the east elevation. The paint has failed and the metal cladding is showing signs of oxidation.

The building is situated approximately 30 feet north of SR-163 on a 3-acre parcel. Tall grass and bushes are growing around and it does not appear to be in use.

History: The Hancock County Auditor's Office indicates that the structure was built in 1947. This date is feasible as many Quonset huts were military surplus and sold by the US government to civilians after WWII.

NRHP Evaluation: The S-50/ HAN0073401 resource was not found to be associated with significant events, patterns of events, or individuals in a manner necessary for inclusion in the NRHP under Criterion A or B. The building is typical of others in the area and throughout Ohio, is not the work of a master, and does not exhibit distinctive character-defining features; therefore, the resource is not eligible for inclusion in the NRHP under Criterion C.

S-58/ HAN0073502

Location: Universal Transverse Mercator (UTM), Zone 17N, 268871 Easting 4552756 Northing, 6681 CR-97, McComb, Ohio

Quadrangle: McComb, OH

Construction Date: c. 1880

Description: The S-58/ HAN0073502 resource is a one and half-story, two-bay, gable-front house (Figures 22-24, 127; Table 1; Appendix A). The roof is covered in modern standing seam metal and the exterior walls are clad in vinyl siding. The windows are modern replacements flanked by vinyl shutters. The house has several additions to the rear including a garage. The paneled front door hangs center behind a wooden screen door. There is an exterior brick chimney at the rear (south) elevation.

The house is situated near the northeast corner of a 70-acre parcel and approximately 50 feet south of CR-97 in Portage Township. The house is surrounded by a lawn and mature deciduous and conifer trees.

History: There are no buildings at this location on Hardesty's 1875 *Atlas of Hancock County* and the land was owned at that time by A. Morehead. The Hancock County Auditor's Office indicates that the house was constructed in 1880 which is feasible because this vernacular house form was being widely constructed by that time.

NRHP Evaluation: The S-58/ HAN0073502 resource was not found to be associated with significant events, patterns of events, or individuals in a manner necessary for inclusion in the NRHP under Criterion A or B. The building is typical of others in the area and throughout Ohio, is not the work of a master, and does not exhibit distinctive character-defining features; therefore, the resource is not eligible for inclusion in the NRHP under Criterion C.

Conclusions

In March and April of 2022, Weller & Associates, Inc. conducted History/Architecture Investigations for the 11.3 km (7 mi) Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio. The work was conducted under contract with American Electric Power (AEP) for submittal to the Ohio Power Siting Board (OPSB) and will be coordinated for Ohio History Connection (OHC) review. The report was conducted in accordance with the Ohio Historic Preservation Office (OHPO) History/Architecture Guidelines (2014) and prepared in a manner that is suitable for review regarding Section 106 of the National Historic Preservation Act of 1966, as amended (54 U.S.C. 306108 [36 CFR 800]).

The archival and literature review did not identify any OHIs, NRHP listings, DOEs, OGS cemeteries, nor any previously conducted professional surveys with an architectural component.

A total of 75 architectural resources 50 years of age or older were identified in the APE. Building types and styles are consistent with patterns of settlement in the area. Most of the resources are vernacular exhibiting no academic style. The resources are primarily single-family residences dating from the mid-to-late-19th century to 1972.

None of the resources in the APE were found to be significant in a manner necessary for inclusion in the NRHP. Weller concludes a finding of 'no historic properties affected.' No further architectural work is considered necessary.

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Figures

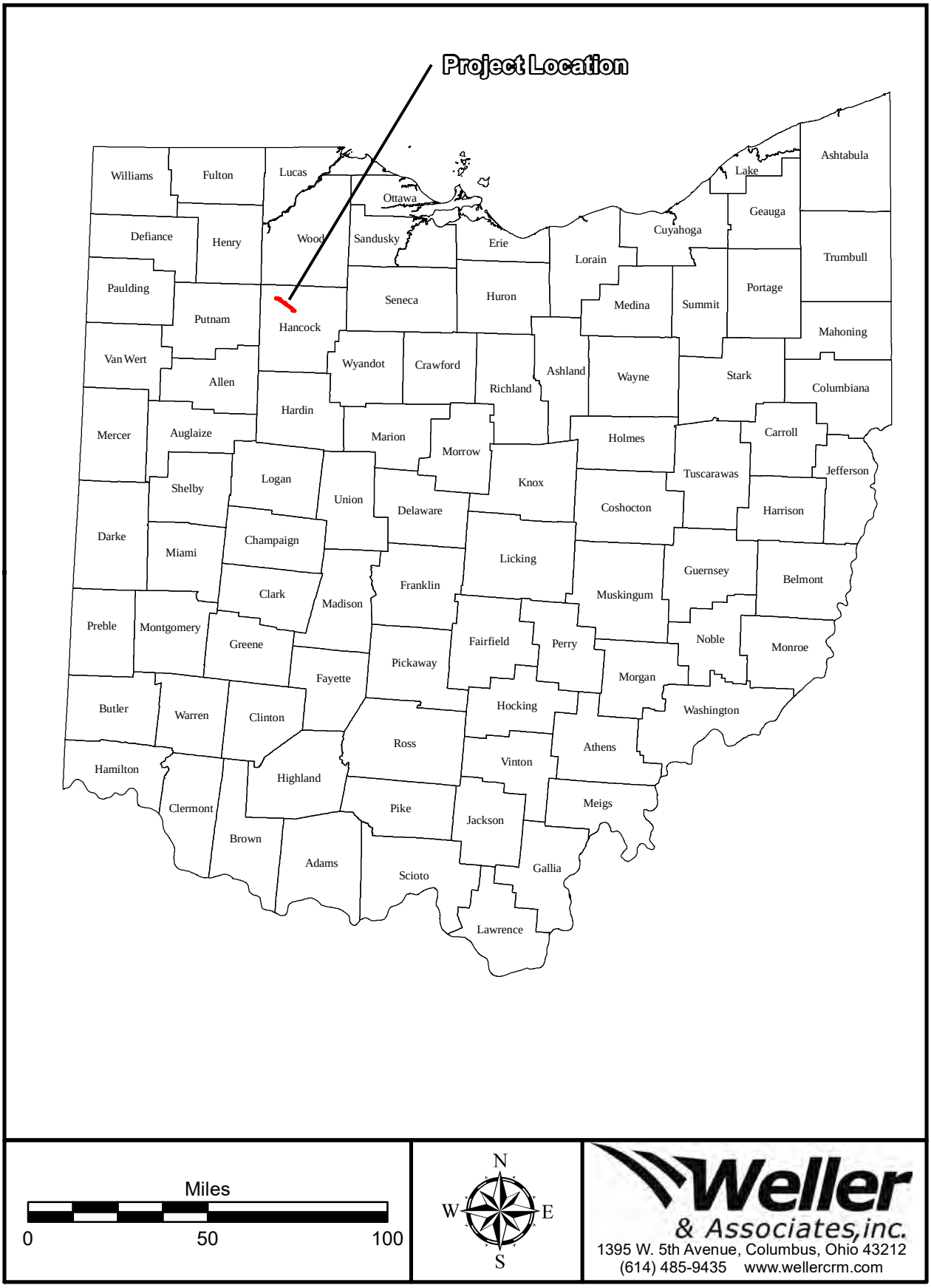


Figure 1. Political map of Ohio showing the approximate location of the project.

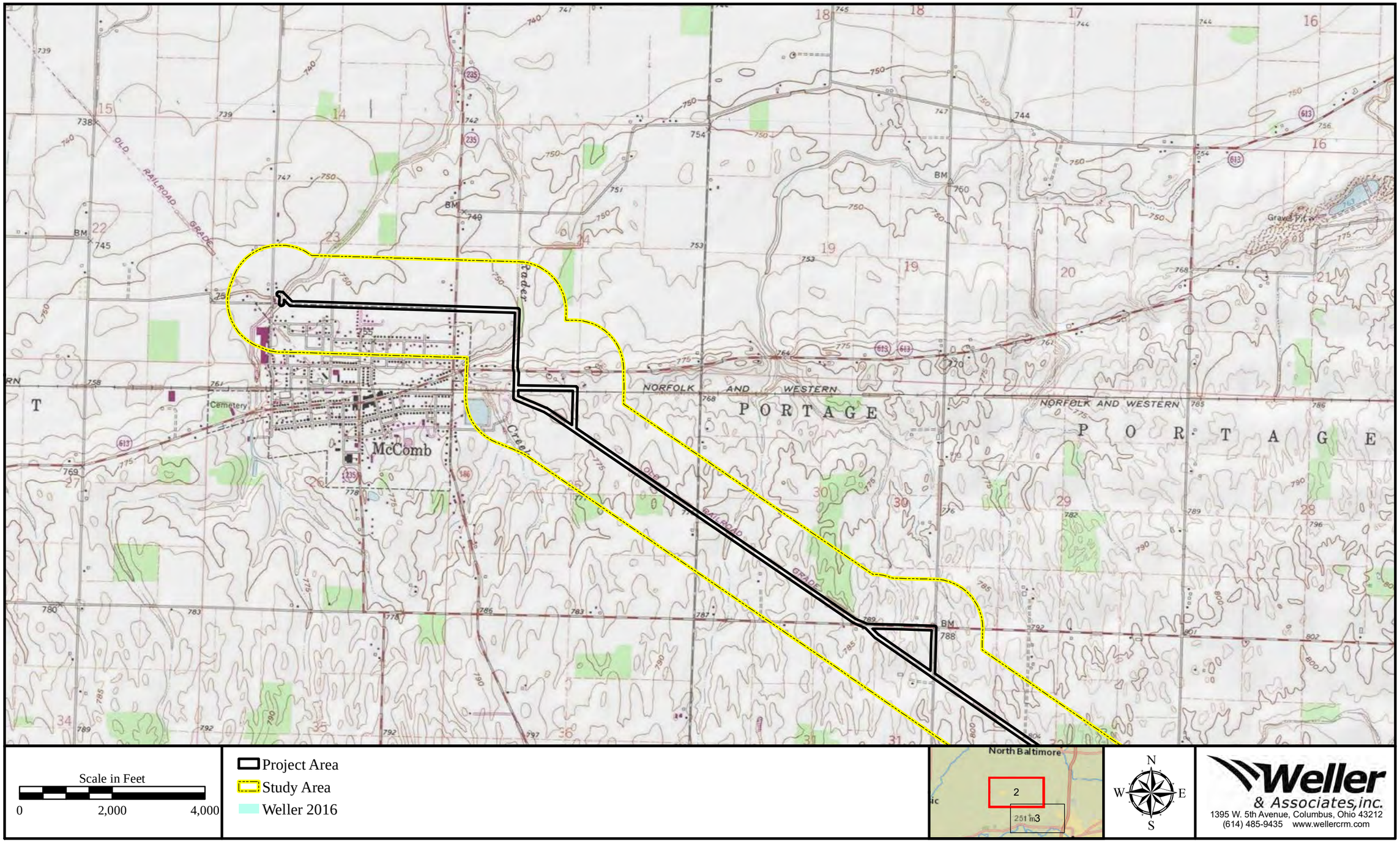


Figure 2. Portions of the USGS *1974 McComb, and 1980 Findlay, Ohio 7.5 Minute Series (Topographic)* maps indicating the location of the project and recorded resources within the project area.

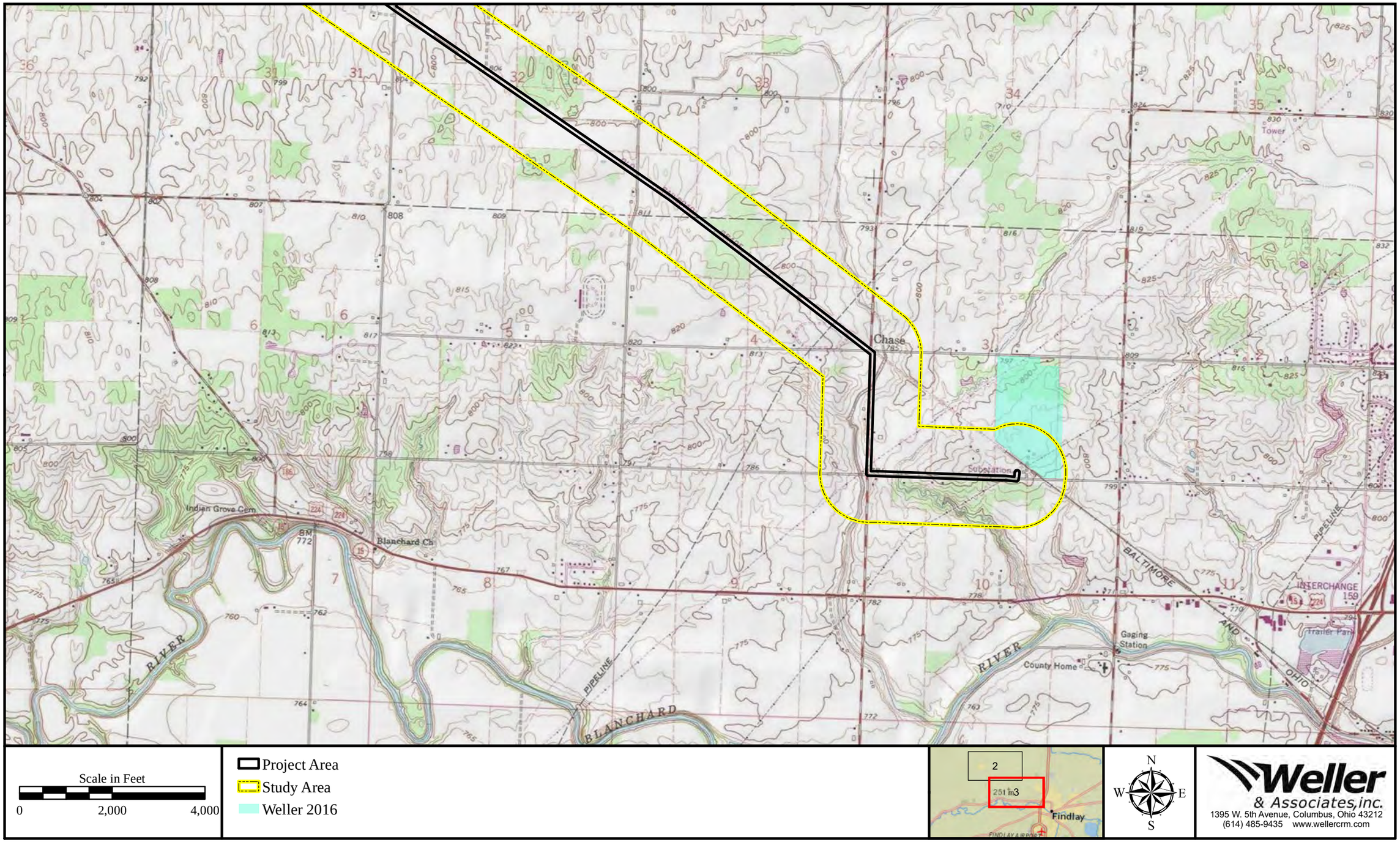


Figure 3. Portions of the USGS *1974 McComb, and 1980 Findlay, Ohio 7.5 Minute Series (Topographic)* maps indicating the location of the project and recorded resources within the project area.

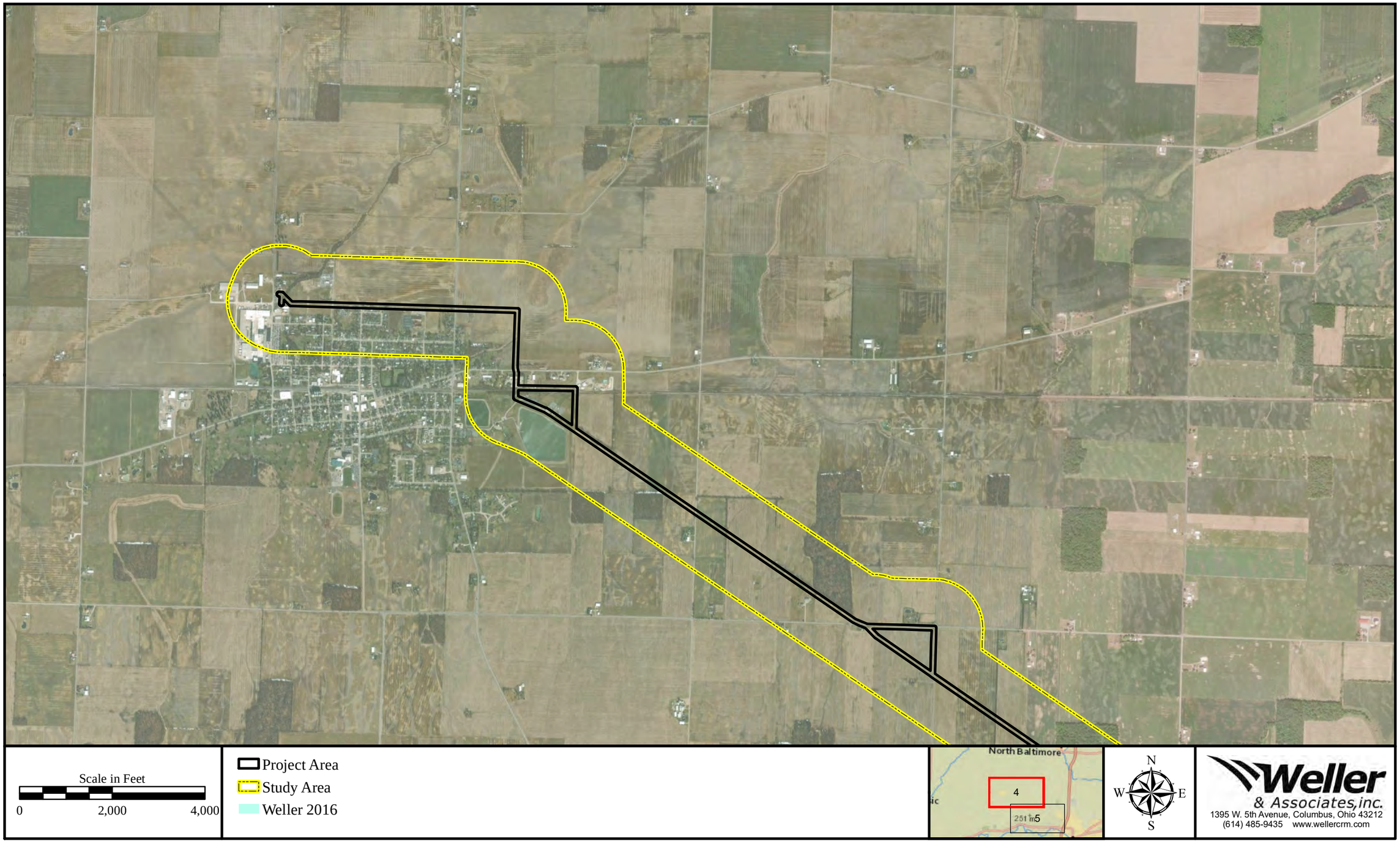


Figure 4. Aerial map indicating the location of the project area and recorded resources within the study area.

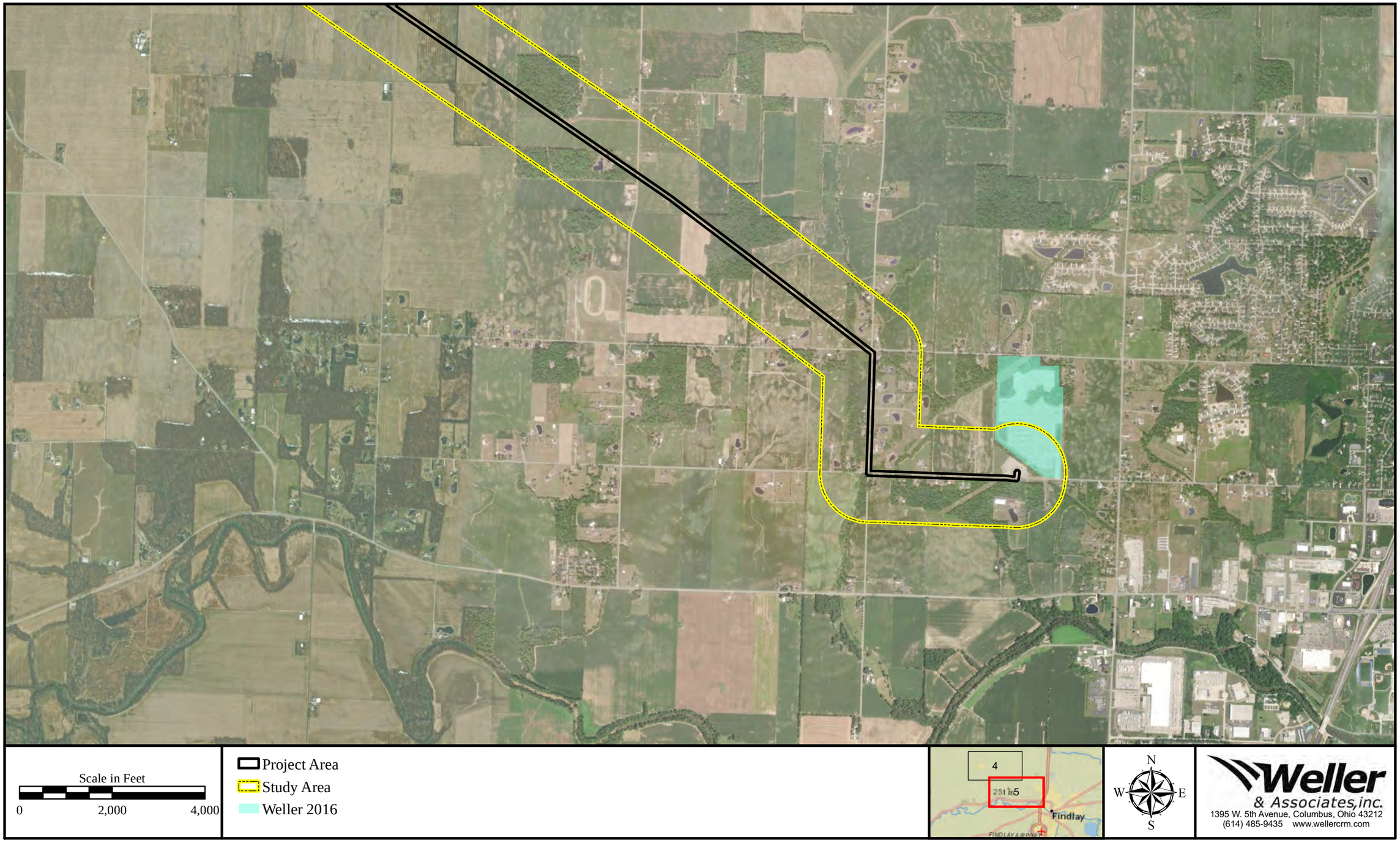


Figure 5. Aerial map indicating the location of the project area and recorded resources within the study area.

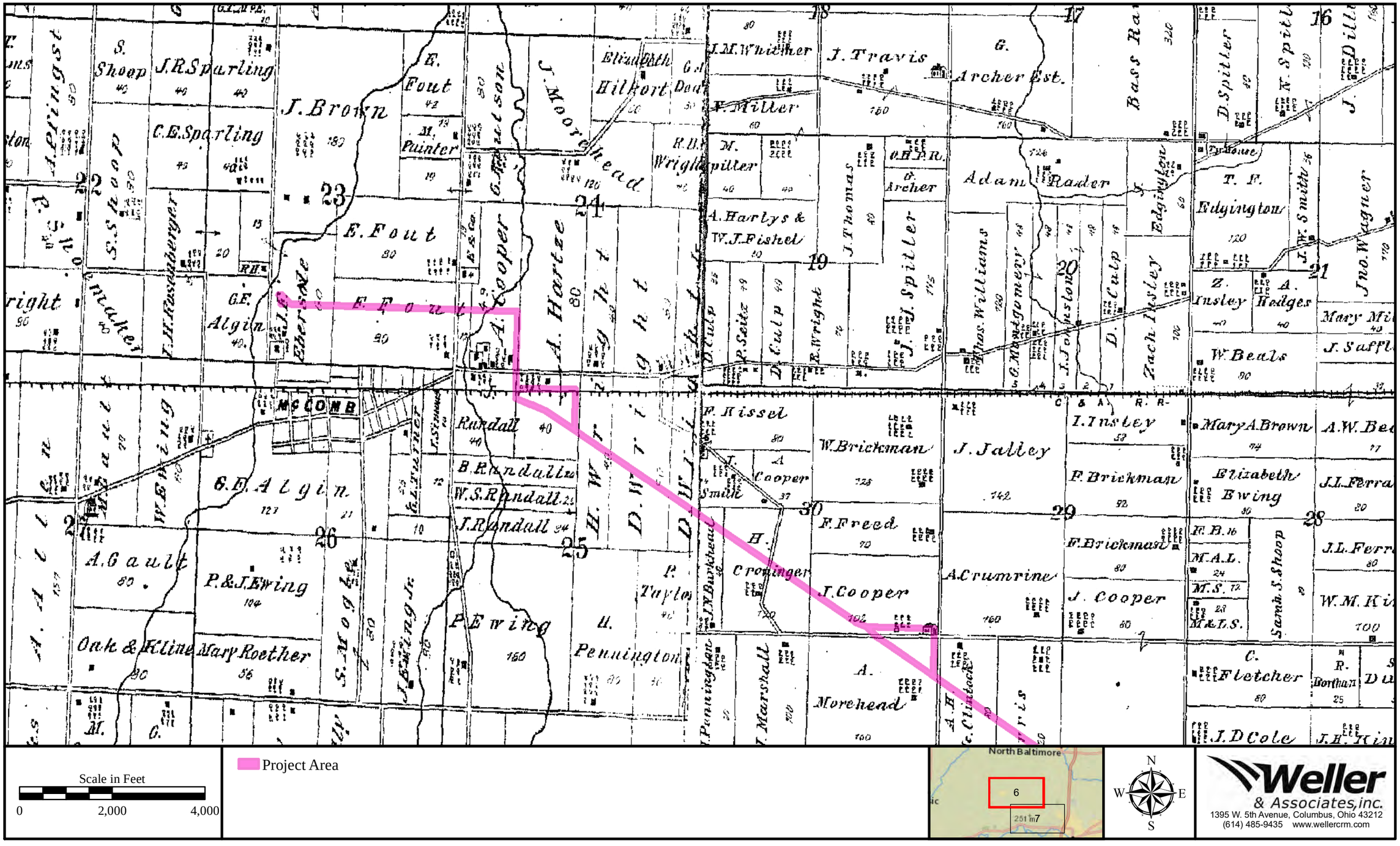


Figure 6. Portion of the USGS *Atlas of Hancock County, Ohio* (Hardesty 1875) indicating the approximate location of the project.

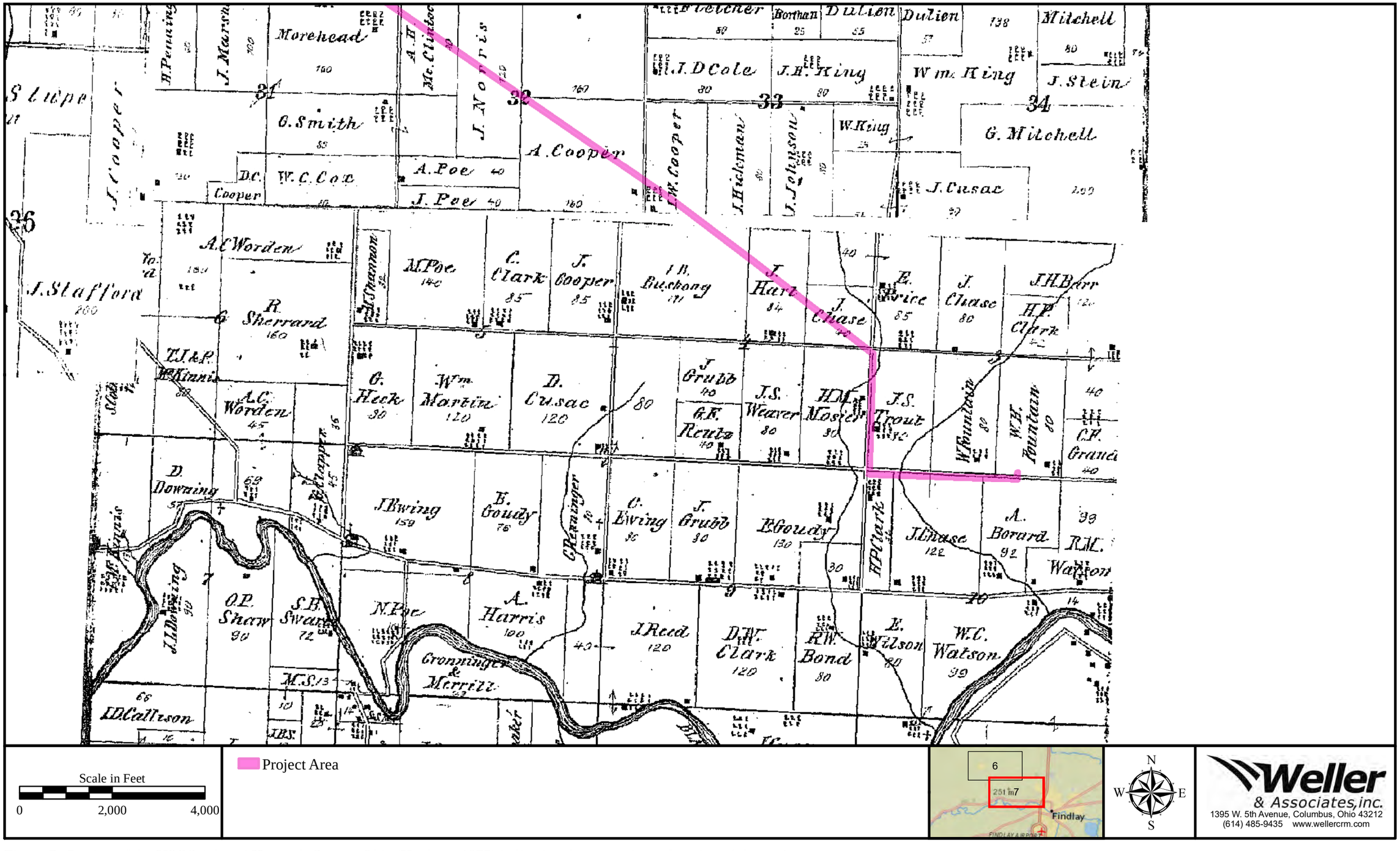


Figure 7. Portion of the USGS *Atlas of Hancock County, Ohio* (Hardesty 1875) indicating the approximate location of the project.

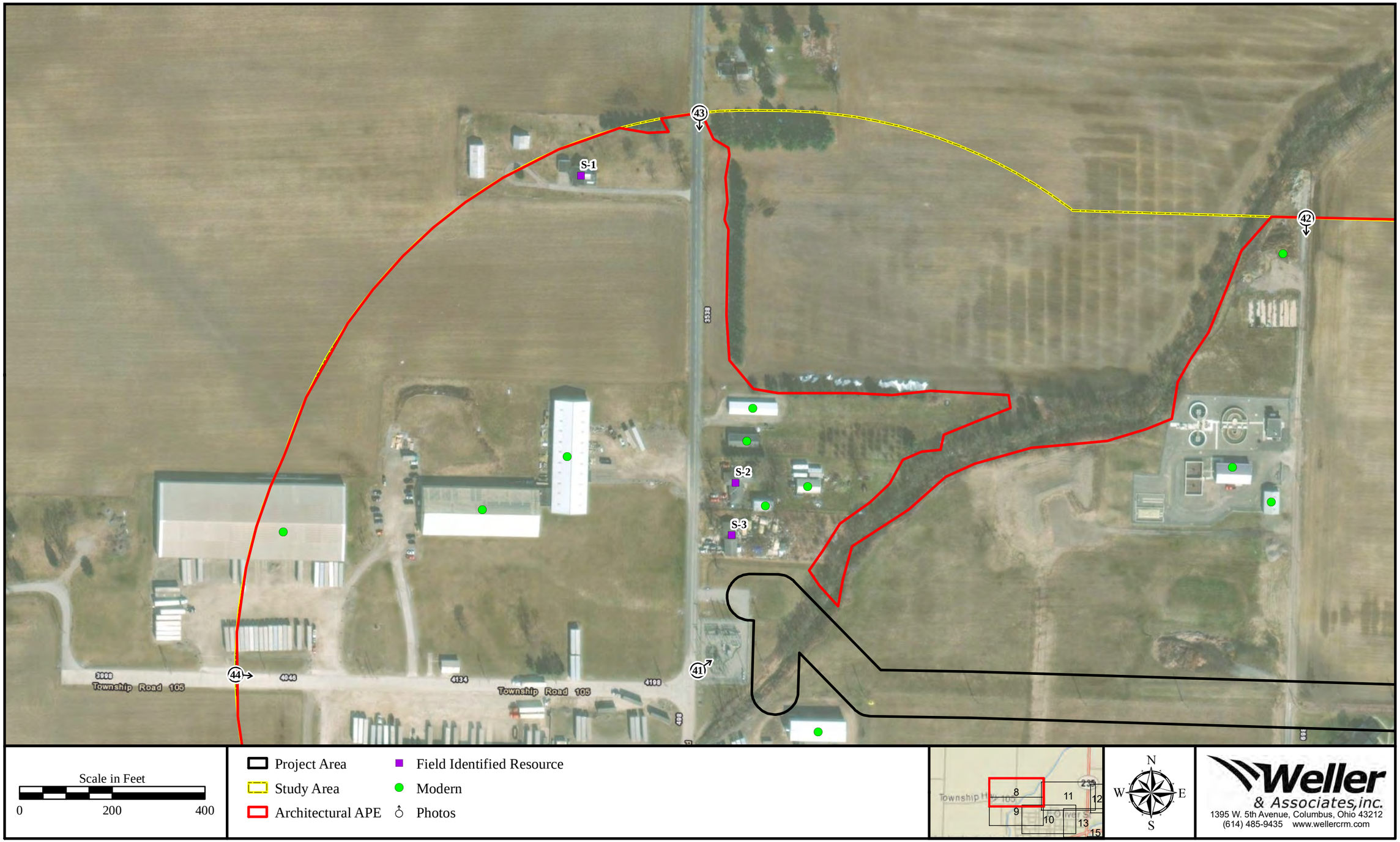


Figure 8. Architectural fieldwork results and photo orientation map.

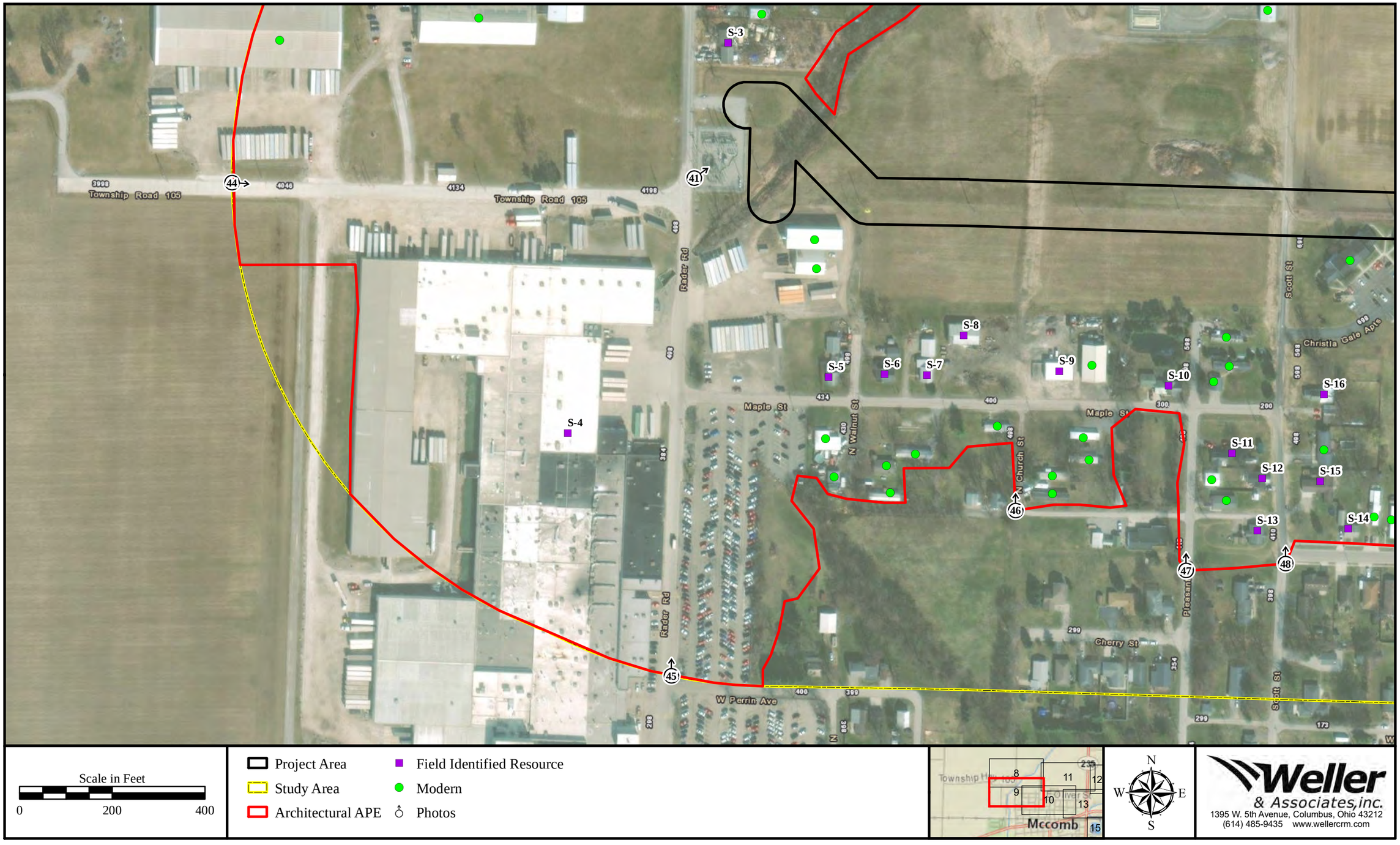


Figure 9. Architectural fieldwork results and photo orientation map.

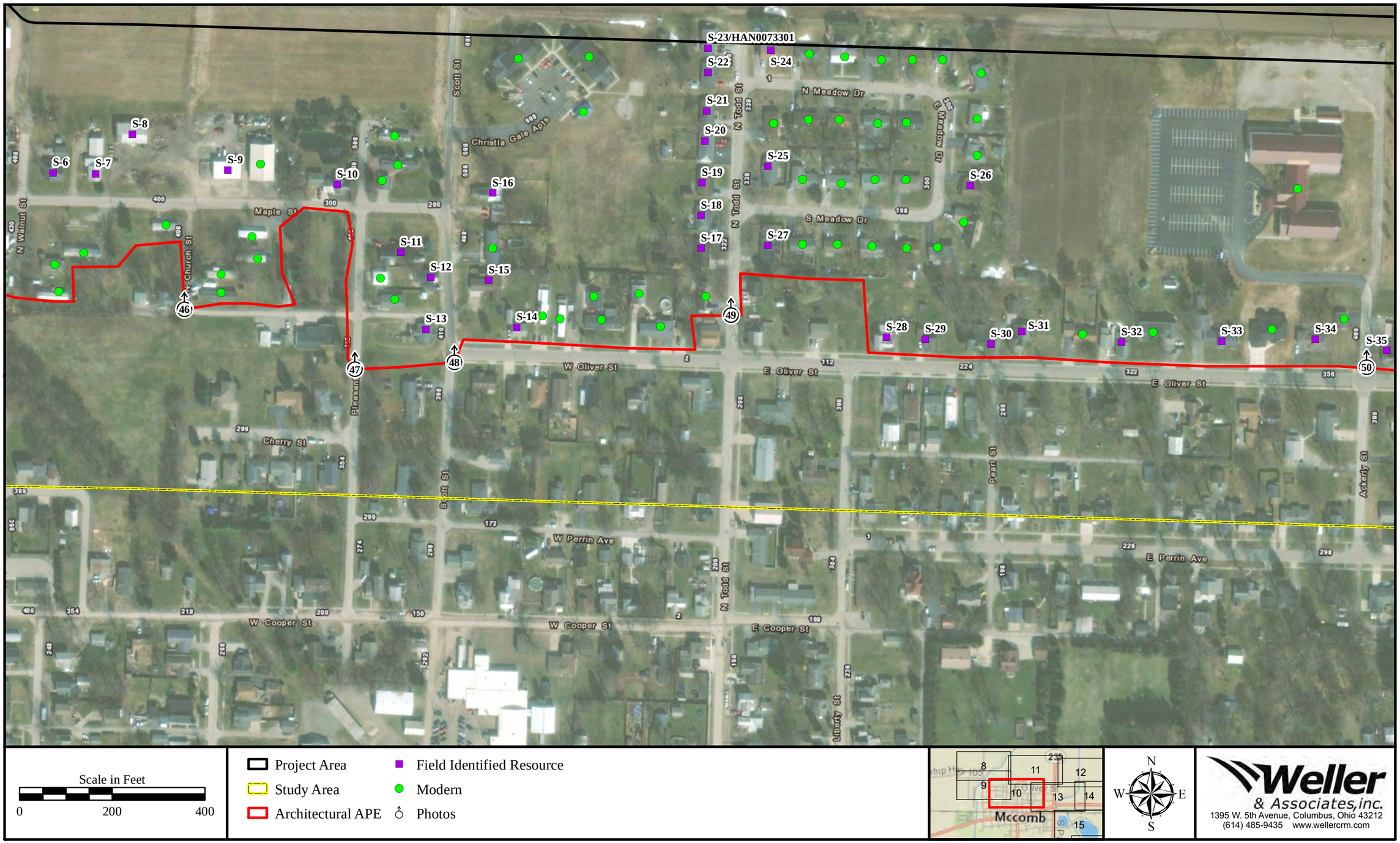


Figure 10. Architectural fieldwork results and photo orientation map.

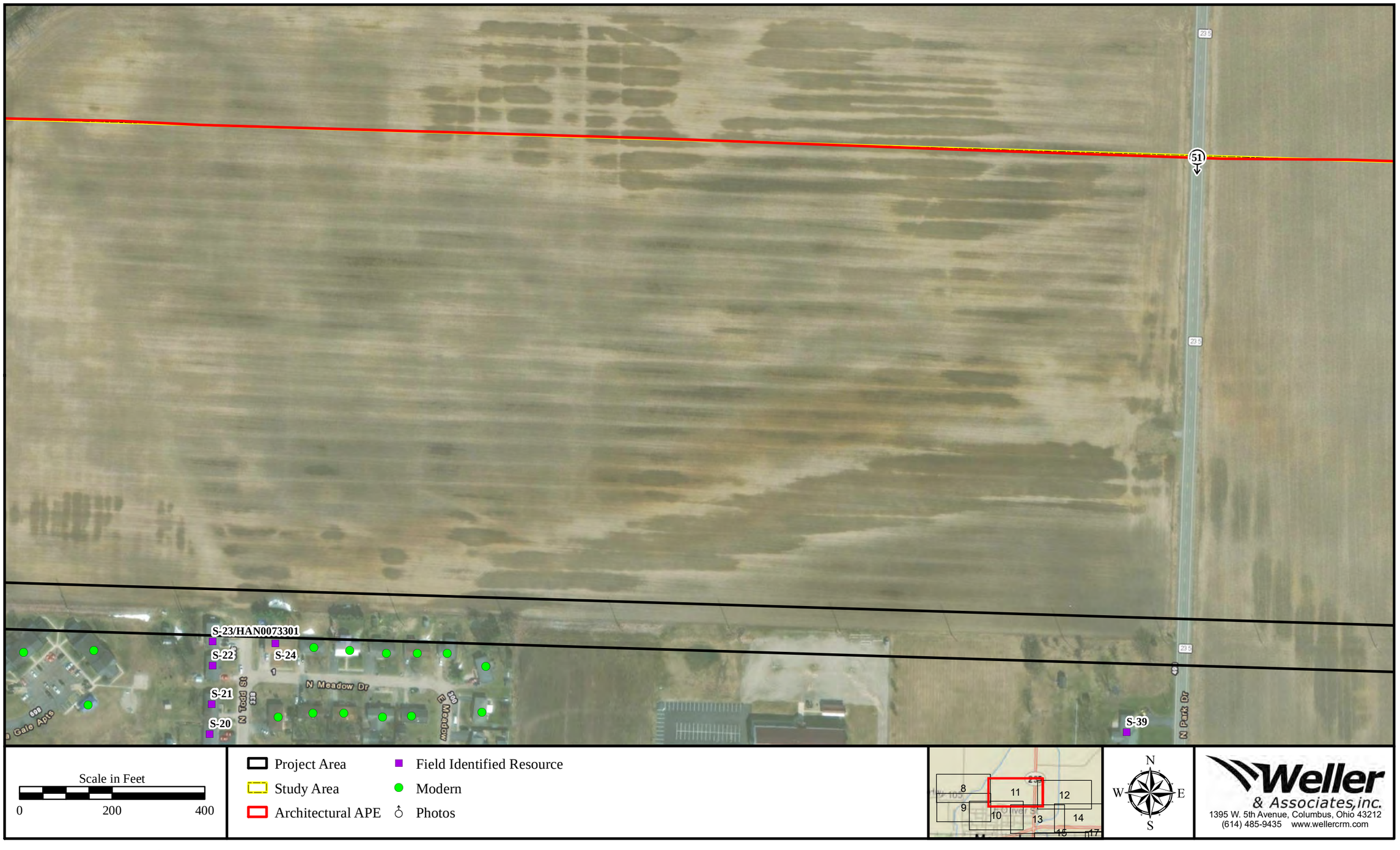


Figure 11. Architectural fieldwork results and photo orientation map.

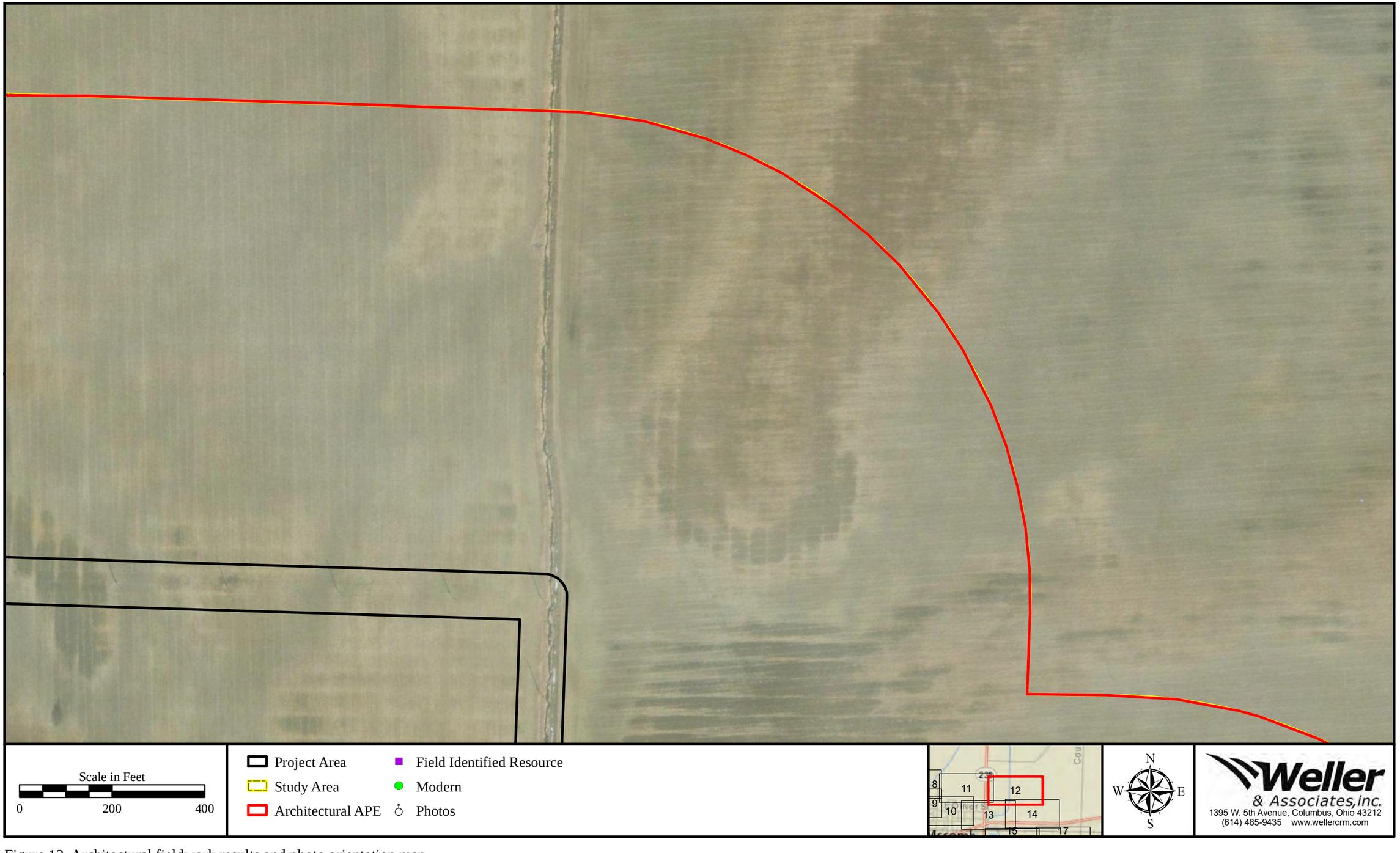


Figure 12. Architectural fieldwork results and photo orientation map.

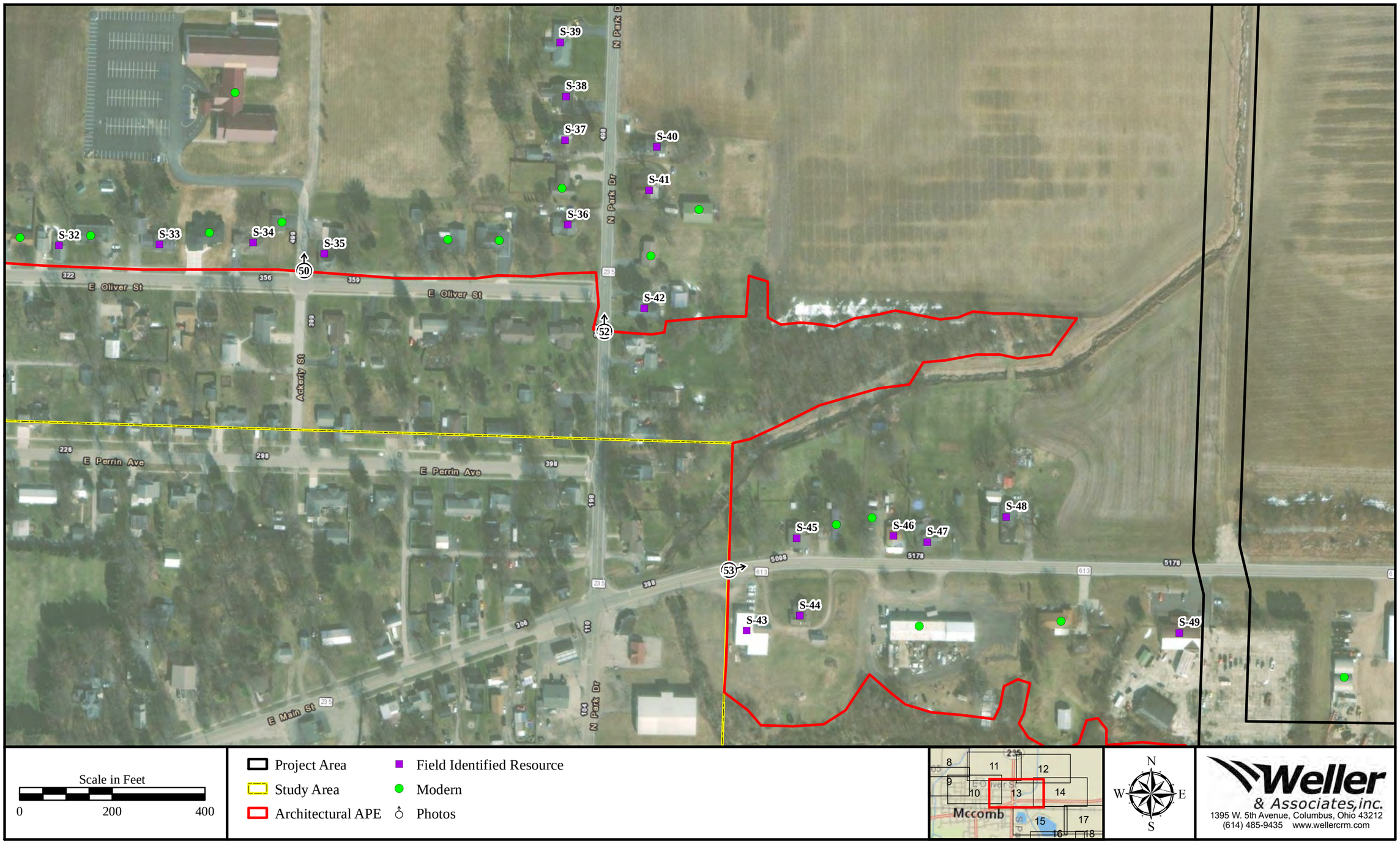


Figure 13. Architectural fieldwork results and photo orientation map.

Figure 14. Architectural fieldwork results and photo orientation map.

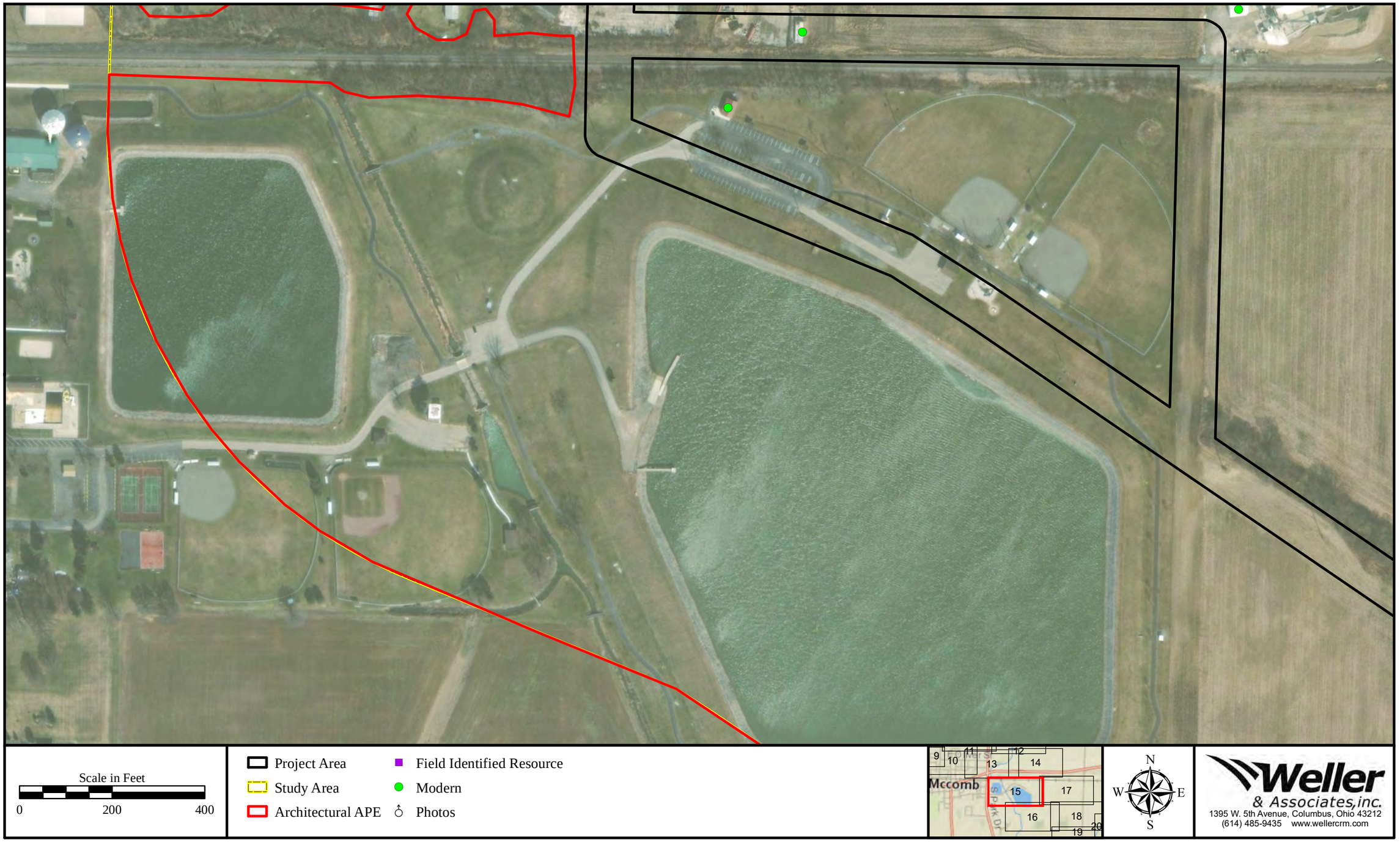


Figure 15. Architectural fieldwork results and photo orientation map.

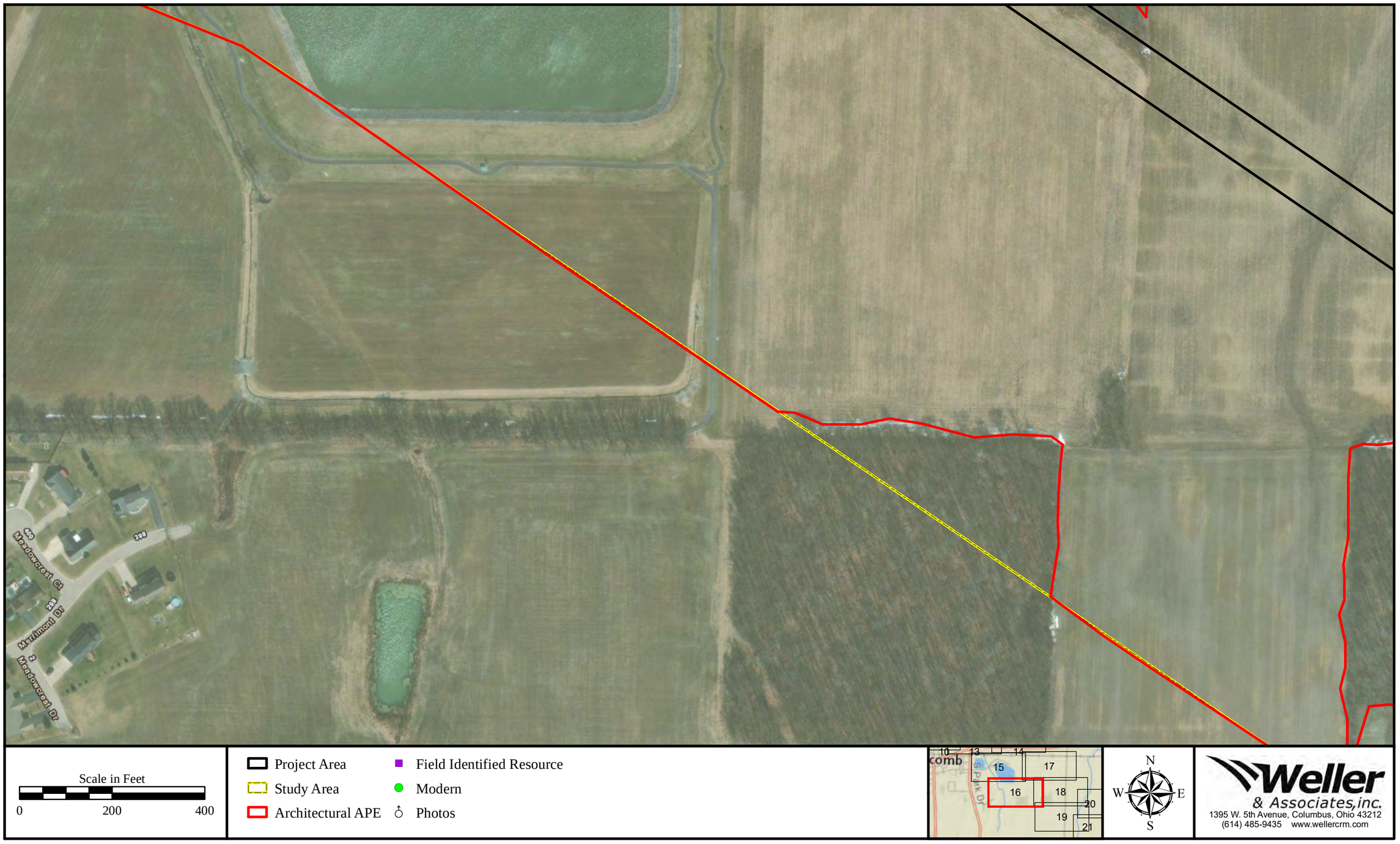


Figure 16. Architectural fieldwork results and photo orientation map.

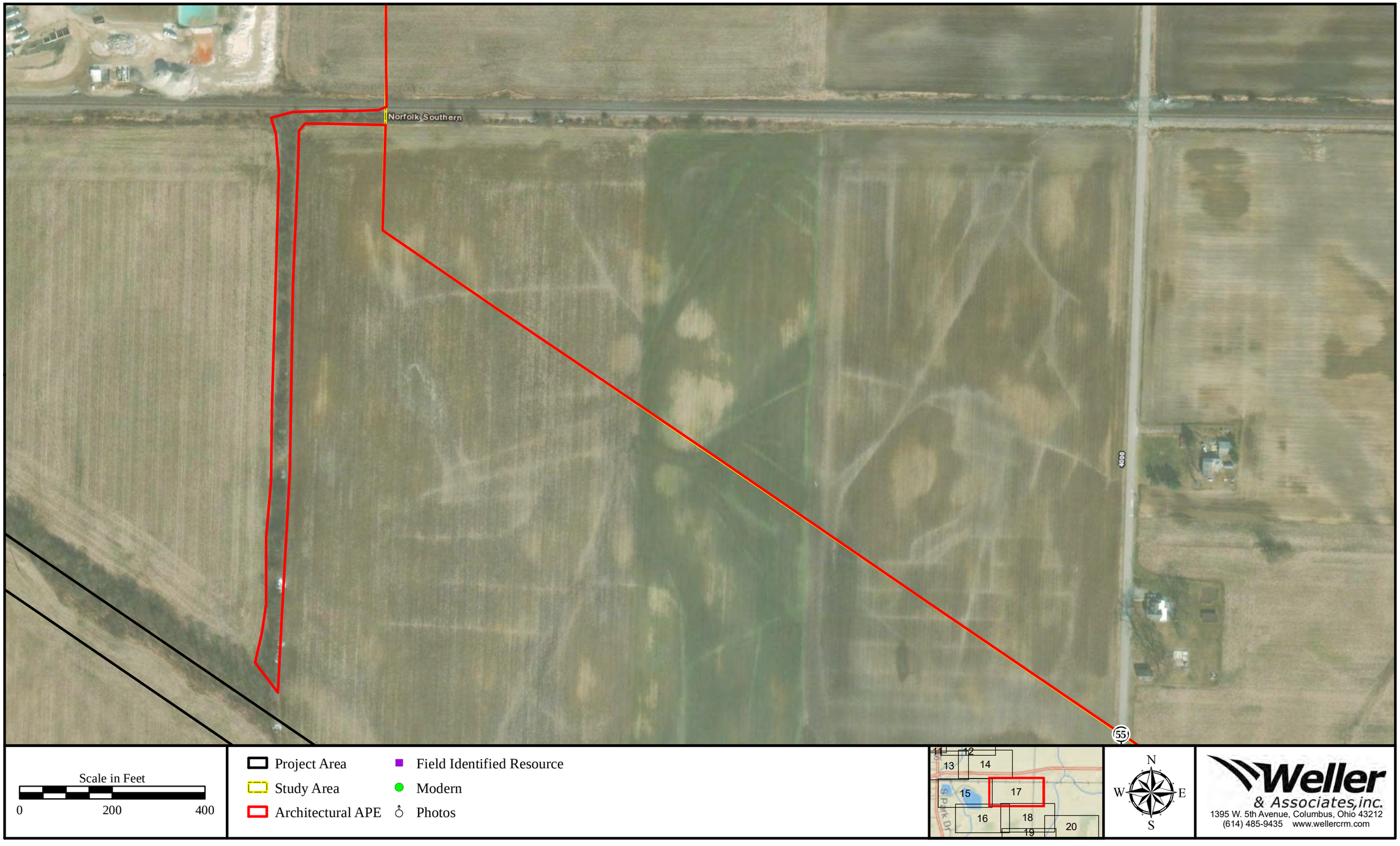


Figure 17. Architectural fieldwork results and photo orientation map.

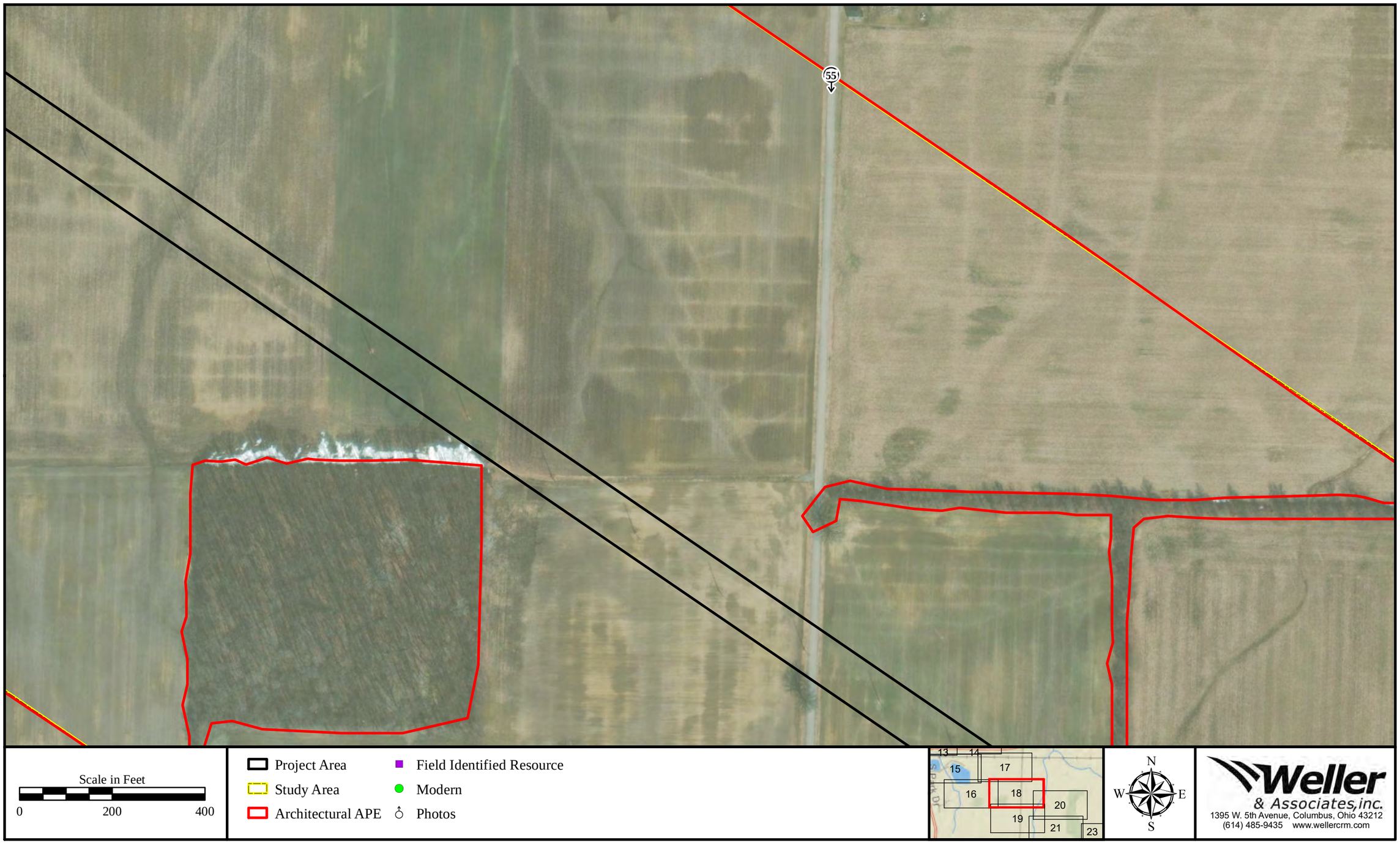


Figure 18. Architectural fieldwork results and photo orientation map.

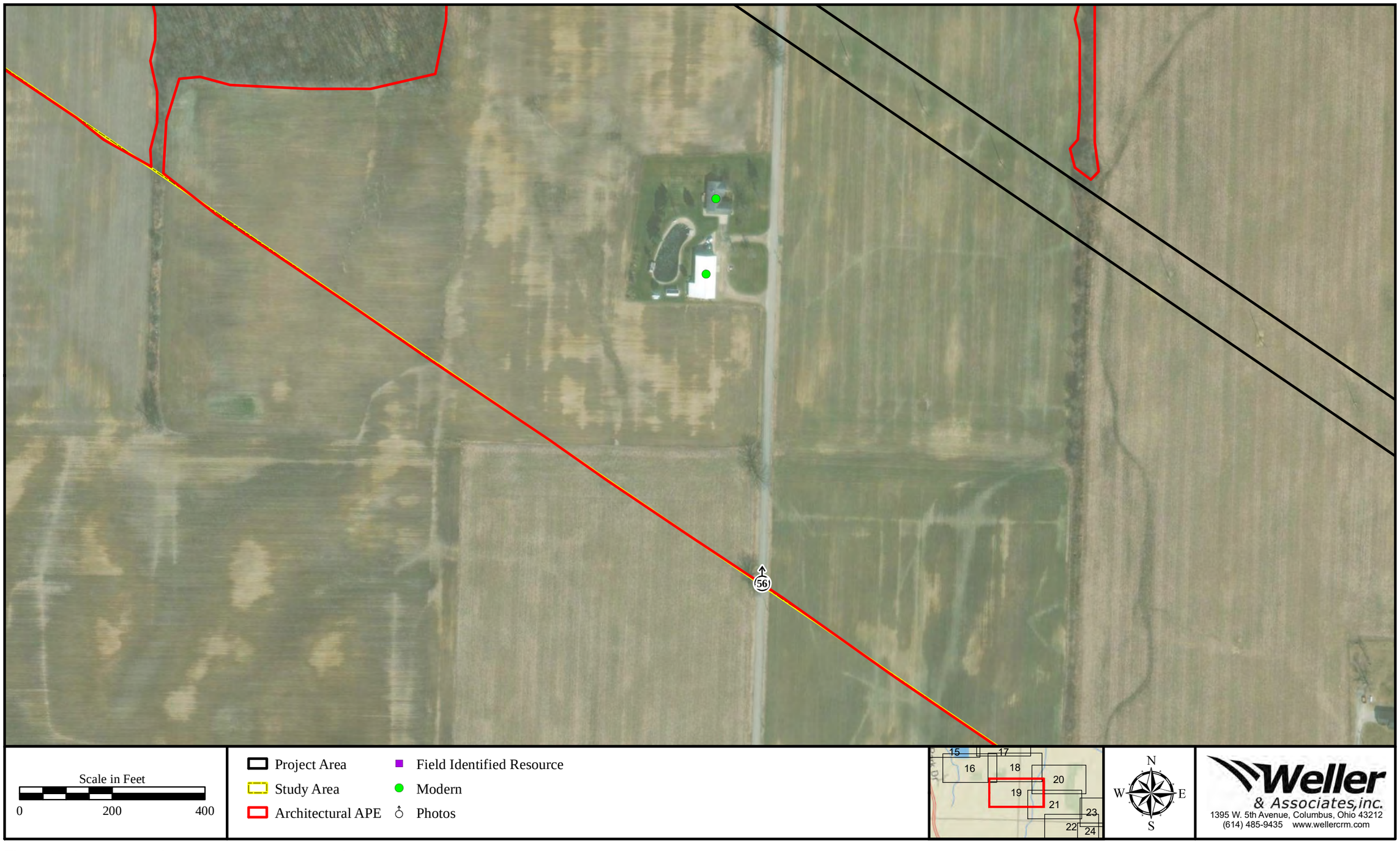


Figure 19. Architectural fieldwork results and photo orientation map.

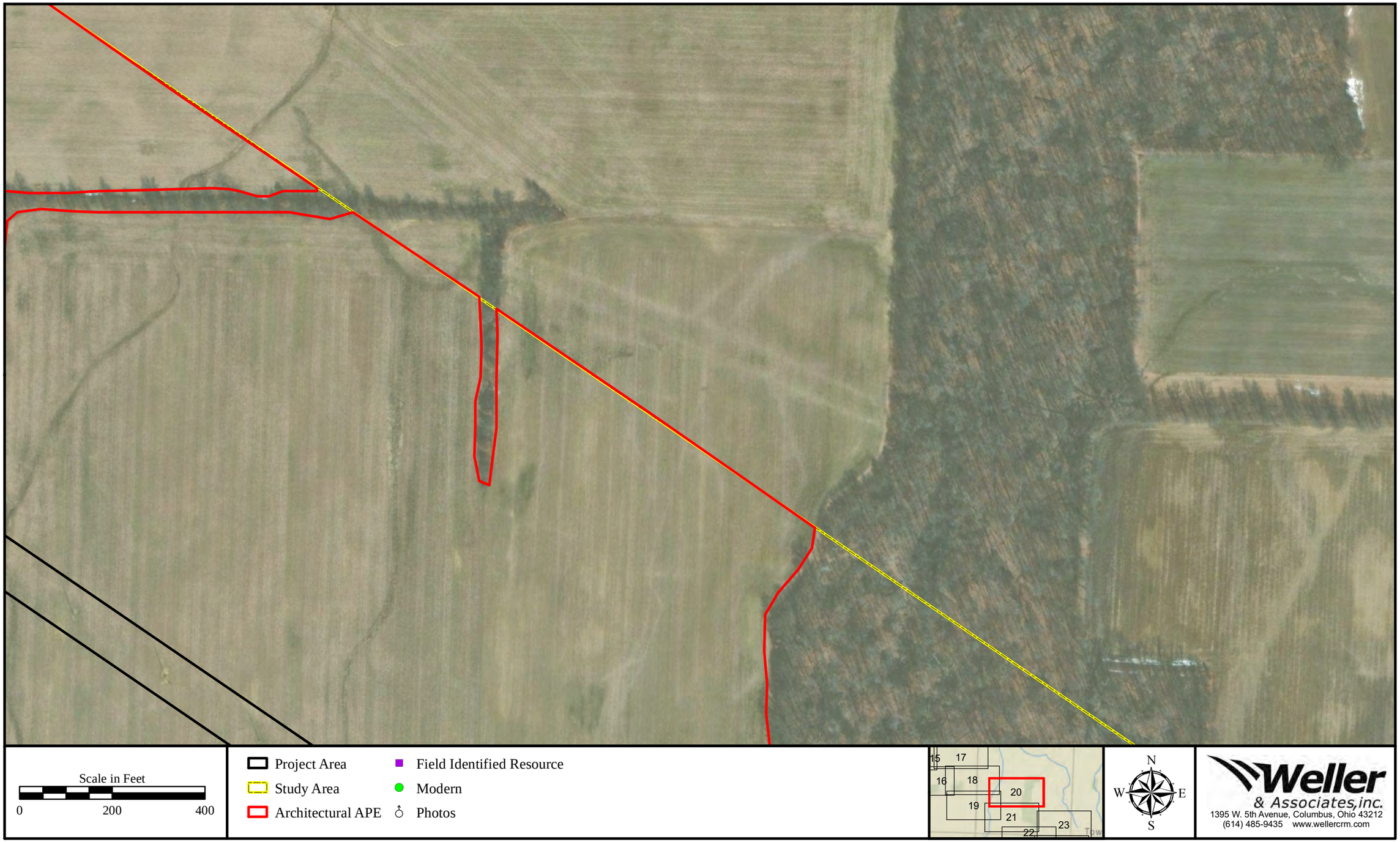


Figure 20. Architectural fieldwork results and photo orientation map.

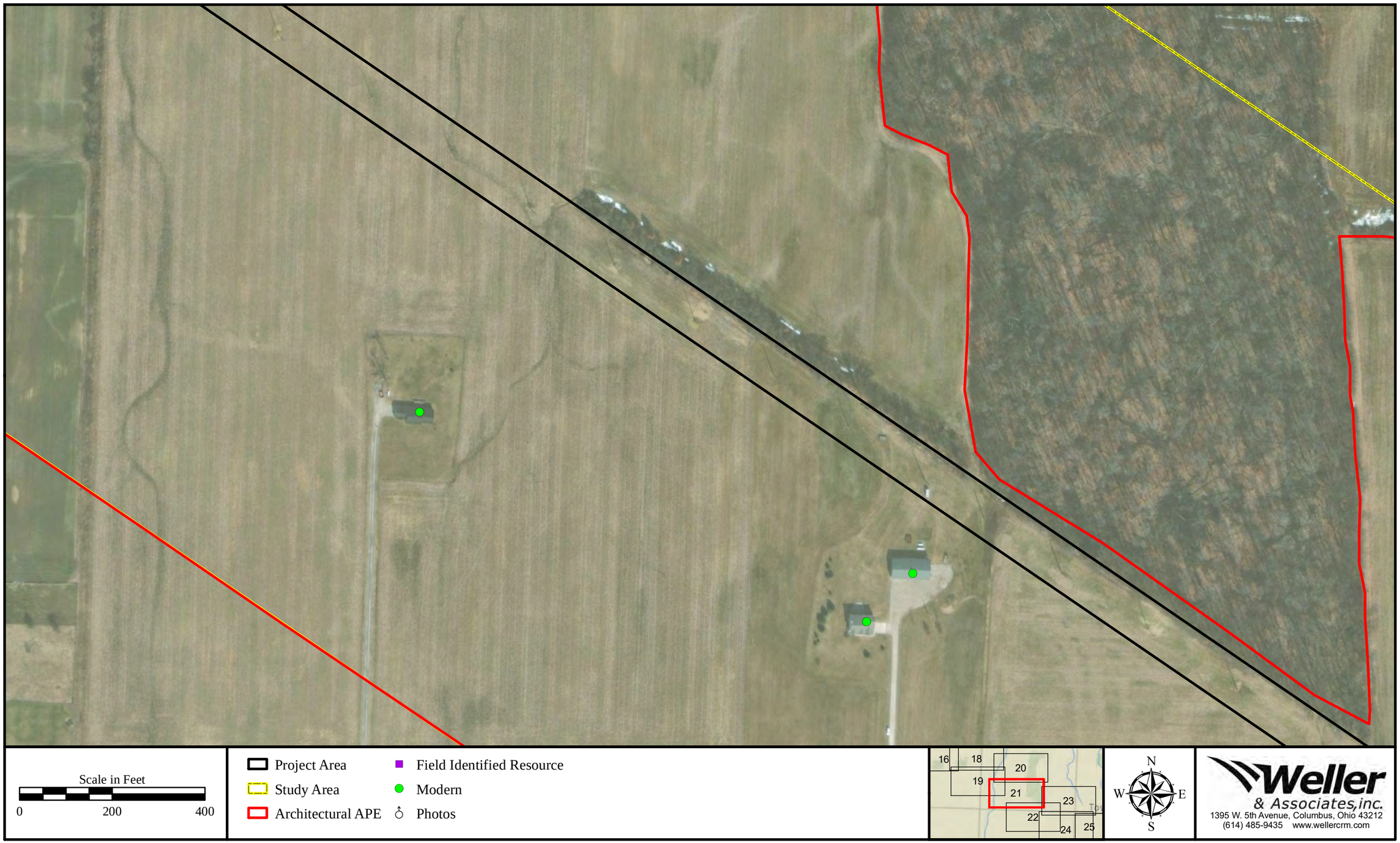


Figure 21. Architectural fieldwork results and photo orientation map.

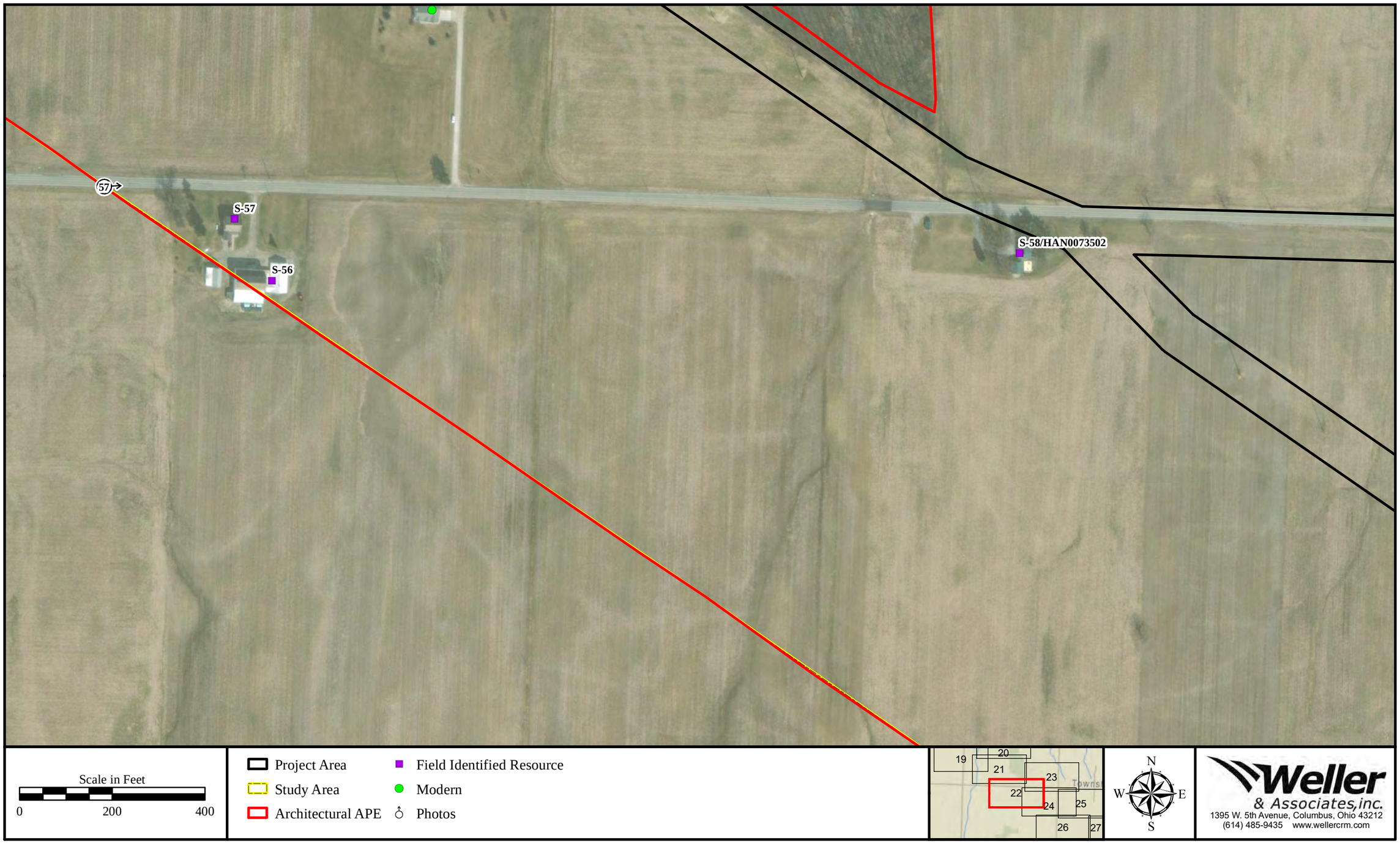


Figure 22. Architectural fieldwork results and photo orientation map.

Figure 23. Architectural fieldwork results and photo orientation map.

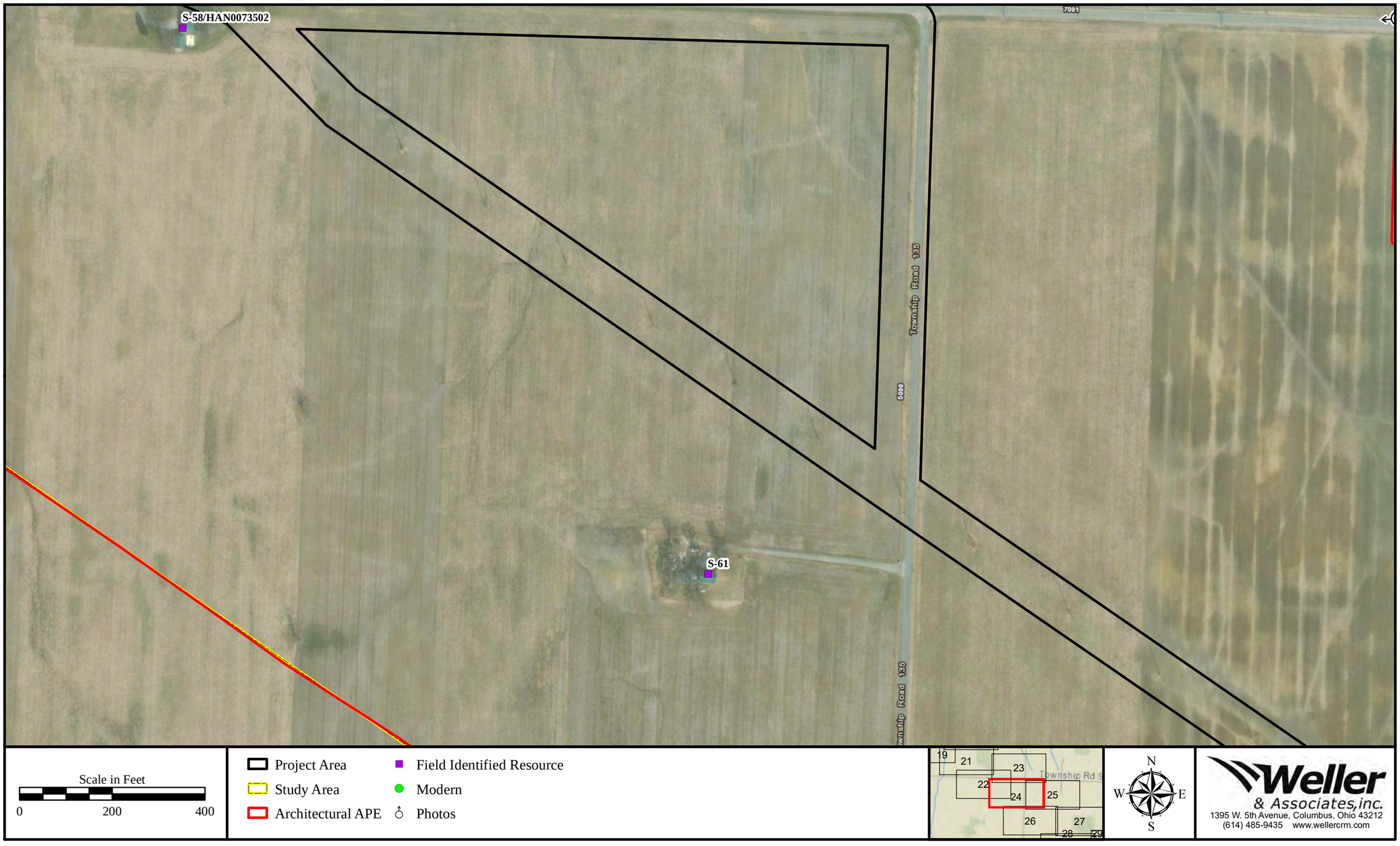


Figure 24. Architectural fieldwork results and photo orientation map.

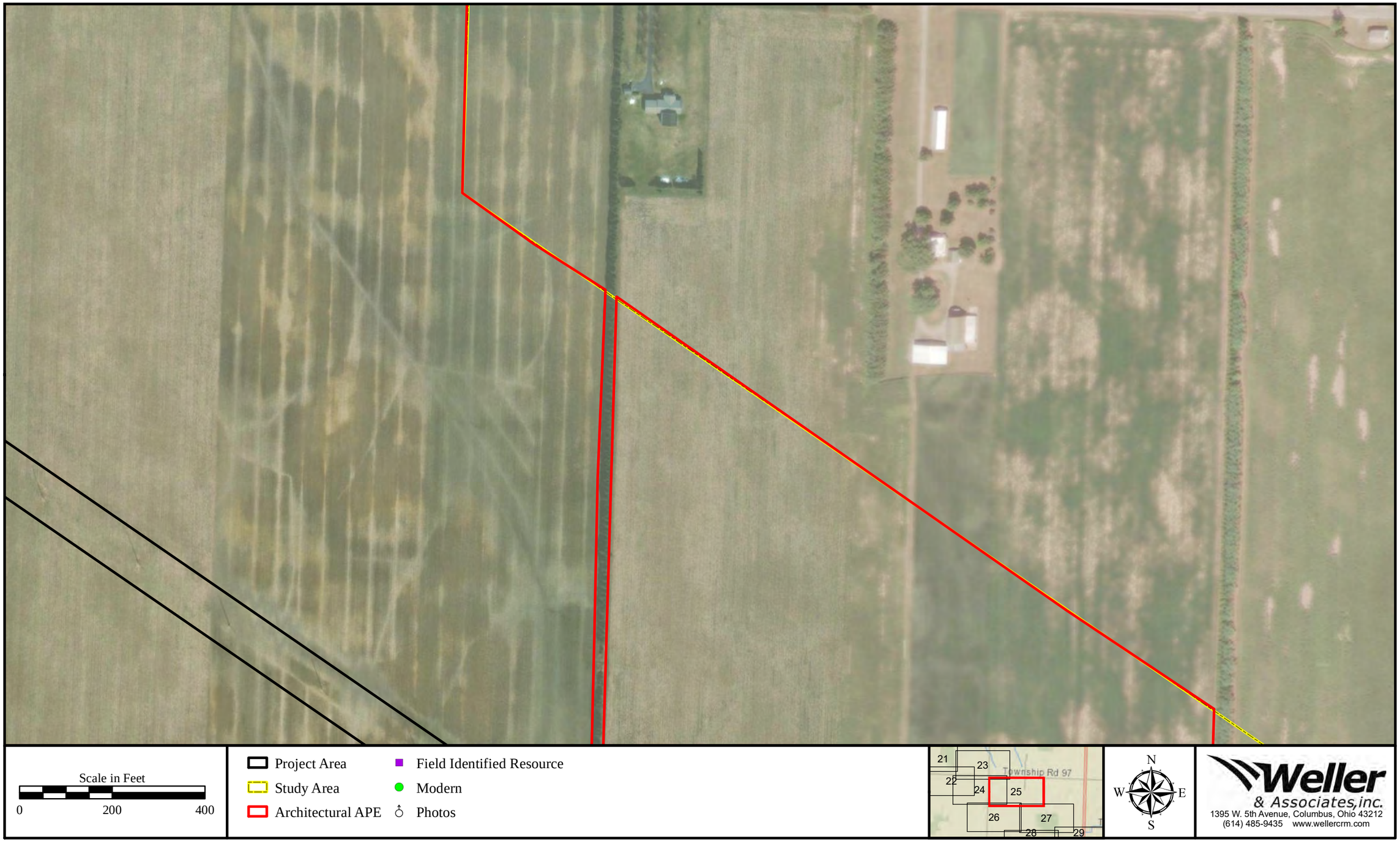


Figure 25. Architectural fieldwork results and photo orientation map.

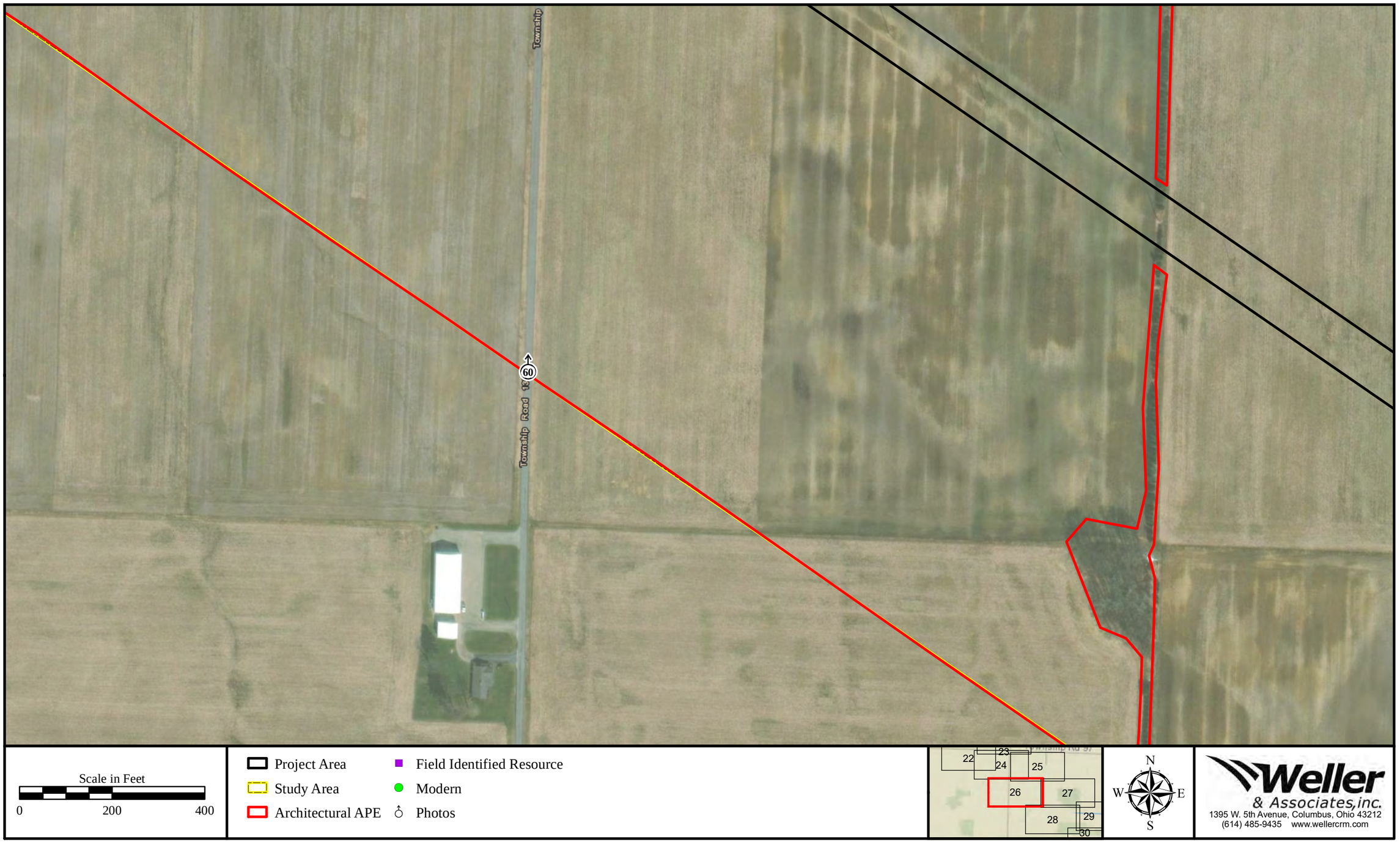


Figure 26. Architectural fieldwork results and photo orientation map.

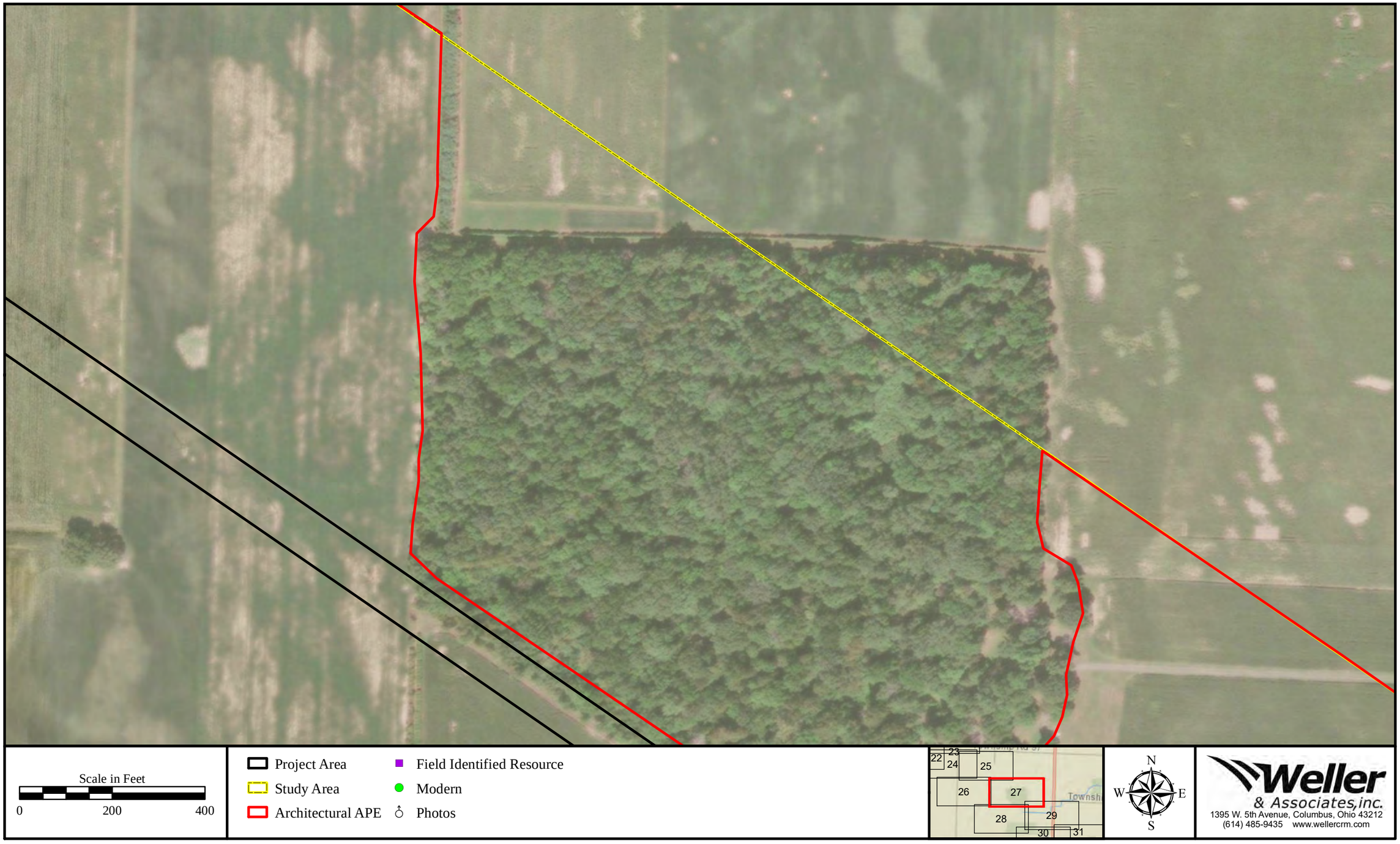


Figure 27. Architectural fieldwork results and photo orientation map.

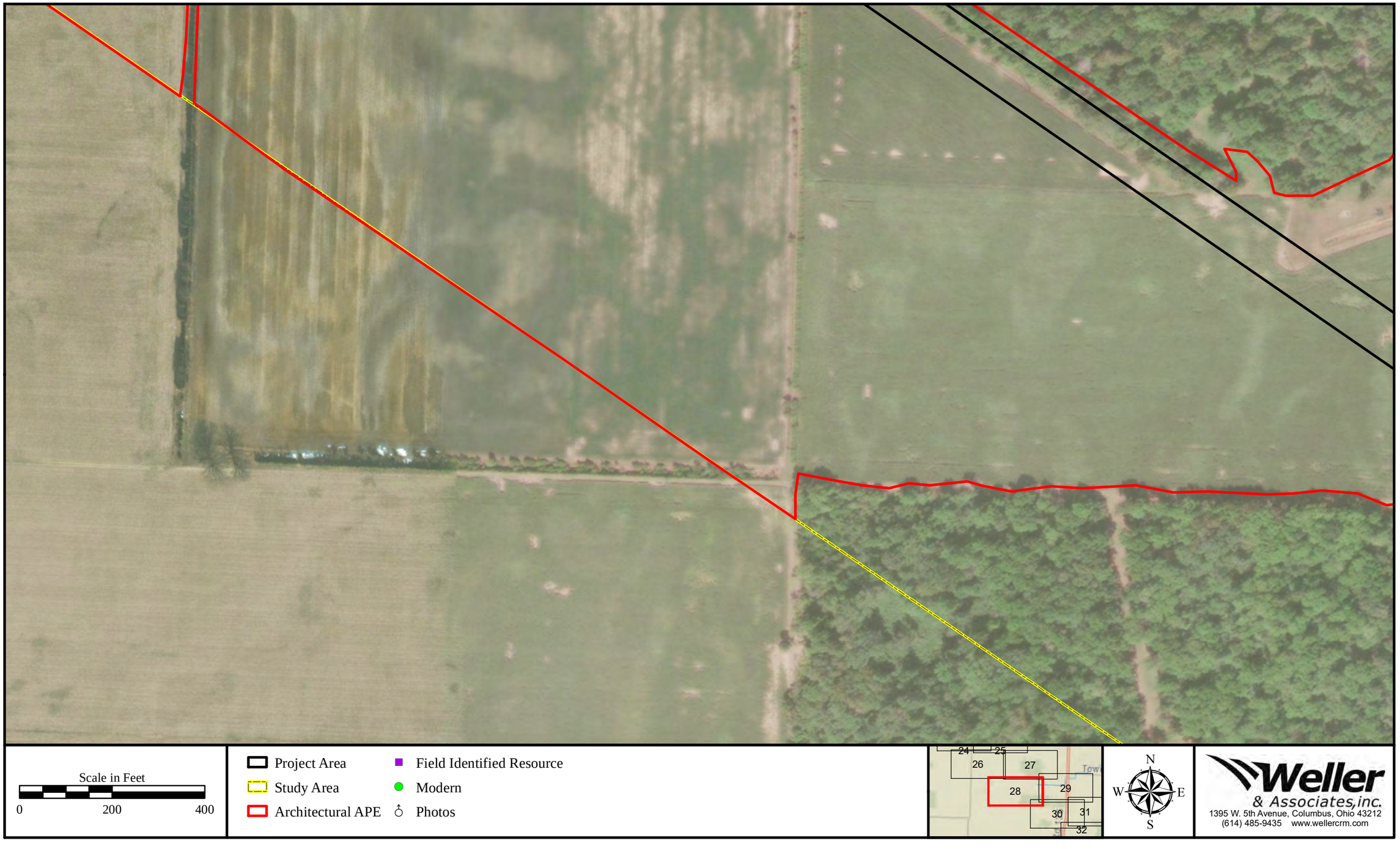


Figure 28. Architectural fieldwork results and photo orientation map.

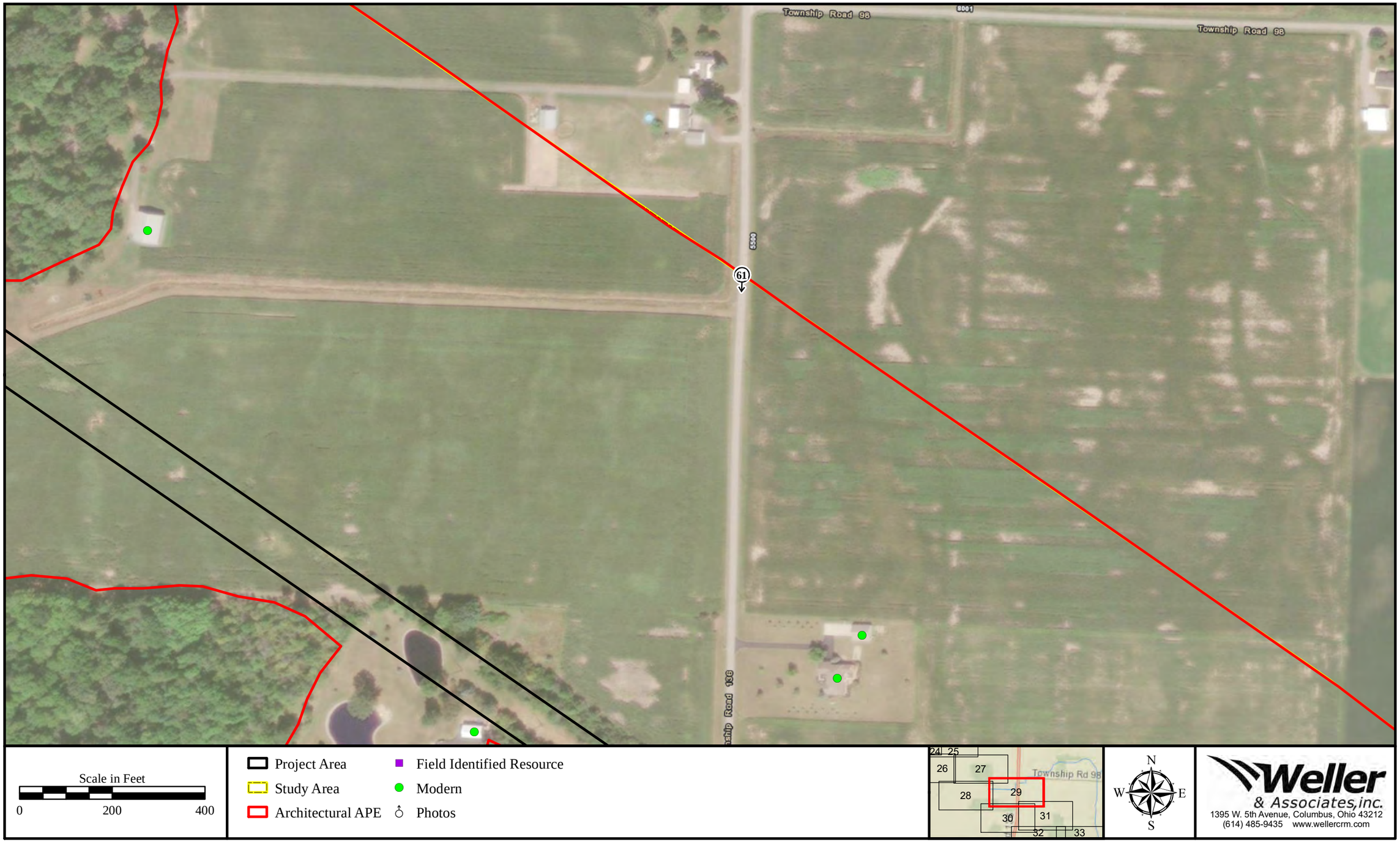


Figure 29. Architectural fieldwork results and photo orientation map.

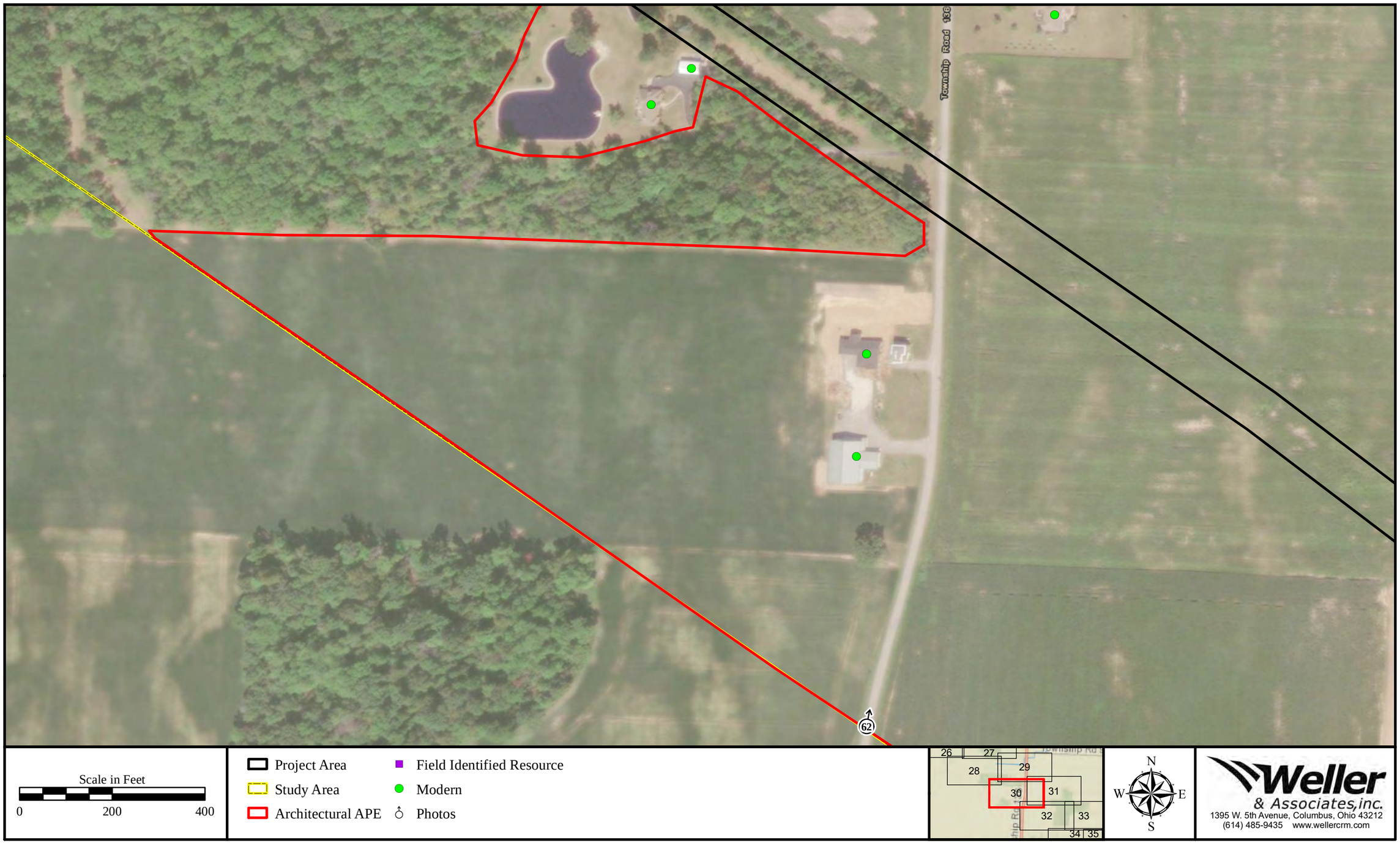


Figure 30. Architectural fieldwork results and photo orientation map.

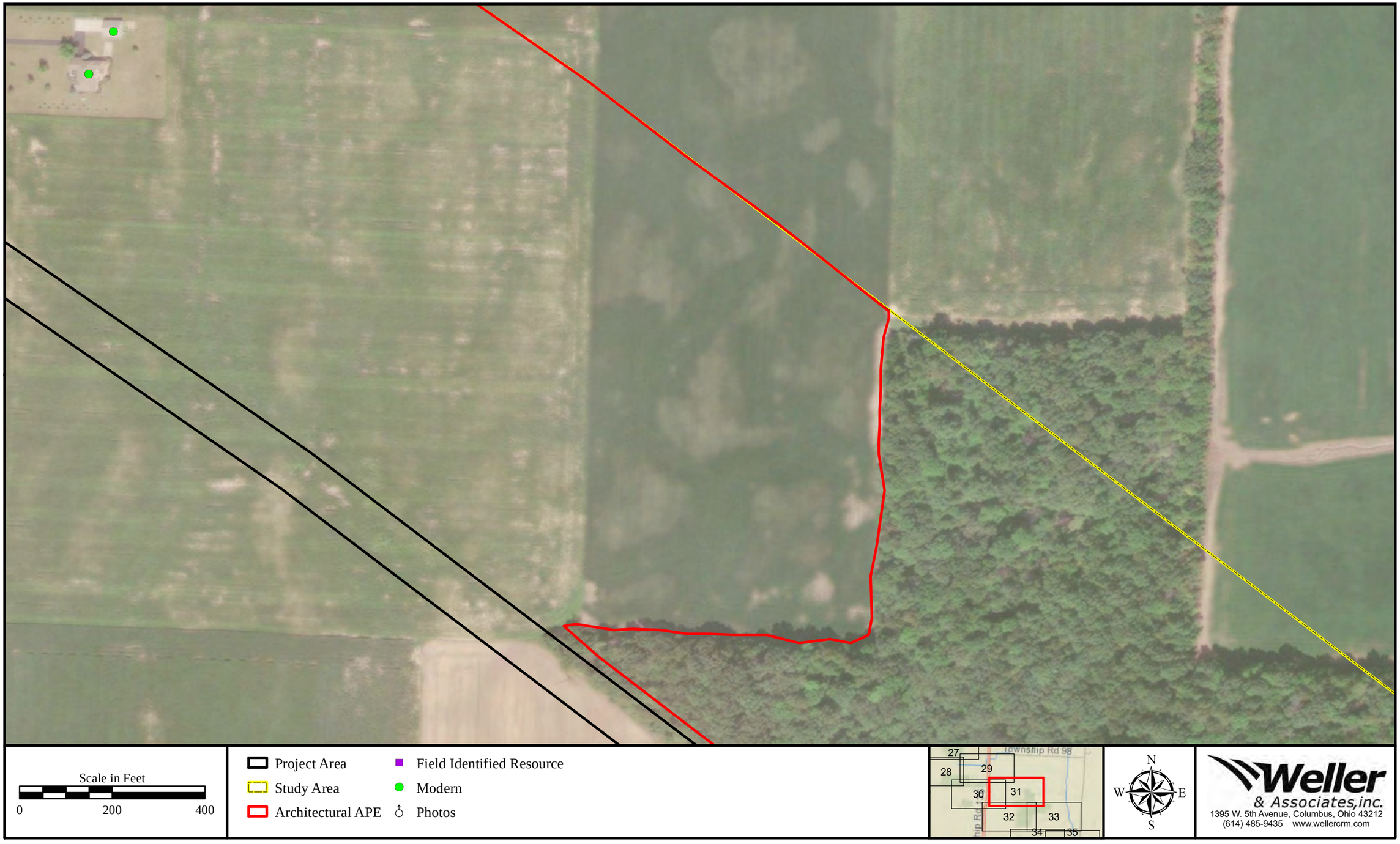


Figure 31. Architectural fieldwork results and photo orientation map.

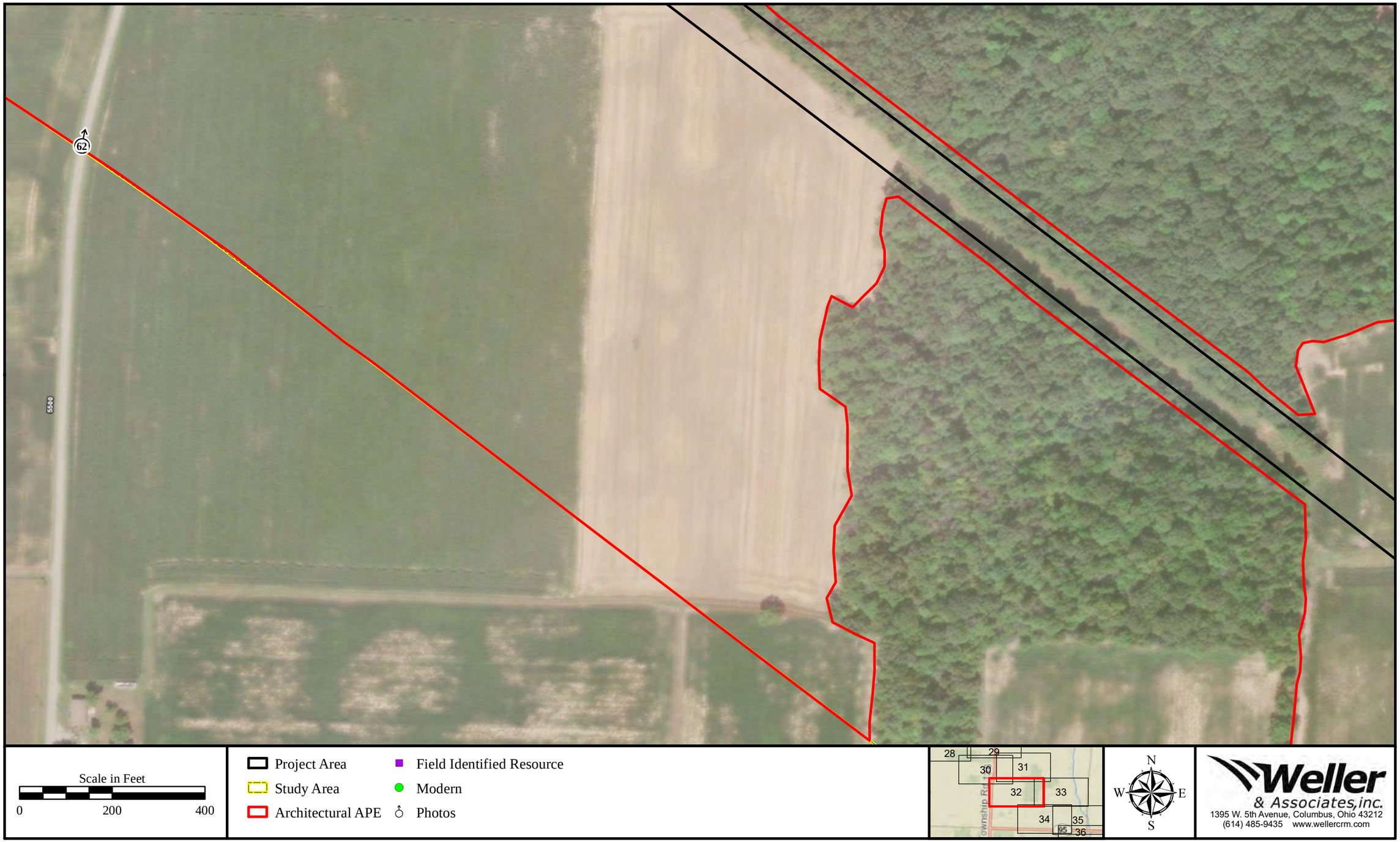


Figure 32. Architectural fieldwork results and photo orientation map.

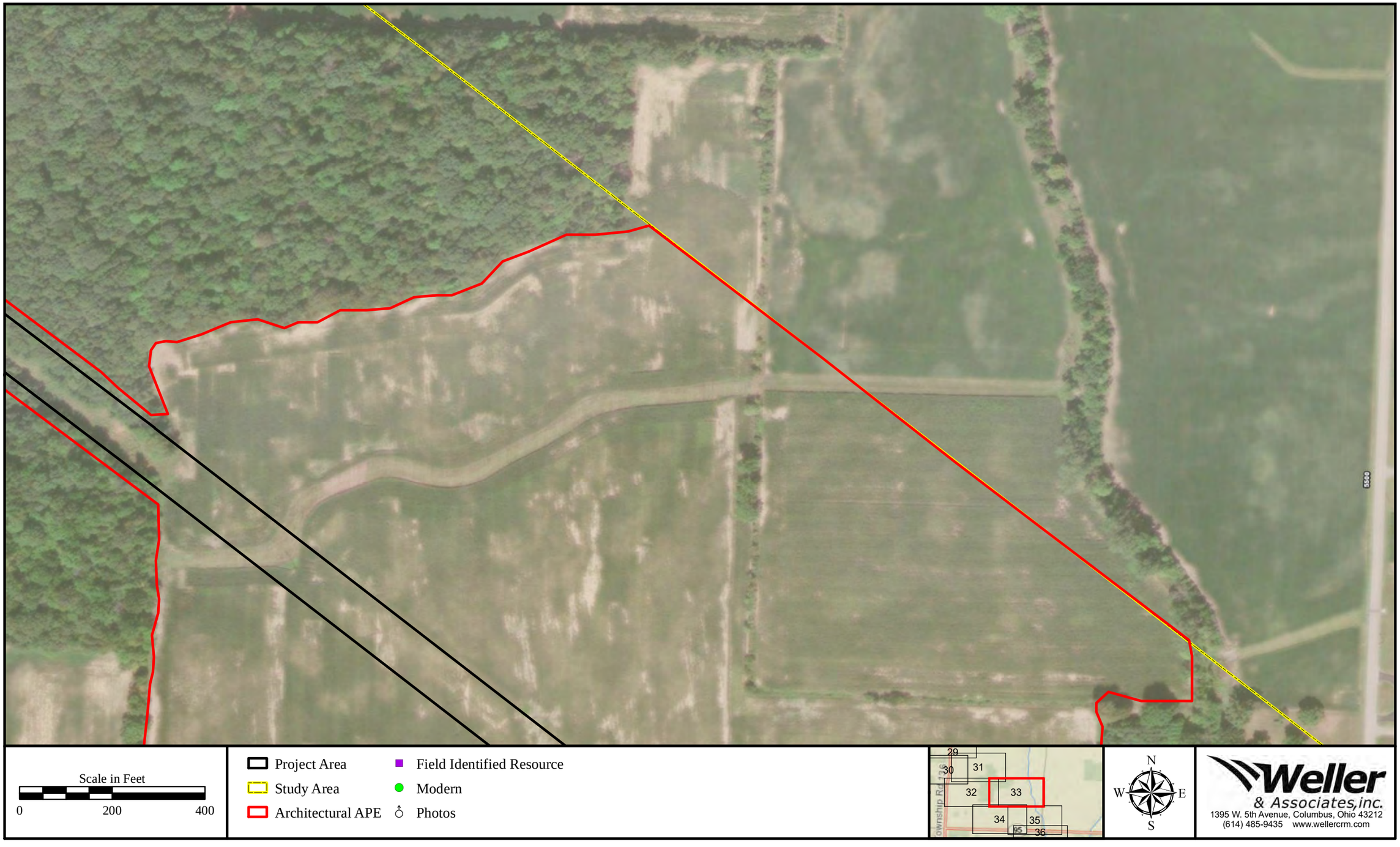


Figure 33. Architectural fieldwork results and photo orientation map.

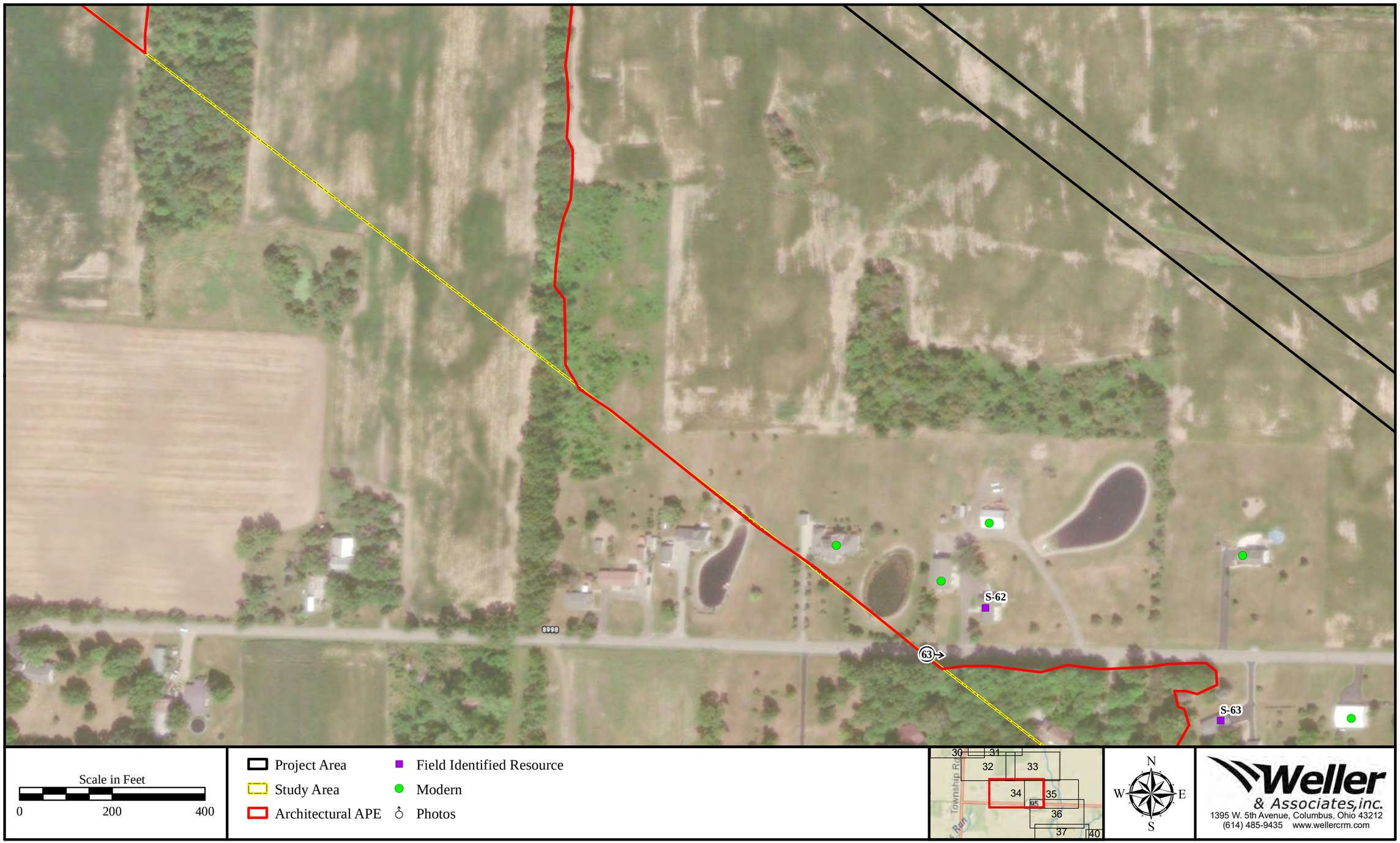


Figure 34. Architectural fieldwork results and photo orientation map.

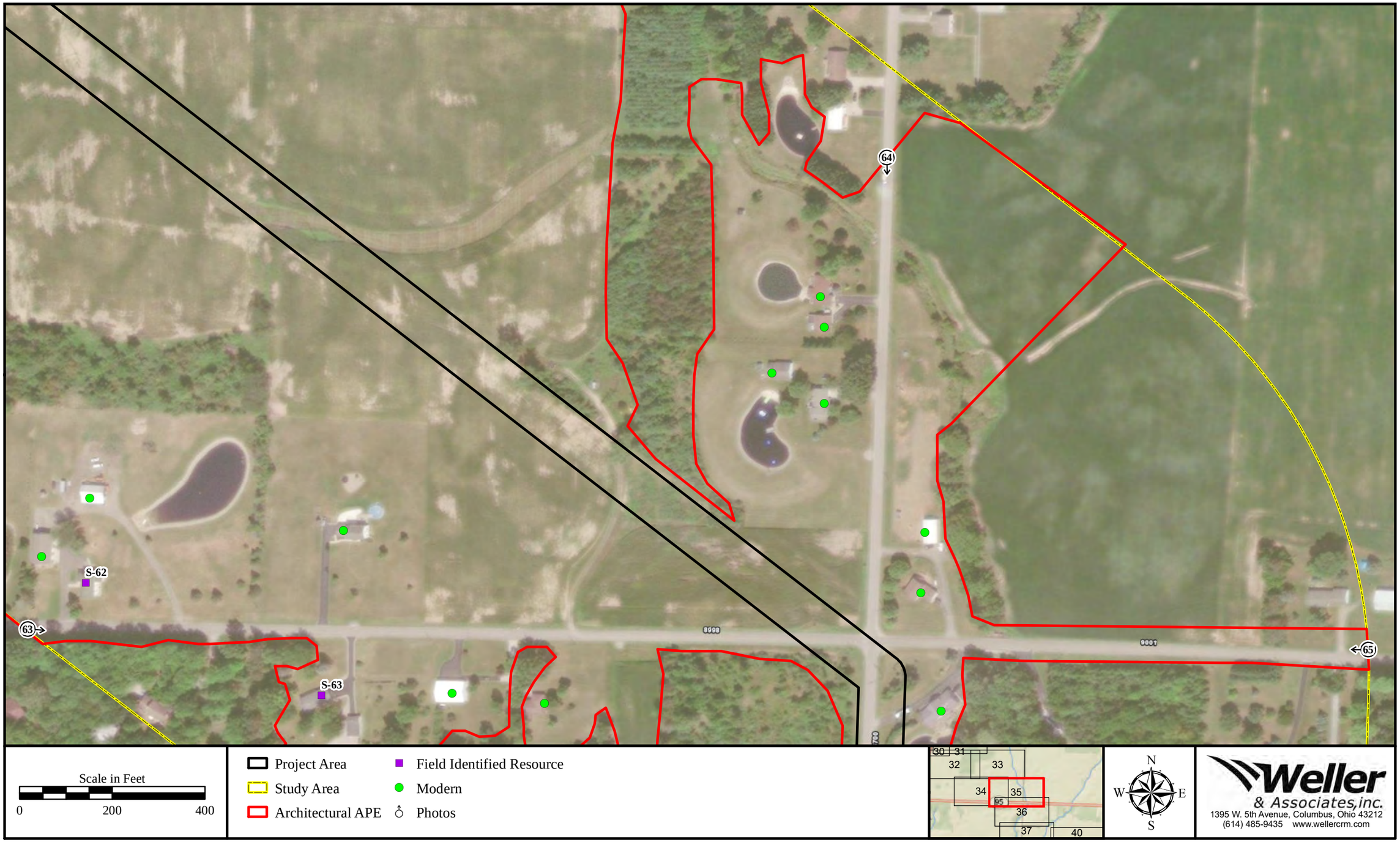


Figure 35. Architectural fieldwork results and photo orientation map.

Figure 36. Architectural fieldwork results and photo orientation map.

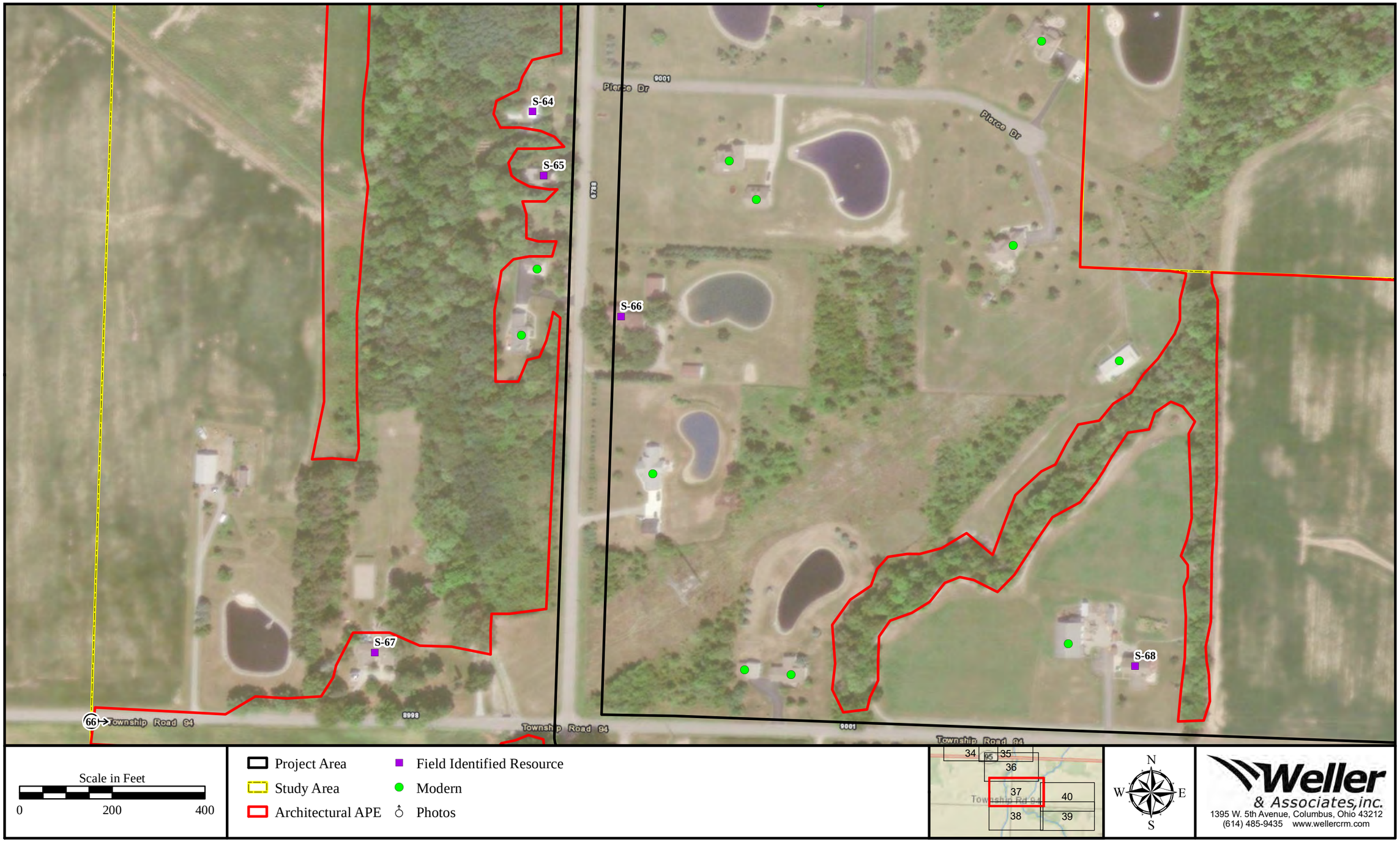


Figure 37. Architectural fieldwork results and photo orientation map.

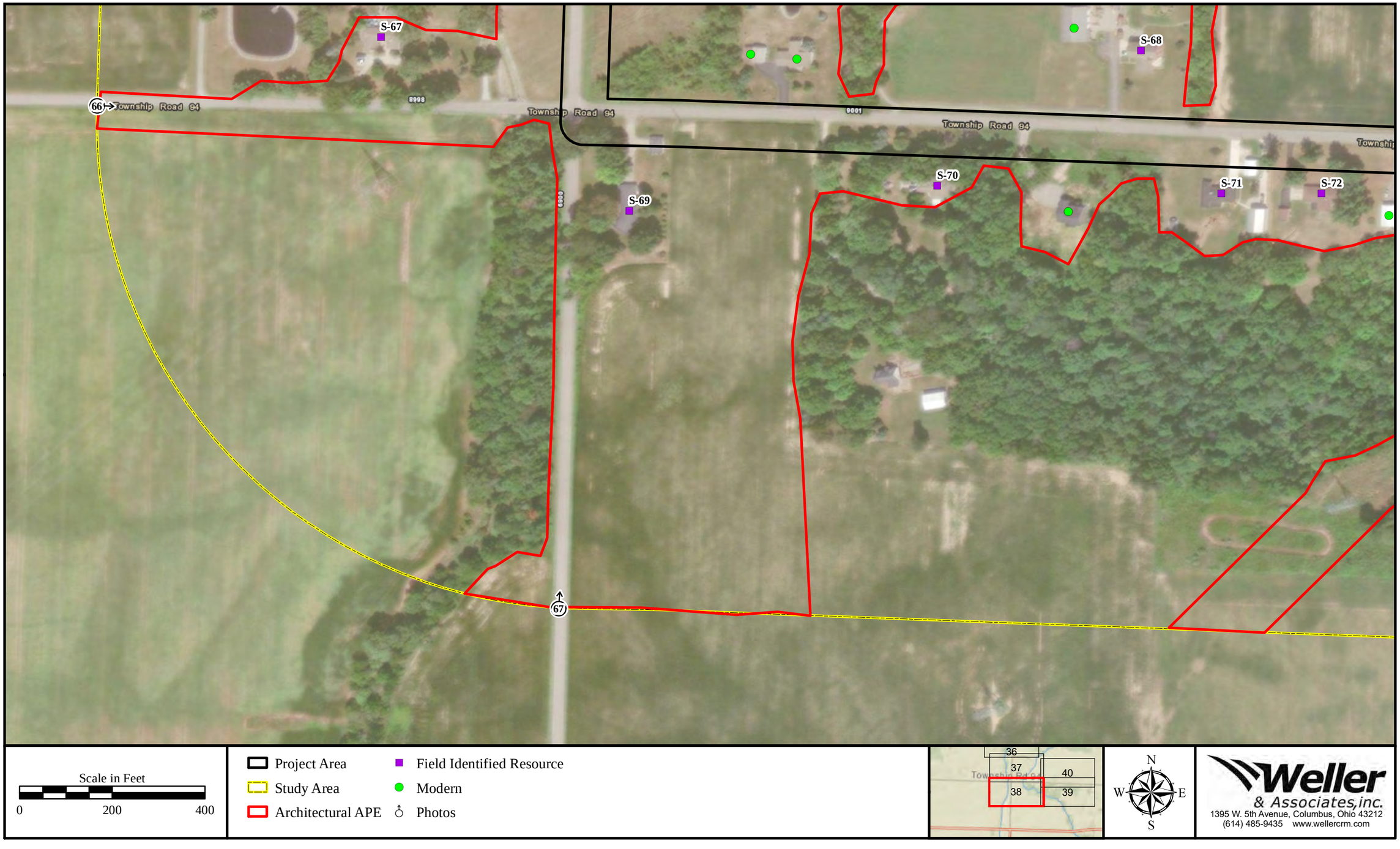


Figure 38. Architectural fieldwork results and photo orientation map.

Figure 39. Architectural fieldwork results and photo orientation map.

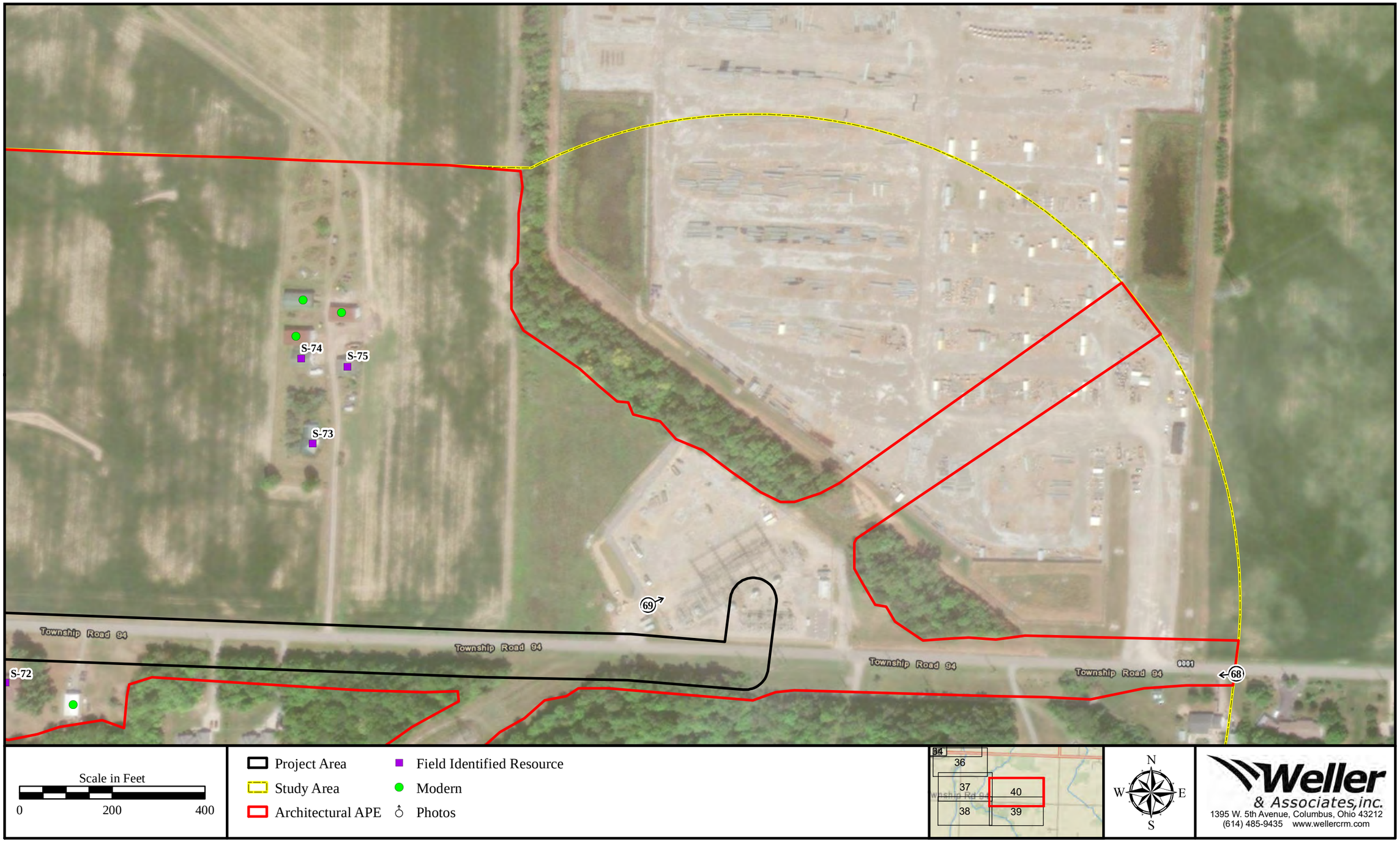


Figure 40. Architectural fieldwork results and photo orientation map.

Figure 41. Northeast view of the northern terminus from TR-105, McComb, Hancock County, Ohio.

Figure 42. South view toward the project area from the Architectural APE boundary at Scott Street, McComb, Hancock County, Ohio.

Figure 43. South view toward the project area from the Architectural APE boundary at CR-126, McComb, Hancock County, Ohio.

Figure 44. East view toward the project area from the Architectural APE boundary at TR-105, McComb, Hancock County, Ohio.

Figure 45. North view toward the project area from the Architectural APE boundary at Rader Road, McComb, Hancock County, Ohio.

Figure 46. North view toward the project area from the Architectural APE boundary at Church Street, McComb, Hancock County, Ohio.

Figure 47. North view toward the project area from the Architectural APE boundary at Pleasant Street, McComb, Hancock County, Ohio.

Figure 48. North view toward the project area from the Architectural APE boundary at Scott Street, McComb, Hancock County, Ohio.

Figure 49. North view toward the project area from the Architectural APE boundary at Todd Street, McComb, Hancock County, Ohio.

Figure 50. North view toward the project area from the Architectural APE boundary at Ackerly Street, McComb, Hancock County, Ohio.

Figure 51. South view toward the project area from the Architectural APE boundary at Park Drive, McComb, Hancock County, Ohio.

Figure 52. North view toward the project area from the Architectural APE boundary at Park Drive, McComb, Hancock County, Ohio.

Figure 53. East view toward the project area from the Architectural APE boundary at SR-613, McComb, Hancock County, Ohio.

Figure 54. West view toward the project area from the Architectural APE boundary at SR-613, McComb, Hancock County, Ohio.

Figure 55. South view toward the project area from the Architectural APE boundary at TR-131, McComb, Hancock County, Ohio.

Figure 56. North view toward the project area from the Architectural APE boundary at TR-131, McComb, Hancock County, Ohio.

Figure 57. East view toward the project area from the Architectural APE boundary at CR-97, McComb, Hancock County, Ohio.

Figure 58. South view toward the project area from the Architectural APE boundary at TR-135, McComb, Hancock County, Ohio.

Figure 59. West view toward the project area from the Architectural APE boundary at CR-97, McComb, Hancock County, Ohio.

Figure 60. North view toward the project area from the Architectural APE boundary at TR-135, McComb, Hancock County, Ohio.

Figure 61. South view toward the project area from the Architectural APE boundary at TR-136, McComb, Hancock County, Ohio.

Figure 62. North view toward the project area from the Architectural APE boundary at TR-136, McComb, Hancock County, Ohio.

Figure 63. East view toward the project area from the Architectural APE boundary at TR-95, Findlay, Hancock County, Ohio.

Figure 64. South view toward the project area from the Architectural APE boundary at CR-139, Findlay, Hancock County, Ohio.

Figure 65. West view toward the project area from the Architectural APE boundary at TR-95, Findlay, Hancock County, Ohio.

Figure 66. East view toward the project area from the Architectural APE boundary at TR-94, Findlay, Hancock County, Ohio.

Figure 67. North view toward the project area from the Architectural APE boundary at CR-139, Findlay, Hancock County, Ohio.

Figure 68. West view toward the project area from the Architectural APE boundary at TR-94, Findlay, Hancock County, Ohio.

Figure 69. Northeast view toward the southern terminus at TR-94, Findlay, Hancock County, Ohio.

Figure 70. Northwest view of S-1 from CR-126, McComb, Hancock County, Ohio.

Figure 71. East view of S-2 from CR-126, McComb, Hancock County, Ohio.

Figure 72. Southeast view of S-3 from CR-126, McComb, Hancock County, Ohio.

Figure 73. Northwest view of S-4 from Rader Road, McComb, Hancock County, Ohio.

Figure 74. North view of S-5 from Maple Street, McComb, Hancock County, Ohio.

Figure 75. North view of S-6 from Maple Street, McComb, Hancock County, Ohio.

Figure 76. North view of S-7 from Maple Street, McComb, Hancock County, Ohio.

Figure 77. Northeast view of S-8 from Maple Street, McComb, Hancock County, Ohio.

Figure 78. Northeast view of S-9 from Maple Street, McComb, Hancock County, Ohio.

Figure 79. Northwest view of S-10 from Maple Street, McComb, Hancock County, Ohio.

Figure 80. Southeast view of S-11 from Pleasant Street, McComb, Hancock County, Ohio.

Figure 81. Northwest view of S-12 from Scott Street, McComb, Hancock County, Ohio.

Figure 82. Northwest view of S-13 from Scott Street, McComb, Hancock County, Ohio.

Figure 83. North view of S-14 from Oliver Street, McComb, Hancock County, Ohio.

Figure 84. Northeast view of S-15 from Scott Street, McComb, Hancock County, Ohio.

Figure 85. Northeast view of S-16 from Scott Street, McComb, Hancock County, Ohio.

Figure 86. Northwest view of S-17 from Todd Street, McComb, Hancock County, Ohio.

Figure 87. Northwest view of S-18 from Todd Street, McComb, Hancock County, Ohio.

Figure 88. Northwest view of S-19 from Todd Street, McComb, Hancock County, Ohio.

Figure 89. Northwest view of S-20 from Todd Street, McComb, Hancock County, Ohio.

Figure 90. Northwest view of S-21 from Todd Street, McComb, Hancock County, Ohio.

Figure 91. Northwest view of S-22 from Todd Street, McComb, Hancock County, Ohio.

Figure 92. Northwest view of S-23/HAN0073301 from Todd Street, McComb, Hancock County, Ohio.

Figure 93. Southeast view of S-24 from Meadow Drive, McComb, Hancock County, Ohio.

Figure 94. Southeast view of S-25 from Todd Street, McComb, Hancock County, Ohio.

Figure 95. Southeast view of S-26 from Meadow Drive, McComb, Hancock County, Ohio.

Figure 96. Southeast view of S-27 from Todd Street, McComb, Hancock County, Ohio.

Figure 97. North view of S-28 from Oliver Street, McComb, Hancock County, Ohio.

Figure 98. North view of S-29 from Oliver Street, McComb, Hancock County, Ohio.

Figure 99. North view of S-30 from Oliver Street, McComb, Hancock County, Ohio.

Figure 100. North view of S-31 from Oliver Street, McComb, Hancock County, Ohio.

Figure 101. North view of S-32 from Oliver Street, McComb, Hancock County, Ohio.

Figure 102. Northwest view of S-33 from Oliver Street, McComb, Hancock County, Ohio.

Figure 103. Northwest view of S-34 from Oliver Street, McComb, Hancock County, Ohio.

Figure 104. Northwest view of S-35 from Oliver Street, McComb, Hancock County, Ohio.

Figure 105. Northwest view of S-36 from Park Drive, McComb, Hancock County, Ohio.

Figure 106. Northwest view of S-37 from Park Drive, McComb, Hancock County, Ohio.

Figure 107. Northwest view of S-38 from Park Drive, McComb, Hancock County, Ohio.

Figure 108. Northwest view of S-39 from Park Drive, McComb, Hancock County, Ohio.

Figure 109. East view of S-40 from Park Drive, McComb, Hancock County, Ohio.

Figure 110. Southeast view of S-41 from Park Drive, McComb, Hancock County, Ohio.

Figure 111. Northeast view of S-42 from Park Drive, McComb, Hancock County, Ohio.

Figure 112. Southeast view of S-43 from SR-613, McComb, Hancock County, Ohio.

Figure 113. Southeast view of S-44 from SR-613, McComb, Hancock County, Ohio.

Figure 114. Northeast view of S-45 from SR-613, McComb, Hancock County, Ohio.

Figure 115. Northeast view of S-46 from SR-613, McComb, Hancock County, Ohio.

Figure 116. Northeast view of S-47 from SR-613, McComb, Hancock County, Ohio.

Figure 117. Northeast view of S-48 from SR-613, McComb, Hancock County, Ohio.

Figure 118. Southeast view of S-49 from SR-613, McComb, Hancock County, Ohio.

Figure 119. Northwest view of S-50/HAN0073401 from SR-613, McComb, Hancock County, Ohio.

Figure 120. Southwest view of S-51 from SR-613, McComb, Hancock County, Ohio.

Figure 121. South view of S-52 from SR-613, McComb, Hancock County, Ohio.

Figure 122. Northeast view of S-53 from SR-613, McComb, Hancock County, Ohio.

Figure 123. Northeast view of S-54 from SR-613, McComb, Hancock County, Ohio.

Figure 124. Northeast view of S-55 from SR-613, McComb, Hancock County, Ohio.

Figure 125. Southwest view of S-56 from CR-97, McComb, Hancock County, Ohio.

Figure 126. Southwest view of S-57 from CR-97, McComb, Hancock County, Ohio.

Figure 127. Southeast view of S-58/HAN0073502 from CR-97, McComb, Hancock County, Ohio.

Figure 128. Northeast view of S-59 from CR-97, McComb, Hancock County, Ohio.

Figure 129. North view of S-60 from CR-97, McComb, Hancock County, Ohio.

Figure 130. Southwest view of S-61 from TR-130, McComb, Hancock County, Ohio.

Figure 131. North view of S-62 from TR-95, Findlay, Hancock County, Ohio.

Figure 132. South view of S-63 from TR-95, Findlay, Hancock County, Ohio.

Figure 133. Southwest view of S-64 from CR-139, Findlay, Hancock County, Ohio.

Figure 134. Southwest view of S-65 from CR-139, Findlay, Hancock County, Ohio.

Figure 135. East view of S-66 from CR-139, Findlay, Hancock County, Ohio.

Figure 136. Northeast view of S-67 from TR-94, Findlay, Hancock County, Ohio.

Figure 137. Northeast view of S-68 from TR-94, Findlay, Hancock County, Ohio.

Figure 138. East view of S-69 from CR-139, Findlay, Hancock County, Ohio.

Figure 139. Southeast view of S-70 from TR-94, Findlay, Hancock County, Ohio.

Figure 140. Southeast view of S-71 from TR-94, Findlay, Hancock County, Ohio.

Figure 141. Southeast view of S-72 from TR-94, Findlay, Hancock County, Ohio.

Figure 142. West view of S-73 near TR-94, Findlay, Hancock County, Ohio.

Figure 143. Southwest view of S-74 near TR-94, Findlay, Hancock County, Ohio.

Figure 144. Southeast view of S-75 near TR-94, Findlay, Hancock County, Ohio.

Appendix A:

OHI Draft Forms

Ohio Historic Preservation Office
800 E. 17th Avenue
Columbus, OH 43211
614/298-2000

OHIO HISTORIC INVENTORY

Draft Form - Not Reviewed by OHPO

Section 106/RPR Review: RPR Number:

1. No. HAN0073301 **NEW**
4. Present Name(s): **Christman House**
2. County: **Hancock**
5. Historic or Other Name(s):

6. Specific Address or Location:
352 N. Todd Street

6a. Lot, Section or VMD Number:
410000107490

7. City or Village:
Pleasant (Township of)

9. U.T.M. Reference
Quadrangle Name: McComb

Zone: 17 Easting: 265563 Northing: 4554863

10. Classification: Building

11. On National Register? NO

13. Part of Established Hist. Dist? NO

15. Other Designation (NR or Local)

16. Thematic Associations:

17. Date(s) or Period:
1972

17b. Alteration Date(s):

18. Style Class and Design:
Element Modern Movements

18a. Style of Addition or Elements(s):

19. Architect or Engineer:

19a. Design Sources:

20. Contractor or Builder:

21. Building Type or Plan: Ranch

22. Original Use, if apparent:
Single Dwelling

23. Present Use:
Single Dwelling

24. Ownership: Private

25. Owner's Name & Address, if known:
CHRISTMAN ROBERTA J
352 N TODD ST
MCCOMB, OH 45858

26. Property Acreage: .281

27. Other Surveys:

28. No. of Stories: One story

29. Basement? No

30. Foundation Material: Concrete block

31. Wall Construction:
Balloon/western/platform frame

32. Roof Type:
Gable
Roof Material:
Asphalt shingle

33. No. of Bays: 4 Side Bays: 2

34. Exterior Wall Material(s):
Aluminum or vinyl siding

35. Plan Shape: Rectangular

36. Changes associated with 17/17b Dates:
17. Original/Most significant construction

17b.

37. Window Type(s):
Modern Replacements

38. Building Dimensions: 53 x 29 ft.

39. Endangered? NO
By What?

40. Chimney Placement: No chimney observed

41. Distance from & Frontage on Road:
35 ft., 80 ft.

51. Condition of Property: Excellent

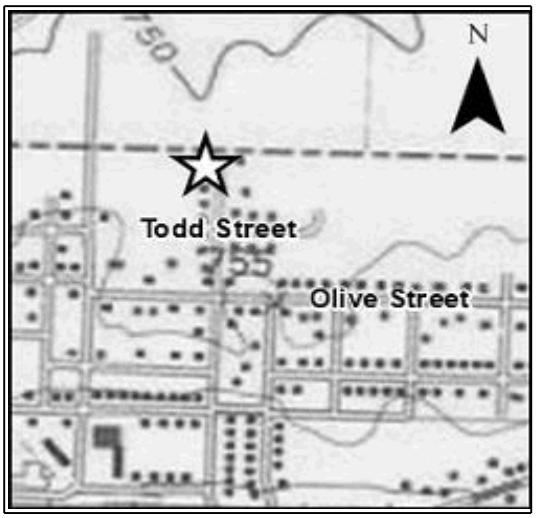
52. Historic Outbuildings & Dependencies
Structure Type(s):

Date(s):

Associated Activity:

53. Affiliated Inventory Number(s):
Historic (OHI):

Archaeological (OAI):



8. Site Plan (location map) with North Arrow

46. Prepared By: **Scott McIntosh**
47. Organization: **Weller & Associates, Inc.**
48. Date Recorded: **04/08/2022**
49. PIR Reviewer:
50. PIR Review Date:

2. County: **Hancock**
4. Present or Historic Name(s): **Christman House**
6. Specific Address or Location: **352 N. Todd Street**

1. No. HAN0073301	**4. Present Name(s): Christman House**
2. County Hancock	**5. Historic or Other Name(s):**

Door Selection: Single off center
Door Position: Flush
Orientation: Lateral axis
Symmetry: Bilateral asymmetry

Report Associated With Project:

Primary Author	Secondary Author(s)	Year	Title
McIntosh, Scott		2022	History/Architecture Investigations for the 11.3 km (7 mi) Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio

42. Further Description of Important Interior and Exterior Features

The resource is a four-bay, side-gable ranch. The roof is covered in asphalt shingles and the exterior walls are clad in vinyl siding. The windows are modern replacements and flanked by vinyl shutters. The front door hangs off-center behind a glass storm door. There is an integrated garage at the south end of the building.

43. History and Significance

The resource was not found to be associated with significant events, patterns of events, or individuals in a manner necessary for inclusion in the NRHP under Criterion A or B. The building is typical of others in the area and throughout Ohio, is not the work of a master, and does not exhibit distinctive character-defining features; therefore, the resource is not eligible for inclusion in the NRHP under Criterion C.

44. Description of Environment and Outbuildings (See #52)

The house is situated approximately 35 feet west of N. Todd Street in McComb on a quarter-acre lot facing east.

45. Sources of Information

Hancock County Auditor's Office

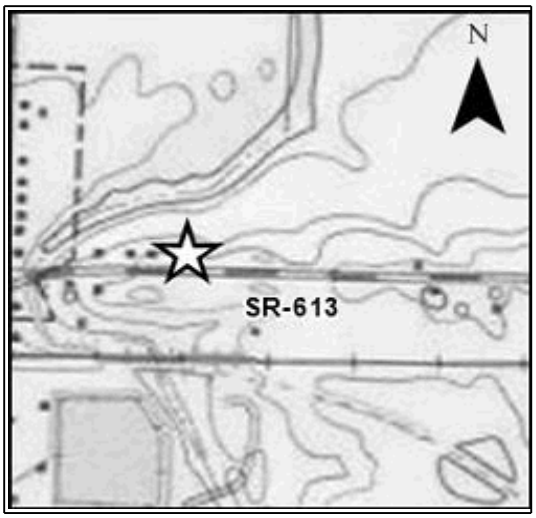
Ohio Historic Preservation Office
800 E. 17th Avenue
Columbus, OH 43211
614/298-2000

OHIO HISTORIC INVENTORY

Draft Form - Not Reviewed by OHPO

Section 106/RPR Review: RPR Number:

1. No. HAN0073401 **NEW**
2. County: **Hancock**
4. Present Name(s): **Snively Quonset**
5. Historic or Other Name(s):
6. Specific Address or Location:
5081 SR-613 (approx)
6a. Lot, Section or VMD Number:
400001010880
7. City or Village:
Pleasant (Township of)
9. U.T.M. Reference
Quadrangle Name: McComb
Zone: 17 Easting: 266771 Northing: 4554667
10. Classification: Building
11. On National Register? NO
13. Part of Established Hist. Dist? NO
15. Other Designation (NR or Local)
16. Thematic Associations:
17. Date(s) or Period:
1947
17b. Alteration Date(s):
18. Style Class and Design:
None — No academic style - Vernacular
18a. Style of Addition or Elements(s):
19. Architect or Engineer:
19a. Design Sources:
20. Contractor or Builder:
21. Building Type or Plan: Quonset
22. Original Use, if apparent:
UNKNOWN USE
23. Present Use:
UNKNOWN USE
24. Ownership: Private
25. Owner's Name & Address, if known:
SNIVELY, RANDALL L
5389 STATE RT 613
MCCOMB, OH 45858
26. Property Acreage: 3
27. Other Surveys:
28. No. of Stories: One story
29. Basement? No
30. Foundation Material: Unknown
31. Wall Construction:
Unknown
32. Roof Type:
Other
Roof Material:
Metal
33. No. of Bays: 0 Side Bays: 1
34. Exterior Wall Material(s):
Metal
35. Plan Shape: Rectangular
36. Changes associated with 17/17b Dates:
17. Original/Most significant construction
17b.
37. Window Type(s):
Other
38. Building Dimensions: 100 x 30 ft.
39. Endangered? NO
By What?
40. Chimney Placement: No chimney observed
41. Distance from & Frontage on Road:
30 ft.; 620 ft.
51. Condition of Property: Good/Fair
52. Historic Outbuildings & Dependencies
Structure Type(s):
Date(s):
Associated Activity:
53. Affiliated Inventory Number(s):
Historic (OHI):
Archaeological (OAI):



8. Site Plan (location map) with North Arrow

46. Prepared By: **Scott McIntosh**
47. Organization: **Weller & Associates, Inc.**
48. Date Recorded: **04/08/2022**
49. PIR Reviewer:
50. PIR Review Date:

2. County: **Hancock**
4. Present or Historic Name(s): **Snively Quonset**
6. Specific Address or Location: **5081 SR-613 (approx)**

1. No. HAN0073401

4. Present Name(s): Snively Quonset

2. County Hancock

5. Historic or Other Name(s):

Door Selection: Other
Door Position: Flush
Orientation: Lateral axis
Symmetry: Bilateral asymmetry

Report Associated With Project:

Primary Author	Secondary Author(s)	Year	Title
McIntosh, Scott		2022	History/Architecture Investigations for the 11.3 km (7 mi) Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio

42. Further Description of Important Interior and Exterior Features

The resource is a metal Quonset hut. There are three mushroom vents equally on top of the structure. A man door and a large sliding door are at the east elevation. The paint has failed and the metal cladding is showing signs of oxidation.

43. History and Significance

The Hancock County Auditor's Office indicates that the structure was built in 1947. This date is feasible as many Quonset huts were military surplus and sold by the US government to civilians after WWII.

44. Description of Environment and Outbuildings (See #52)

The building is situated approximately 30 feet north of SR-163 on a 3-acre parcel. Tall grass and bushes are growing around it and it does not appear to be in use.

45. Sources of Information

Hancock County Auditor's Office

Ohio Historic Preservation Office
800 E. 17th Avenue
Columbus, OH 43211
614/298-2000

OHIO HISTORIC INVENTORY

Draft Form - Not Reviewed by OHPO

Section 106/RPR Review: RPR Number:

1. No. HAN0073502 **NEW**
2. County: **Hancock**
4. Present Name(s): **Schroll House**
5. Historic or Other Name(s):

6. Specific Address or Location:
6681 CR-97

6a. Lot, Section or VMD Number:
420000111070

7. City or Village:
Portage (Township of)

9. U.T.M. Reference
Quadrangle Name: McComb

Zone: 17 Easting: 268871 Northing: 4552756

10. Classification: Building

11. On National Register? NO

13. Part of Established Hist. Dist? NO

15. Other Designation (NR or Local)

16. Thematic Associations:

17. Date(s) or Period:
c. 1880

17b. Alteration Date(s):

18. Style Class and Design:
None — No academic style - Vernacular

18a. Style of Addition or Elements(s):

19. Architect or Engineer:

19a. Design Sources:

20. Contractor or Builder:

21. Building Type or Plan: Other House Type

22. Original Use, if apparent:
Single Dwelling

23. Present Use:
Single Dwelling

24. Ownership: Private

25. Owner's Name & Address, if known:
SCHROLL, CATHY J
403 W SOUTH ST
MCCOMB, OH 45858

26. Property Acreage: 70

27. Other Surveys:

28. No. of Stories: One and a half story

29. Basement? Yes

30. Foundation Material: Unknown

31. Wall Construction:
Balloon/western/platform frame

32. Roof Type:
Gable
Roof Material:
Standing seam (metal)

33. No. of Bays: 3 Side Bays: 3

34. Exterior Wall Material(s):
Aluminum or vinyl siding

35. Plan Shape: Rectangular

36. Changes associated with 17/17b Dates:
17. Original/Most significant construction
17b.

37. Window Type(s):
Modern Replacements

38. Building Dimensions: 30 x 38 ft.

39. Endangered? NO
By What?

40. Chimney Placement: Gable end, exterior

41. Distance from & Frontage on Road:
50 ft.; 1320 ft.

51. Condition of Property: Excellent

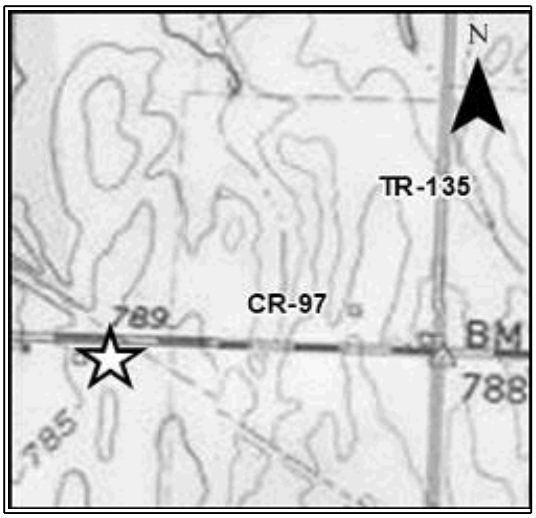
52. Historic Outbuildings & Dependencies
Structure Type(s):

Date(s):

Associated Activity:

53. Affiliated Inventory Number(s):
Historic (OHI):

Archaeological (OAI):



8. Site Plan (location map) with North Arrow

46. Prepared By: **Scott McIntosh**
47. Organization: **Weller & Associates, Inc.**
48. Date Recorded: **04/08/2022**
49. PIR Reviewer:
50. PIR Review Date:

2. County: **Hancock**
4. Present or Historic Name(s): **Schroll House**
6. Specific Address or Location: **6681 CR-97**

Door Selection: Single centered
Door Position: Flush
Orientation: Gable end axis
Symmetry: Bilateral symmetry

Report Associated With Project:

Primary Author	Secondary Author(s)	Year	Title
McIntosh, Scott		2022	History/Architecture Investigations for the 11.3 km (7 mi) Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio

42. Further Description of Important Interior and Exterior Features

The resource is a one and half-story, two-bay, gable-front house. The roof is covered in modern standing seam metal and the exterior walls are clad in vinyl siding. The windows are modern replacements flanked by vinyl shutters. The house has several additions to the rear including a garage. The paneled front door hangs center behind a wooden screen door. There is an exterior brick chimney at the rear (south) elevation.

43. History and Significance

There are no buildings at this location on Hardesty's 1875 *Atlas of Hancock County* and the land was owned at that time by A. Morehead. The Hancock County Auditor's Office indicates that the house was constructed in 1880 which is feasible because this vernacular house form was being widely constructed by that time.

The resource was not found to be associated with significant events, patterns of events, or individuals in a manner necessary for inclusion in the NRHP under Criterion A or B. The building is typical of others in the area and throughout Ohio, is not the work of a master, and does not exhibit distinctive character-defining features; therefore, the resource is not eligible for inclusion in the NRHP under Criterion C.

44. Description of Environment and Outbuildings (See #52)

The house is situated near the northeast corner of a 70-acre parcel and approximately 50 feet south of CR-97 in Portage Township. The house is surrounded by a lawn and mature deciduous and conifer trees.

45. Sources of Information

Hardesty, H.H.
1875 *History of Putnam County, Ohio.* H.H. Hardesty and Company, Chicago and Toledo.

Hancock County Auditor's Office

In reply, refer to
2022-HAN-54538

May 6, 2022

Mr. Ryan J. Weller
Weller & Associates, Inc.
1395 West Fifth Avenue
Columbus, Ohio 43212

RE: East Leipsic-Rader Road 69kV to a 138kV Conversion/Rebuild Project, Van Buren Township, Putnam County, and Pleasant Township, Hancock County, Ohio

Dear Mr. Weller:

This letter is in response to the correspondence received April 8, 2022 regarding the proposed East Leipsic-Rader Road 69kV to a 138kV Conversion/Rebuild Project, Van Buren Township, Putnam County, and Pleasant Township, Hancock County, Ohio. We appreciate the opportunity to comment on this project. The comments of the Ohio State Historic Preservation Office (SHPO) are made pursuant to Section 149.53 of the Ohio Revised Code and the Ohio Power Siting Board rules for siting this project (OAC 4906-5). The comments of the Ohio SHPO are also submitted in accordance with the provisions of Section 106 of the National Historic Preservation Act of 1966, as amended (54 U.S.C. 306108 [36 CFR 800]).

The following comments pertain to the *Phase I Archaeological Survey for the 17.7 km (11 mi) East Leipsic-Rader Road 69kV to a 138kV Conversion/Rebuild Project in Van Buren Township, Putnam County, and Pleasant Township, Hancock County, Ohio* by Ryan J. Weller (Weller & Associates, Inc. 2022).

A literature review, visual inspection, surface collection, shovel probe and shovel test unit excavation was completed as part of the investigations. One (1) previously identified archaeological site is located within the project area. Ohio Archaeological Inventory (OAI) 33PU0168 was not reidentified during this survey. The site was previously recommended not eligible for listing in the National Register of Historic Place (NRHP). Six (6) new archaeological sites were identified during survey, OAI# 33PU0235-33PU0236 and 33HK1038-33HR1041. Our office agrees the archaeological sites are not eligible for listing in the NRHP and no additional archeological investigation is needed.

The following comments pertain to the *History/Architecture Investigations for the 17.7 km (11 mi) East Leipsic-Rader Road 69kV to a 138kV Conversion/Rebuild Project in Van Buren Township, Putnam County, and Pleasant Township, Hancock County, Ohio* by Scott McIntosh (Weller & Associates, Inc. 2022).

A literature review and field survey were completed as part of the investigations. Forty-one (41) resources 50 years of age or older were identified within the Area of Potential Effects (APE). Weller recommends that none of the resources are eligible for listing in the NRHP. Our office agrees with Weller's recommendations regarding eligibility.

Based on the information provided, we agree that the project as proposed will have no effect on historic properties. No further coordination with this office is necessary, unless the project changes or unless new or additional historic properties are discovered during implementation of this project. In such a situation, this office should be contacted. If you have any questions, please contact me at (614) 298-2022, or by e-mail at khorrocks@ohiohistory.org, or Joy Williams at jwilliams@ohiohistory.org. Thank you for your cooperation.

Sincerely,

Krista Horrocks, Project Reviews Manager
Resource Protection and Review

RPR Serial No: 1092860-1092861

In reply, refer to
2022-HAN-54568

May 11, 2022

Mr. Ryan J. Weller
Weller & Associates, Inc.
1395 West Fifth Avenue
Columbus, Ohio 43212

RE: Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio

Dear Mr. Weller:

This letter is in response to the correspondence received April 13, 2022 regarding the proposed Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio. We appreciate the opportunity to comment on this project. The comments of the Ohio State Historic Preservation Office (SHPO) are made pursuant to Section 149.53 of the Ohio Revised Code and the Ohio Power Siting Board rules for siting this project (OAC 4906-5). The comments of the Ohio SHPO are also submitted in accordance with the provisions of Section 106 of the National Historic Preservation Act of 1966, as amended (54 U.S.C. 306108 [36 CFR 800]).

The following comments pertain to the *Phase I Archaeological Survey for the 11.3 km (7.0 mi) Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio* by Ryan J. Weller (Weller & Associates, Inc. 2022).

A literature review, visual inspection, surface collection, shovel probe and shovel test unit excavation was completed as part of the investigations. No previously identified archaeological sites are located within the project area. Six (6) new archaeological sites were identified during survey, Ohio Archaeological Inventory (OAI) 33HK1042-33HK1047. None of the sites are recommended eligible for listing in the National Register of Historic Places (NRHP). Our office agrees with this recommendation and no additional archeological investigation is needed.

The following comments pertain to the *History/Architecture Investigations for the Investigations for the 11.3 km (7.0 mi) Rader Road-New Liberty 69kV to 138kV Transmission Line Rebuild/Upgrade Project in Pleasant, Portage, and Liberty Townships, Hancock County, Ohio* by Scott McIntosh (Weller & Associates, Inc. 2022).

A literature review and field survey were completed as part of the investigations. Seventy-five (75) resources 50 years of age or older were identified within the Area of Potential Effects. Weller recommends that none of the resources are eligible for listing in the NRHP. Our office agrees with Weller's recommendations regarding eligibility.

Based on the information provided, we agree that the project as proposed will have no effect on historic properties. No further coordination with this office is necessary, unless the project changes or unless new or additional historic properties are discovered during implementation of this project. In such a situation, this office should be contacted. If you have any questions, please contact me at (614) 298-2022, or by e-mail at khorrocks@ohiohistory.org, or Joy Williams at jwilliams@ohiohistory.org. Thank you for your cooperation.

Sincerely,

Krista Horrocks, Project Reviews Manager
Resource Protection and Review

RPR Serial No: 1092902-1092903

Transmittal Letter Report

East Leipsic – Rader Road 138 kV T Line
Putnam and Hancock Counties, Ohio
April 28, 2023
Terracon Project No. N4225114

Prepared for:
American Electric Power
New Albany, Ohio

Prepared by:
Terracon Consultants, Inc.
Columbus, Ohio

April 28, 2023

American Electric Power
8600 Smiths Mill Road
New Albany, Ohio 43054

Attn: Mr. Kyle A. Oberster
P: (614) 933-2661
E: kaoberster@aep.com

Re: Transmittal Letter Report for Geotechnical Engineering Services
East Leipsic – Rader Road 138 kV T Line
McComb, Ohio
Terracon Project No. N4225114

Dear Mr. Oberster:

We have completed the geotechnical engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. PN4225114 dated March 21, 2022, issued under existing Blanket Contract No. 029549420000X103.The AEP work order number for this project is T10160388-002 and BPID number is P20017004.

This transmittal letter presents the findings of the subsurface exploration conducted for twenty (20) test borings designated B-1 through B-20. Maps showing the site and boring locations are presented in the **Site Location and Exploration Plans** section of this report. The boring logs and results of the laboratory testing performed on selected soil samples obtained during the field exploration are included in the **Exploration Results** section of this report.

The recommended soil parameters for design of drilled shafts using the computer programs MFAD and SHAFT have been developed for each test boring and are included in the **MFAD™ Design Parameters** and **SHAFT™ Design Parameters** sections of this report, respectively.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Ganesh Vairavan
Senior Staff Engineer

Yogesh S. Rege, P.E.
Senior Principal

CONTENTS

DESIGN PARAMETERS FOR DEEP FOUNDATIONS 1
MFAD™ DESIGN PARAMETERS 1
SHAFT™ DESIGN PARAMETERS 10
GENERAL COMMENTS 19

Note: This report was originally delivered in a web-based format. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES
SITE LOCATION AND EXPLORATION PLANS
EXPLORATION RESULTS
SUPPORTING INFORMATION

Note: Refer to each individual Attachment for a listing of contents.

DESIGN PARAMETERS FOR DEEP FOUNDATIONS

Parameters provided in tables below for each boring are ultimate values and designer should apply adequate factor of safety values aligned with their use. A casing if used during construction of the shaft, should be removed after concrete is poured. Casing should not be left in place permanently as during the shaft construction process, voids/gaps could get created between the casing and the surrounding soils. If the casing cannot be removed for some reason, jet grouting should be performed to completely fill the gaps/voids between the casing and the surrounding soils. In that case there may still be a reduction in the skin friction capacity of the shaft, which will have to be evaluated by the project geotechnical and structural engineers.

MFAD™ DESIGN PARAMETERS

Test Boring: B-1

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	9	124	0.50	--	0.75
2	Clay	18.5	128	1.2	--	2.0
3	Clay	33.5	125	0.6	--	1.0
4	Clay	38.5	131	2.5	--	4.0
5	Clay	43.5	126	1.0	--	1.5
6	Clay	50	130	2.0	--	3.5

Static long-term groundwater table anticipated at about 7.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was not encountered while drilling and upon completion[3].

Test Boring: B-2

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength [4] (ksf)
1[2]	Clay	4.5	124	0.5	--	0.75
2	Clay	18.5	130	2.0	--	3.5
3	Clay	28.5	126	1.0	--	1.5
4	Clay	48.5	130	1.75	--	3.0
5	Clay	50	131	2.75	--	4.5

Static long-term groundwater table anticipated at about 18.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was not encountered while drilling and upon completion[3].

Test Boring: B-3

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	7.5	124	0.50	--	0.75
2	Clay	13.5	130	2.0	--	3.5
3	Clay	43.5	128	1.2	--	2.0
4	Clay	50	130	2	--	3.5

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was not encountered while drilling and upon completion[3].

Test Boring: B-4

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	6.0	124	0.50	--	0.75
2	Clay	18.5	126	1.0	--	1.5
3	Clay	23.5	130	2	--	3.5
4	Clay	48.5	126	1.0	--	1.5
5	Clay	50	130	2	--	3.5

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was not encountered while drilling and upon completion[3].

Test Boring: B-5

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	6	123	0.35	--	0.5
2	Clay	13.5	130	2.0	--	3.5
3	Clay	50	125	0.6	--	1.0

Static long-term groundwater table anticipated at about 6 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was not encountered while drilling and upon completion[3].

Test Boring: B-6

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength (ksf)
1[2]	Clay	6	124	0.50	--	0.75
2	Clay	9	126	1.0	--	1.5
3	Clay	28.5	128	1.2	--	2.0
4	Clay	38.5	126	1.0	--	1.5
5	Clay	50	130	1.75	--	3.0

Static long-term groundwater table anticipated at about 6 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-7

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength (ksf)
1[2]	Clay	7.5	123	0.35	--	0.5
2	Clay	13.5	128	1.2	--	2.0
3	Clay	28.5	126	1.0	--	1.5
4	Clay	48.5	128	1.2	--	2.0
5	Clay	50	130	2.0	--	3.5

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-8

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	6	123	0.35	--	0.5
2	Clay	43.5	126	1.0	--	1.5
3	Clay	50	130	1.75	--	3.0

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-9

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	7.5	123	0.35	--	0.5
2	Clay	9.0	130	2.0	--	3.5
3	Clay	18.5	126	1.0	--	1.5
4	Clay	38.5	125	0.6	--	1.0
5	Clay	48.5	130	2.0	--	3.5
6	Sand	50	130	7.0	36	--

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-10

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	7.5	125	0.6	--	1.0
2	Clay	23.5	130	1.75	--	3.0
3	Clay	43.5	125	0.6	--	1.0
4	Clay	50	130	1.75	--	3.0

Static long-term groundwater table anticipated at about 28.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-11

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	3	123	0.35	--	0.5
2	Clay	7.5	125	0.6	--	1.0
3	Clay	13.5	128	1.2	--	2.0
4	Clay	33.5	126	1.0	--	1.5

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
5	Clay	38.5	129	1.5	--	2.5
6	Clay	50	131	2.5	--	4.0

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-12

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	7.5	125	0.6	--	1.0
2	Clay	13.5	128	1.2	--	2.0
3	Clay	38.5	126	1.0	--	1.5
4	Clay	48.5	131	2.75	--	4.5
5	Sand	50	125	1.5	34	--

Static long-term groundwater table anticipated at about 18.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was encountered at 43.5 feet while drilling[3].

Test Boring: B-13

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	4.5	124	0.50	--	0.75
2	Clay	7.5	125	0.6	--	1.0
3	Clay	13.5	130	1.75	--	3.0
4	Clay	18.5	128	1.2	--	2.0
5	Clay	33.5	130	1.75	--	3.0
6	Clay	38.8	131	2.75	--	4.5

Static long-term groundwater table anticipated at about 7.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-14

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	7.5	123	0.35	--	0.5
2	Clay	43.6	126	1.0	--	1.5

Static long-term groundwater table anticipated at about 28.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-15

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	7.5	124	0.50	--	0.75
2	Clay	23.5	128	1.2	--	2.0
3	Clay	28.5	126	1.0	--	1.5
4	Sand	33.5	127	3.5	35	--
5	Sand	38.7	132	8.0	37	--

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-16

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	7.5	124	0.50	--	0.75
2	Clay	9	130	1.75	--	3.0
3	Clay	13.5	126	1.0	--	1.5
4	Clay	33.5	128	1.2	--	2.0
5	Clay	43.5	125	0.6	--	1.0
6	Clay	50	131	2.5	--	4.0

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-17

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	7.5	124	0.50	--	0.75
2	Clay	9.0	130	1.75	--	3.0
3	Clay	28.5	126	1	--	1.5
4	Sand	38.5	130	2	--	3.5
5	Dolomite (Rock modeled as clay)	40	131	2.75	--	4.5
6	Dolomite	50	See table below for rock properties			

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Layer Number	Material Type	Approximate Depth to Bottom of Layer (feet) [1]	Effective Rock Cohesion (ksf)	Effective Friction Angle for Rock (degrees)	Rock/ Concrete Bond Strength (ksf)	Deformation Modulus (ksi)
6	Dolomite	50	3.7	38	20	1,442

Test Boring: B-18

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength [4] (ksf)
1[2]	Clay	6	124	0.50	--	0.75
2	Clay	18.5	126	1.0	--	1.5
3	Clay	23.5	124	0.50	--	0.75
4	Clay	28.5	129	1.5	--	2.5
5	Clay	33.5	130	2.0	--	3.5
6	Clay	38.5	131	2.5	--	4.0
7	Dolomite	48.5	See table below for rock properties			

Static long-term groundwater table anticipated at about 6 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was encountered at 13.5 feet while drilling[3].

Layer Number	Material Type	Approximate Depth to Bottom of Layer (feet) [1]	Effective Rock Cohesion (ksf)	Effective Friction Angle for Rock (degrees)	Rock/ Concrete Bond Strength (ksf)	Deformation Modulus (ksi)
7	Dolomite	48.5	3.7	38	20	1,442

Test Boring: B-19

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	3	123	0.35	--	0.5
2	Clay	23.5	126	1.0	--	1.5
3	Clay	28.5	130	1.75	--	3.0
4	Clay	32.2	131	2.75	--	4.5

Static long-term groundwater table anticipated at about 6 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-20

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	7.5	124	0.50	--	0.75
2	Clay	9	130	2.0	--	3.5
3	Clay	18.5	126	1	--	1.5
4	Clay	23.5	130	2	--	3.5
5	Clay	29	131	2.75	--	4.5
6	Dolomite	39	See table below for rock properties			

Static long-term groundwater table anticipated at about 18.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Layer Number	Material Type	Approximate Depth to Bottom of Layer (feet) [1]	Effective Rock Cohesion (ksf)	Effective Friction Angle for Rock (degrees)	Rock/ Concrete Bond Strength (ksf)	Deformation Modulus (ksi)
5	Dolomite	39	3.7	38	20	1,442

Notes:

1. Depth referenced to existing ground surface. Minimum drilled shaft length of 10 feet recommended.
2. The resistance of the uppermost 2 feet of the soil should be ignored due to the potential for disturbance caused during the drilled shaft construction operation.
3. Groundwater level fluctuations occur due to the change in water level in the nearby creek and other factors not evident at the time the borings were performed, hence may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.
4. Our borings encountered variability in soil strength, with generally higher strength soils overlying lower strength soils. Therefore, we recommend that when calculating the end bearing capacity of the drilled shaft, in order to be able to use the prescribed soil parameters of the subject soil bearing stratum, that soil stratum should extend at least three times the drilled shaft diameter below the bottom of the drilled shaft. If this condition is not met, and the strength parameters of the soil stratum below the bearing soil stratum are less than those of the bearing stratum, then the soil parameters of the lowest strength layer below within the three diameters depth, should be used in calculating the end bearing capacity.

SHAFT™ DESIGN PARAMETERS

Test Boring: B-1

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	9	124	750	0.55	--	--	--	--
2	Clay	18.5	128	2,000	0.55	--	--	7.0	--
3	Clay	33.5	125	1,000	0.55	--	--	7.0	--
4	Clay	38.5	131	4,000	0.51	--	--	7.0	--
5	Clay	43.5	126	1,500	0.55	--	--	7.0	--
6	Clay	50	130	3,500	0.53	--	--	7.0	--

Static long-term groundwater table anticipated at about 7.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-2

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	4.5	124	750	0.55	--	--	--	--
2	Clay	18.5	130	3,500	0.53	--	--	7.0	--
3	Clay	28.5	126	1,500	0.55	--	--	7.0	--
4	Clay	48.5	130	3,000	0.55	--	--	7.0	--
5	Clay	50	131	4,500	0.49	--	--	7.0	--

Static long-term groundwater table anticipated at about 18.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was not encountered while drilling and upon completion[4].

Test Boring: B-3

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	7.5	124	750	0.55	--	--	--	--

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
2	Clay	13.5	130	3,500	0.53	--	--	7.0	--
3	Clay	43.5	128	2,000	0.55	--	--	7.0	--
4	Clay	50	130	3,500	0.53	--	--	7.0	--

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was encountered at 33.5 feet while drilling [4].

Test Boring: B-4

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	6	124	750	0.55	--	--	--	--
2	Clay	18.5	126	1,500	0.55	--	--	7.0	--
3	Clay	23.5	130	3,500	0.53	--	--	7.0	--
4	Clay	48.5	126	1,500	0.55	--	--	7.0	--
5	Clay	50	130	3,500	0.53	--	--	7.0	--

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was not encountered while drilling and upon completion [4].

Test Boring: B-5

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	6	123	500	0.55	--	--	--	--
2	Clay	13.5	130	3,500	0.53	--	--	7.0	--
3	Clay	50	125	1,000	0.55	--	--	7.0	--

Static long-term groundwater table anticipated at about 6 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was not encountered while drilling and upon completion [4].

Test Boring: B-6

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	6	124	750	0.55	--	--	--	--
2	Clay	9	126	1,500	0.55	--	--	--	--
3	Clay	28.5	128	2,000	0.55	--	--	7.0	--
4	Clay	38.5	126	1,500	0.55	--	--	7.0	--
5	Clay	50	130	3,000	0.55	--	--	7.0	--

Static long-term groundwater table anticipated at about 6 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-7

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	7.5	123	500	0.55	--	--	--	--
2	Clay	13.5	128	2,000	0.55	--	--	7.0	--
3	Clay	28.5	126	1,500	0.55	--	--	7.0	--
4	Clay	48.5	128	2,000	0.55	--	--	7.0	--
5	Clay	50	130	3,500	0.53	--	--	7.0	--

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-8

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	6	123	500	0.55	--	--	--	--
2	Clay	43.5	126	1,500	0.55	--	--	7.0	--
3	Clay	50	130	3,000	0.55	--	--	7.0	--

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion [4].

Test Boring: B-9

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	7.5	123	500	0.55	--	--	--	--
2	Clay	9.0	130	3,500	0.53	--	--	--	--
3	Clay	18.5	126	1,500	0.55	--	--	7.0	--
4	Clay	38.5	125	1,000	0.55	--	--	7.0	--
5	Clay	48.5	130	3,500	0.53	--	--	7.0	--
6	Sand	50	130	--	--	36	0.5	--	87

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion [4].

Test Boring: B-10

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	7.5	125	1,000	0.55	--	--	--	--
2	Clay	23.5	130	3,000	0.55	--	--	7.0	--
3	Clay	43.5	125	1,000	0.55	--	--	7.0	--
4	Clay	50	130	3,000	0.55	--	--	7.0	--

Static long-term groundwater table anticipated at about 28.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion [4].

Test Boring: B-11

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	3	123	500	0.55	--	--	--	--
2	Clay	7.5	125	1,000	0.55	--	--	--	--
3	Clay	13.5	128	2,000	0.55	--	--	7.0	--
4	Clay	33.5	126	1,500	0.55	--	--	7.0	--
5	Clay	38.5	129	2,500	0.55	--	--	7.0	--
6	Clay	50	131	4,000	0.51	--	--	7.0	--

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion [4].

Test Boring: B-12

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	7.5	125	1,000	0.55	--	--	--	--
2	Clay	13.5	128	2,000	0.55	--	--	7.0	--
3	Clay	38.5	126	1,500	0.55	--	--	7.0	--
4	Clay	48.5	131	4,500	0.49	--	--	7.0	--
5	Sand	50	125	--	--	34	0.7	--	62

Static long-term groundwater table anticipated at about 18.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was encountered at 43.5 feet while drilling [4].

Test Boring: B-13

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	4.5	124	750	0.55	--	--	--	--
2	Clay	7.5	125	1,000	0.55	--	--	--	--
3	Clay	13.5	130	3,500	0.53	--	--	7.0	--

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
4	Clay	18.5	128	2,000	0.55	--	--	7.0	--
5	Clay	33.5	130	3,000	0.55	--	--	7.0	--
6	Clay	38.8	131	4,500	0.49	--	--	7.0	--

Static long-term groundwater table anticipated at about 7.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-14

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	7.5	123	500	0.55	--	--	--	--
2	Clay	43.6	126	1,500	0.55	--	--	7.0	--

Static long-term groundwater table anticipated at about 28.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-15

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	7.5	124	750	0.55	--	--	--	--
2	Clay	23.5	128	2,000	0.55	--	--	7.0	--
3	Clay	28.5	126	1,500	0.55	--	--	7.0	--
4	Sand	33.5	127	--	--	35	0.48	--	74
5	Sand	38.7	132	--	--	37	0.52	--	102

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-16

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	7.5	124	750	0.55	--	--	--	--
2	Clay	9	130	3,000	0.55	--	--	--	--
3	Clay	13.5	126	1,500	0.55	--	--	7.0	--
4	Clay	33.5	128	2,000	0.55	--	--	7.0	--
5	Clay	43.5	125	4,000	0.51	--	--	7.0	--

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion [4].

Test Boring: B-17

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	7.5	124	750	0.55	--	--	--	--
2	Clay	9.0	130	3,000	0.55	--	--	--	--
3	Clay	28.5	126	1,500	0.55	--	--	7.0	--
4	Clay	38.5	130	3,500	0.53	--	--	7.0	--
5	Clay[a]	40	131	4,500	0.49	--	--	7.0	--
6	Dolomite	50	145	See table below for rock properties.					

a. Dolomite modeled as clay.

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion [4].

Layer No.	Rock Type	Depth to Bottom of Layer [1] (feet)	Rock Compressive Strength (psi)	Elastic Modulus (psi)	Discontinuity Spacing (feet)	Discontinuity Thickness (feet)	RQD (%)
6	Strong rock (Dolomite)	50	3,000	96,000	2.0	0.1	54

Test Boring: B-18

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	6	124	750	0.55	--	--	--	--
2	Clay	18.5	126	1,500	0.55	--	--	7.0	--
3	Clay	23.5	124	750	0.55	--	--	7.0	--
4	Clay	28.5	129	2,500	0.55	--	--	7.0	--
5	Clay	33.5	130	3,500	0.53	--	--	7.0	--
6	Clay	38.5	131	4,000	0.51	--	--	7.0	--
7	Dolomite	48.5	145	See table below for Rock properties					

Static long-term groundwater table anticipated at about 6 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was encountered at 13.5 feet while drilling[4].

Layer No.	Rock Type	Depth to Bottom of Layer[1] (feet)	Rock Compressive Strength (psi)	Elastic Modulus (psi)	Discontinuity Spacing (feet)	Discontinuity Thickness (feet)	RQD (%)
7	Strong rock (Dolomite)	48.5	2,400	108,000	2.0	0.1	64

Test Boring: B-19

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	3	123	500	0.55	--	--	--	--
2	Clay	23.5	126	1,500	0.55	--	--	7.0	--
3	Clay	28.5	130	3,500	0.53	--	--	7.0	--
4	Clay	32.2	131	4,500	0.49	--	--	7.0	--

Static long-term groundwater table anticipated at about 6 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-20

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	7.5	124	750	0.55	--	--	--	--
2	Clay	9	130	3,500	0.53	--	--	--	--
3	Clay	18.5	126	1,500	0.55	--	--	7.0	--
4	Clay	23.5	130	3,500	0.53	--	--	7.0	--
5	Clay	29	131	4,500	0.49	--	--	7.0	--
6	Dolomite	39	145	See table below for Rock properties					

Static long-term groundwater table anticipated at about 18.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion [4].

Layer No.	Rock Type	Depth to Bottom of Layer [1] (feet)	Rock Compressive Strength (psi)	Elastic Modulus (psi)	Discontinuity Spacing (feet)	Discontinuity Thickness (feet)	RQD (%)
6	Strong rock (Dolomite)	39	5,600	187,000	2.0	0.1	60

Notes:

1. Depth referenced to existing ground surface.
2. The resistance of the uppermost 2 feet of the soil should be ignored due to the potential for disturbance caused during the drilled shaft construction operation.
3. Bearing capacity factor N_c = 7 is based on assumption that drilled shaft are constructed by the slurry displacement method. This value could be increased to 8 when drilled shafts are constructed using dry casing method.
4. Groundwater level fluctuations occur due to change in water level in the nearby creek and other factors not evident at the time the boring was performed, hence may be higher or lower than the levels indicated on the boring log. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.
5. Our borings encountered variability in soil strengths, with generally higher strength soils overlying lower strength soils. Therefore, we recommend that when calculating the end bearing capacity of the drilled shaft, in order to be able to use the recommended soil parameters of the subject soil bearing stratum, that soil stratum should extend at least three times the drilled shaft diameter below the proposed bottom of the drilled shaft. If this condition is not met, and the strength parameters of the soil stratum below the bearing soil stratum are less than those of the bearing stratum, then the soil parameters of the lowest strength layer below within the three diameters depth, should be used in calculating the end bearing capacity.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES
SITE LOCATION AND EXPLORATION PLANS
EXPLORATION RESULTS
SUPPORTING INFORMATION

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Number of Borings	Boring Depth (feet)	Planned Location
20	32.2 to 50	Transmission Line Structures

Boring Layout and Elevations: The subsurface exploration consisted of drilling and sampling of twnety test borings designated as B-1 through B-20 to an approximate depth of 50 feet below existing surface grade. Boring locations and elevations were determined in field by Terracon personnel with a hand-held survey grade GPS unit. The locations and elevations of the test borings should be considered accurate only to the degree implied by the means and methods used to define them.

Subsurface Exploration Procedures: We advanced the borings with an ATV mounted rig, using continuous flight hollow-stem augers. The soil encountered in the borings was generally sampled continuously to 10.5 feet and at 5-foot intervals thereafter using a 2-inch outside diameter split-barrel Standard Penetration Test (SPT) sampler. The soil samples were obtained by driving the SPT sampler 18 inches into the soil with a 140-pound automatic hammer free-falling 30 inches. The number of blows required for each 6 inches of penetration was recorded. The blow count "N-value" of the soil was calculated as the number of blows required for the final 12 inches of the typical total 18-inch-penetration. This SPT resistance value, or N-value, provides a measure of the relative density of granular soils and the relative consistency of cohesive soils. The field recorded blow counts and N-values are shown on the boring logs at the respective sample depths

An automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A greater efficiency is typically achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. Published correlations between the SPT values and soil properties are based on the lower efficiency cathead and rope method. This higher efficiency affects the standard penetration resistance blow count (N) value by increasing the penetration per hammer blow over what would be obtained using the cathead and rope method.

The spilt-barrel samples were sealed in watertight glass jars. All samples were returned to Terracon's laboratory for testing and classification. Upon completion, the borings were backfilled with a cement-bentonite grout.

Rock coring was performed in the borings using NQ2-size double tube-swivel core barrel tooling. Percentage recovery and rock quality designation (RQD) were calculated for the core samples and is noted at its depth of occurrence on the boring logs.

A field log for the borings was prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The final boring logs included in this report represents the engineer's interpretation of the field logs and includes modifications based on laboratory observation and testing of select samples. Observations of groundwater conditions made during drilling included on the boring logs represents a short-term condition and may or may not be representative of the long-term groundwater conditions at the site.

Laboratory Testing

Descriptive classifications of the soil indicated on the boring logs are in accordance with the enclosed General Notes, and the Unified Soil Classification System presented in Attachments. Atterberg Limits, grain size distribution, moisture content, and hand penetrometer tests were performed on select soil samples. The tests were performed in general accordance with the test methods of ASTM procedures. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods are applied because of local practice or professional judgment.

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D422 Standard Test Method for Particle-Size Analysis of Soils
- ASTM D7012 Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under varying States of Stress and Temperatures

The laboratory testing program often included examination of soil samples by an engineer. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System.

Rock classification was conducted using locally accepted practices for engineering purposes; petrographic analysis may reveal other rock types. Rock core samples typically provide an improved specimen for this classification. Boring log rock classification was determined using the Description of Rock Properties.

SITE LOCATION AND EXPLORATION PLAN

Contents:

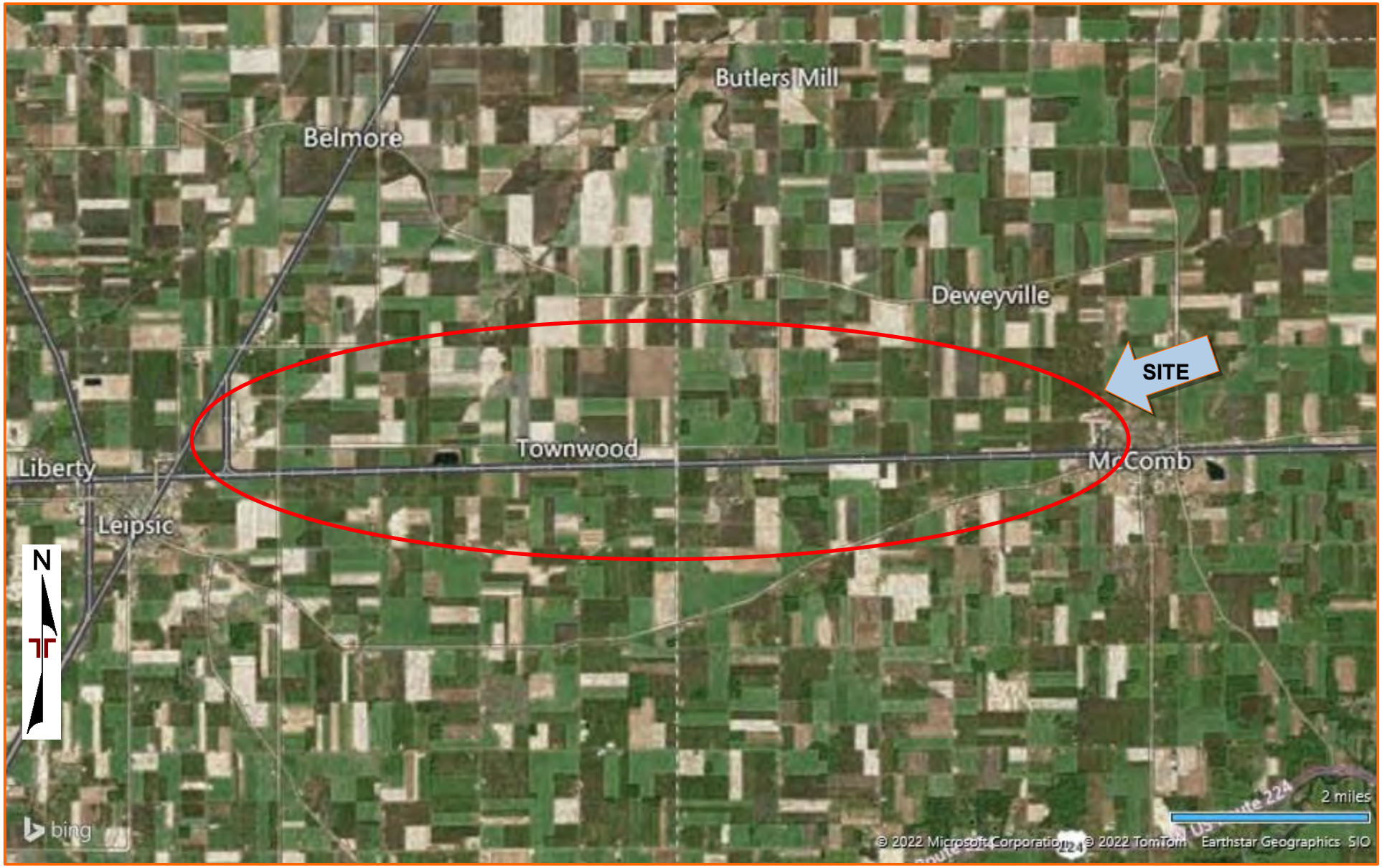
Site Location Plan
Exploration Plan (20 pages)

Note: All attachments are one page unless noted above.

SITE LOCATION

East Leipsic - Rader Road 138 kV T Line ■ McComb, OH
August 9, 2022 ■ Terracon Project No. N4225114

Terracon GeoReport



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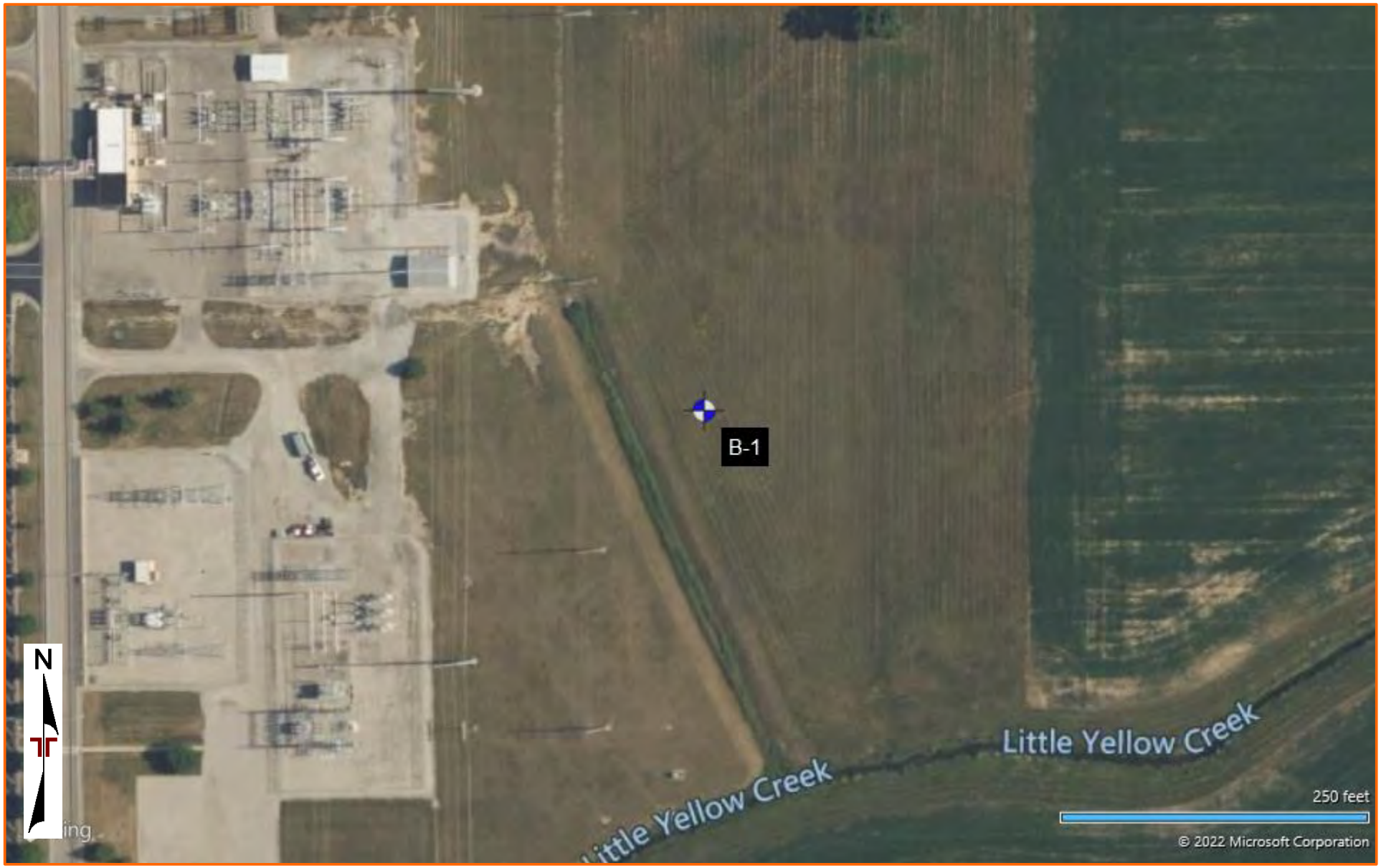
EXPLORATION PLAN

East Leipsic - Rader Road 138 kV T Line ■ McComb, OH

August 9, 2022 ■ Terracon Project No. N4225114



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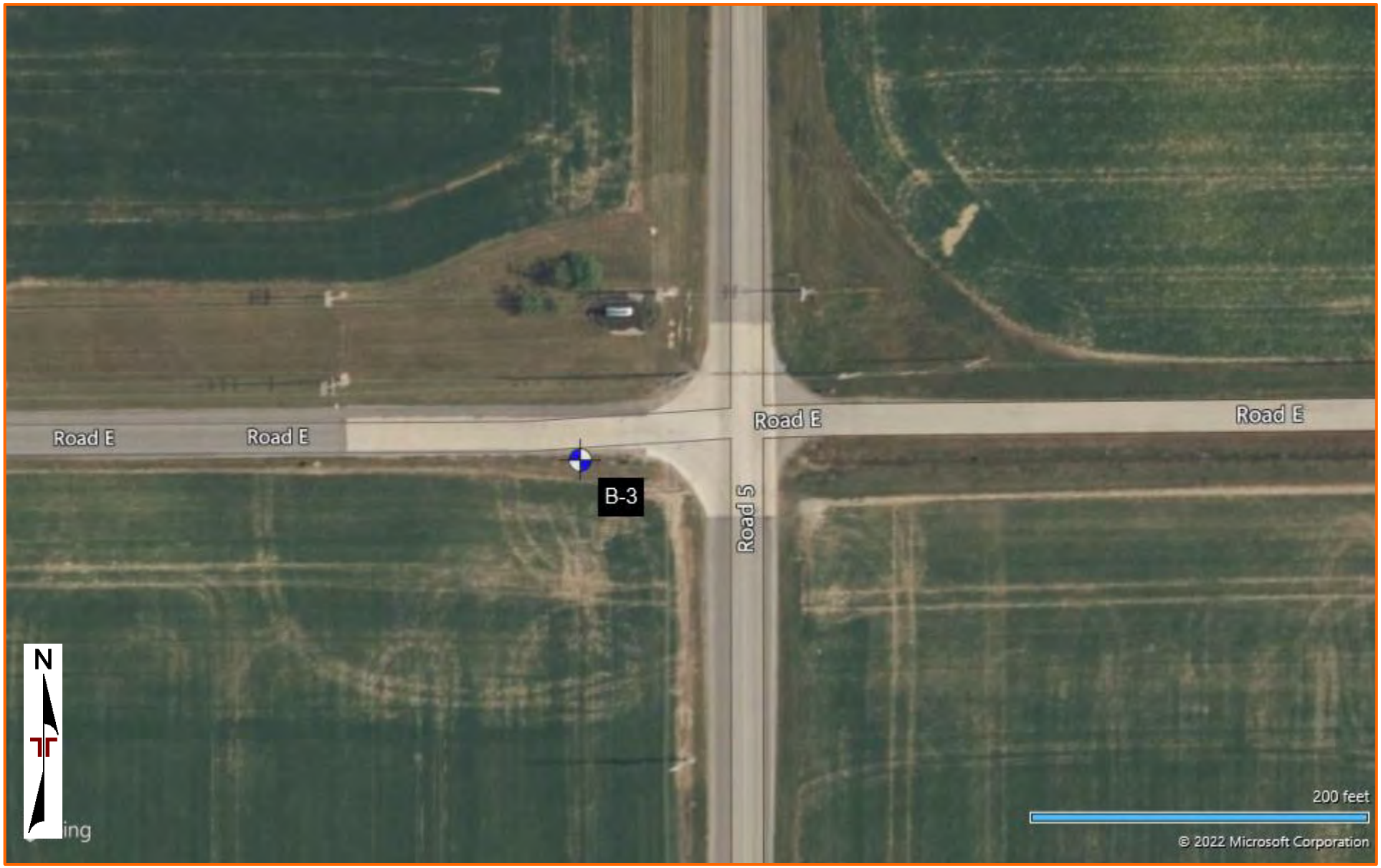

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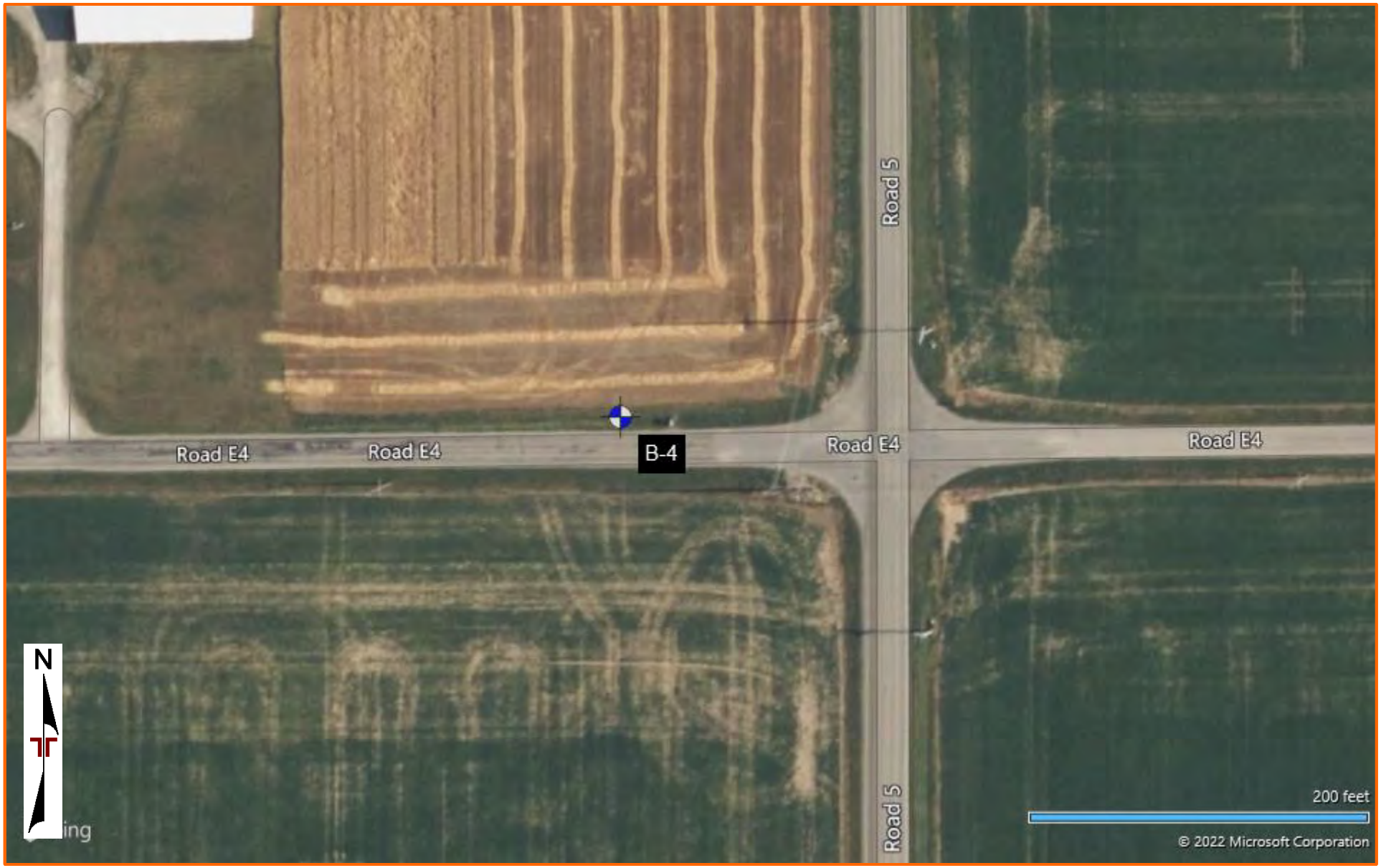

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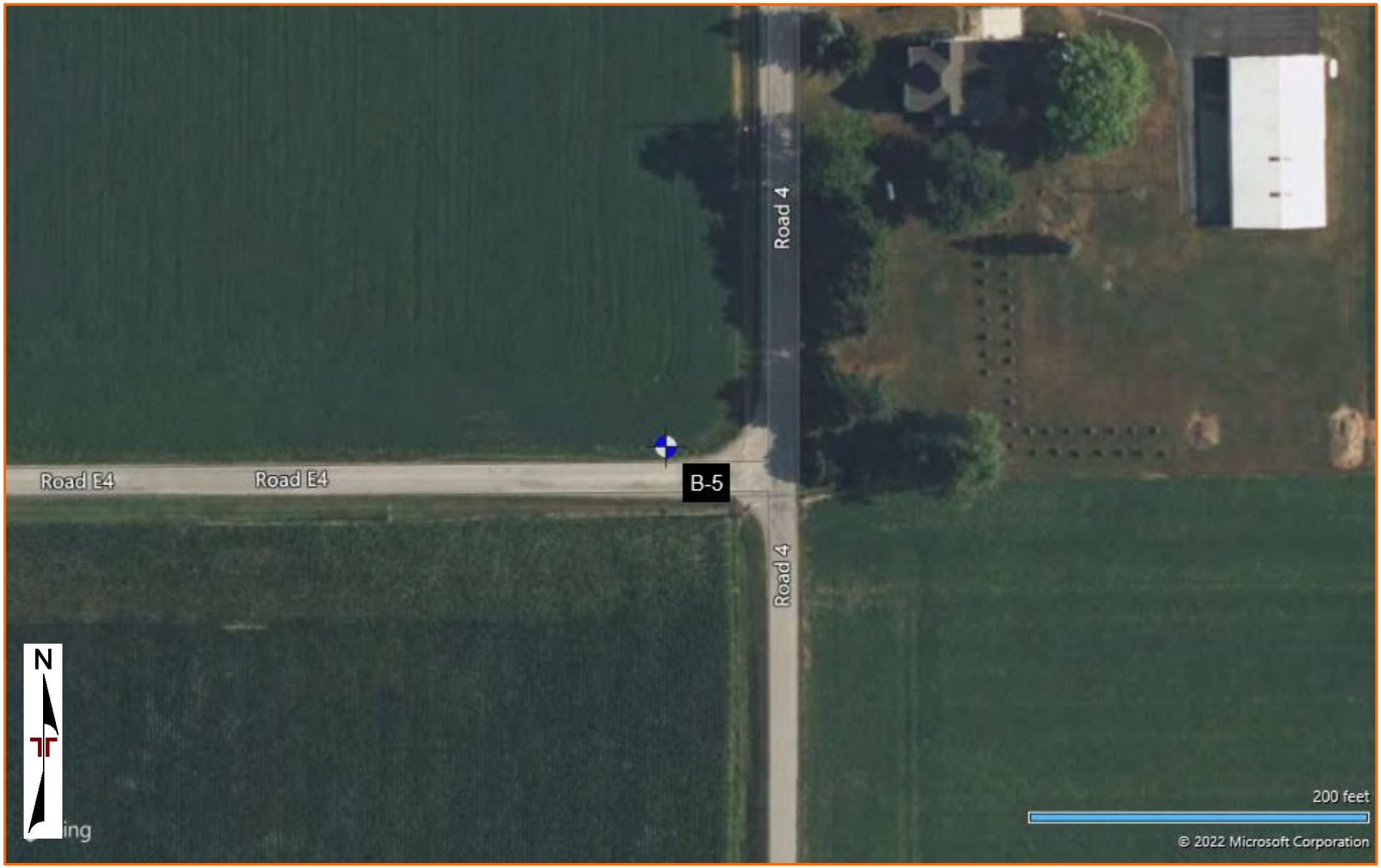

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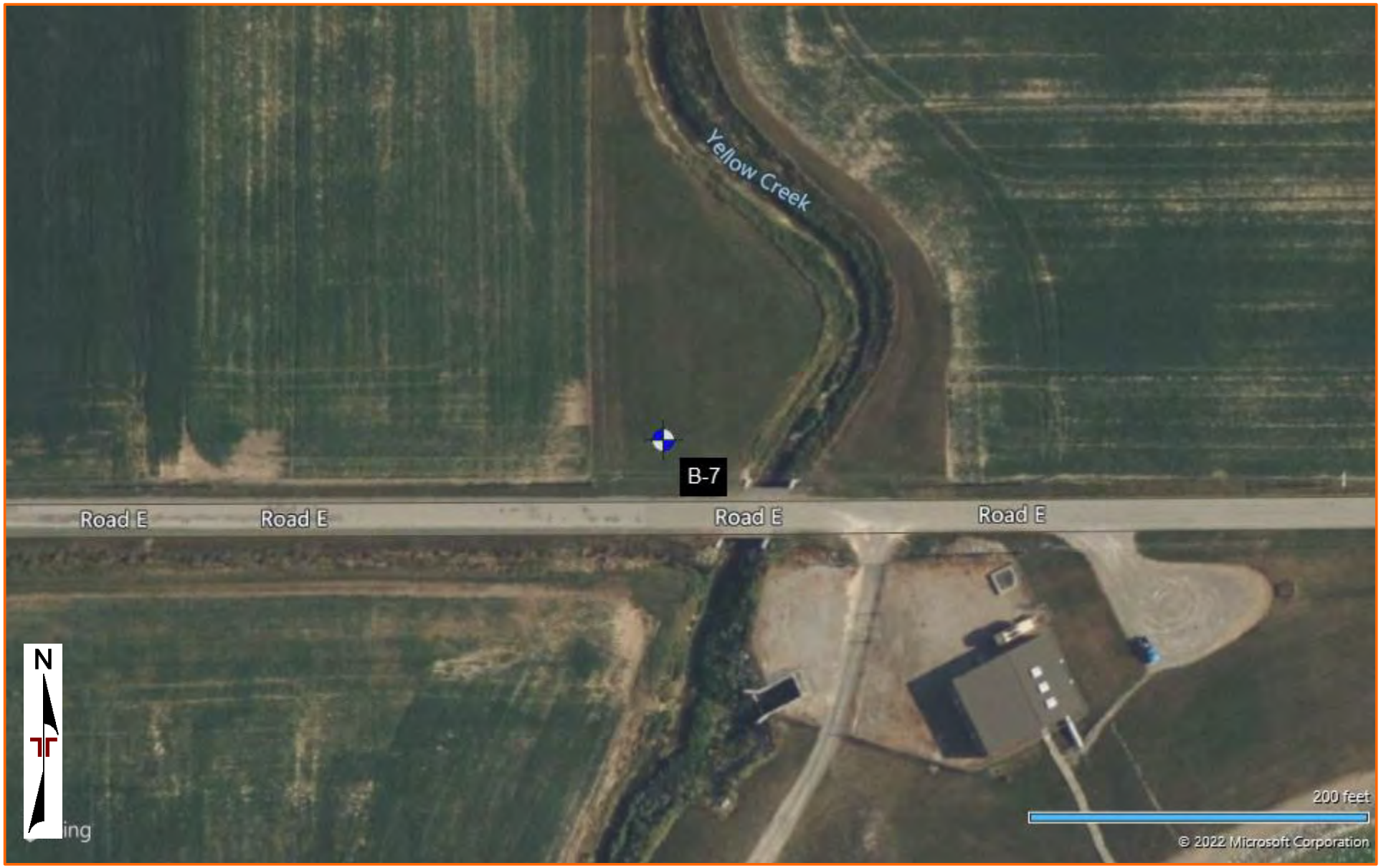

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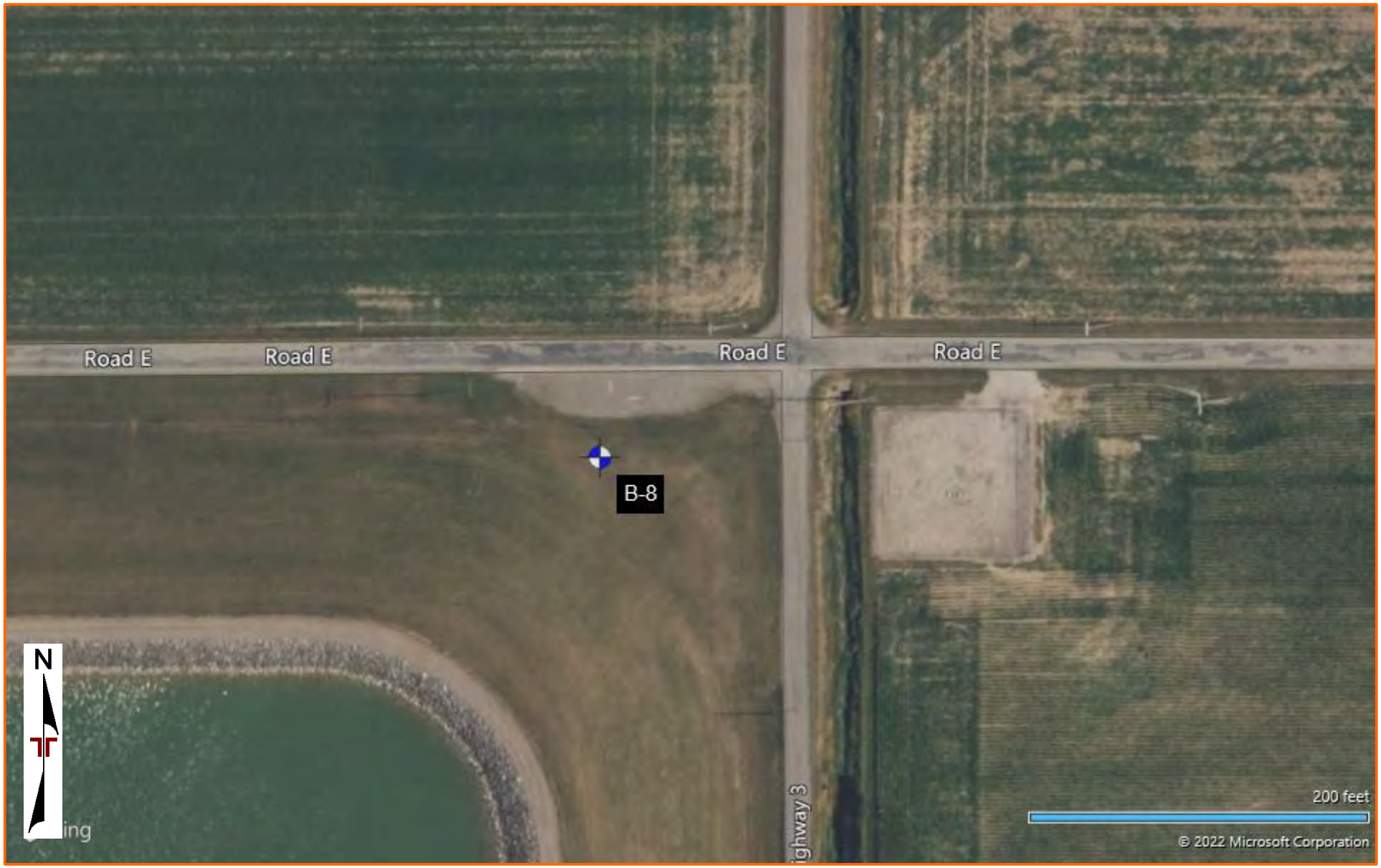

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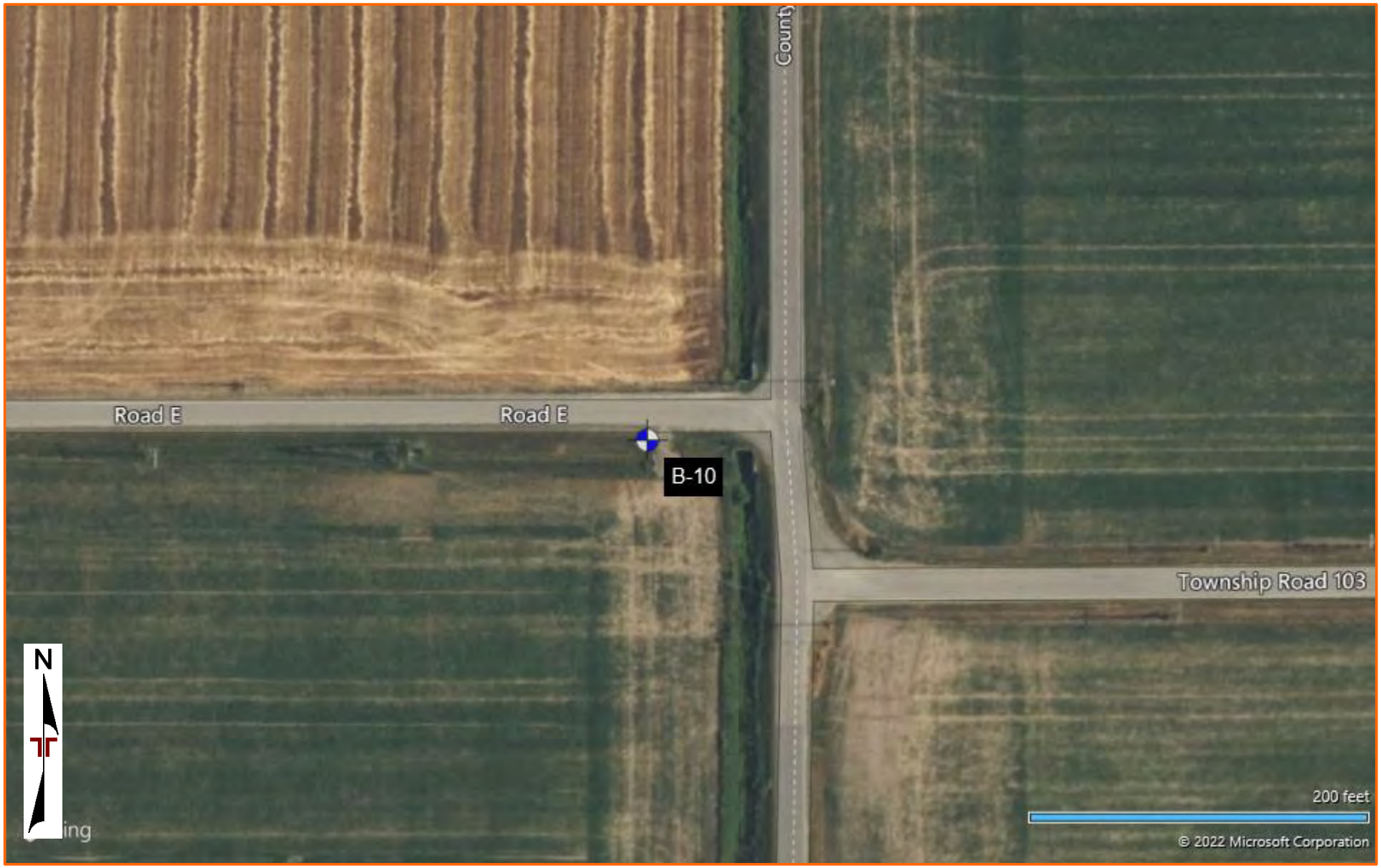

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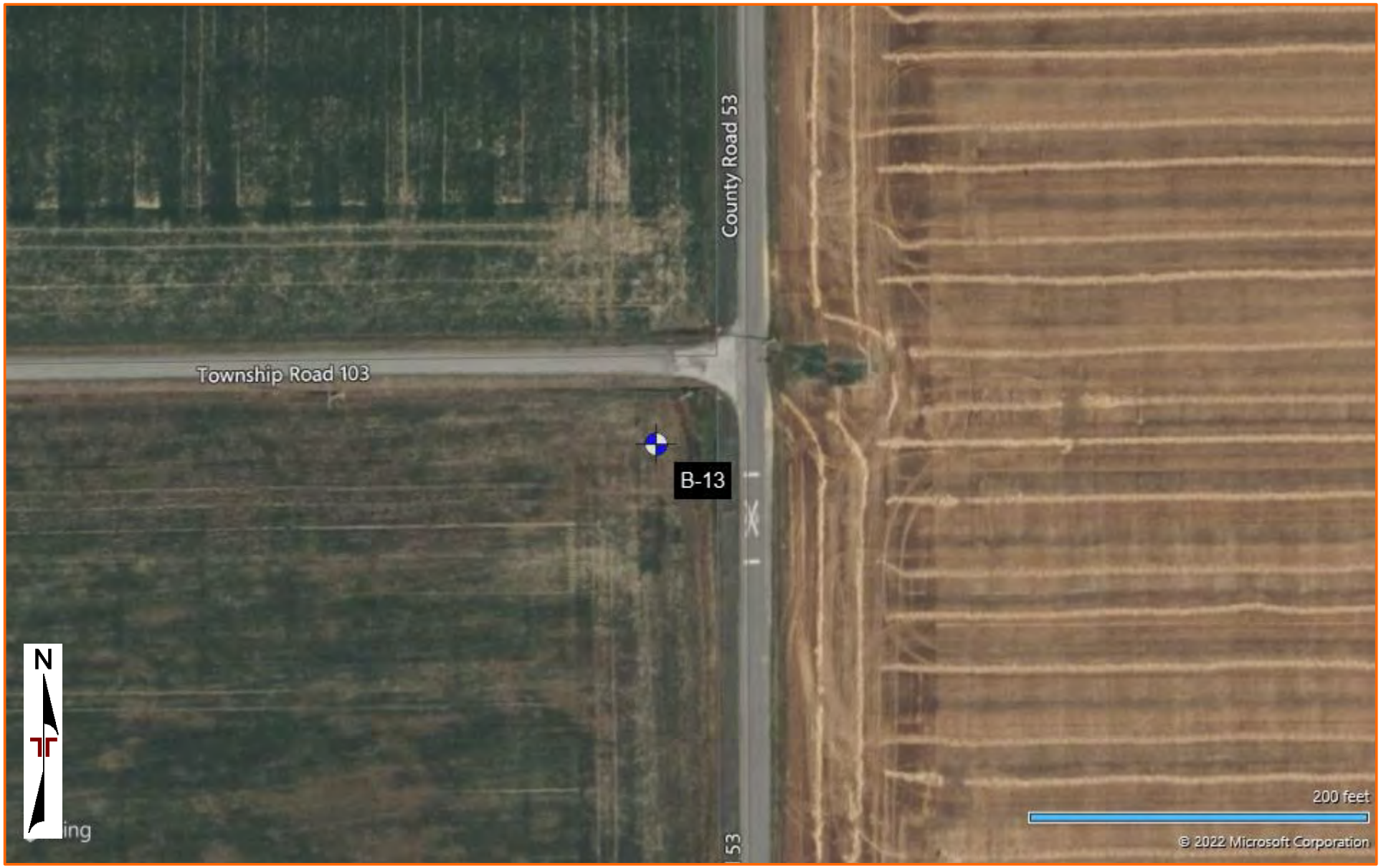

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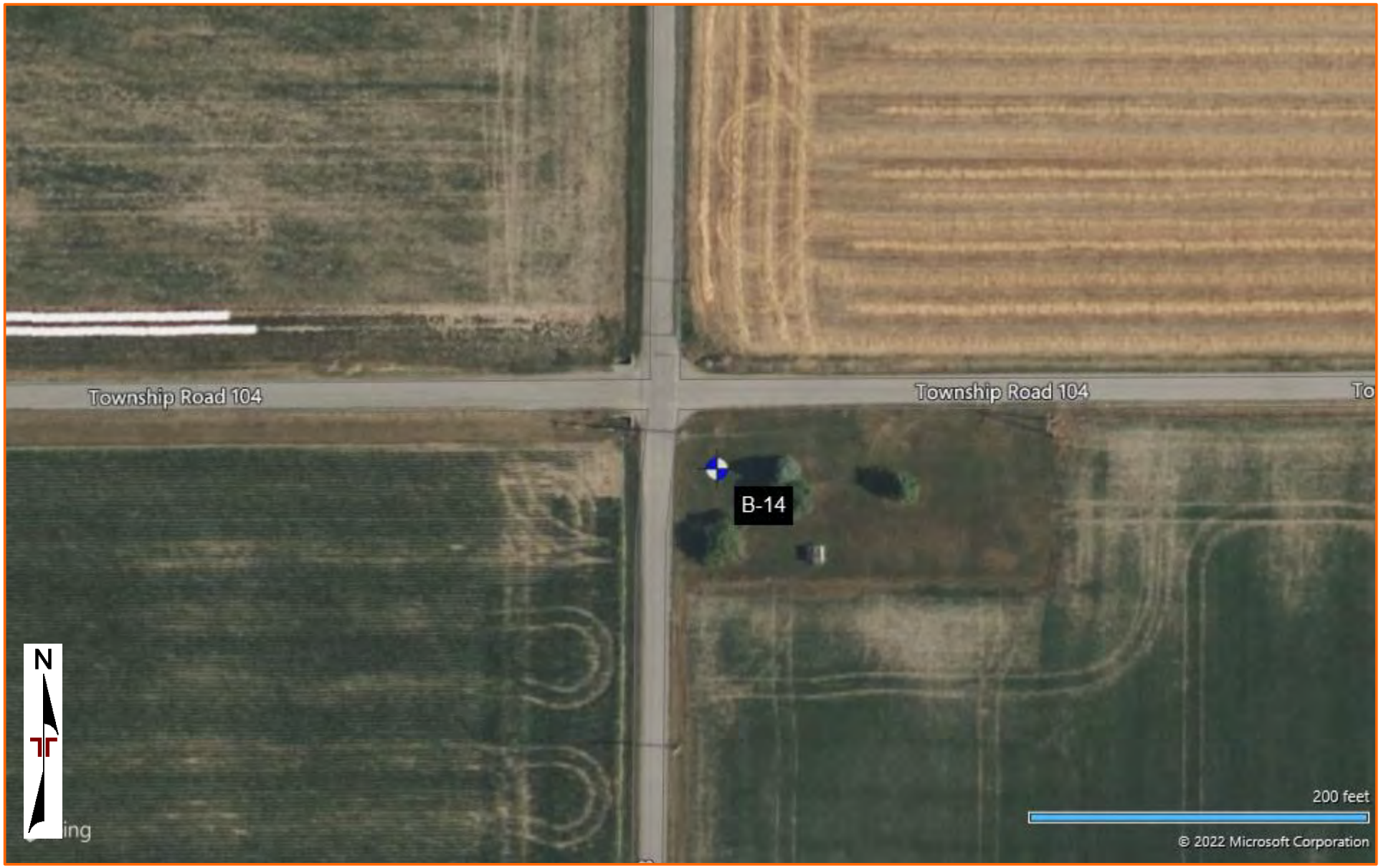

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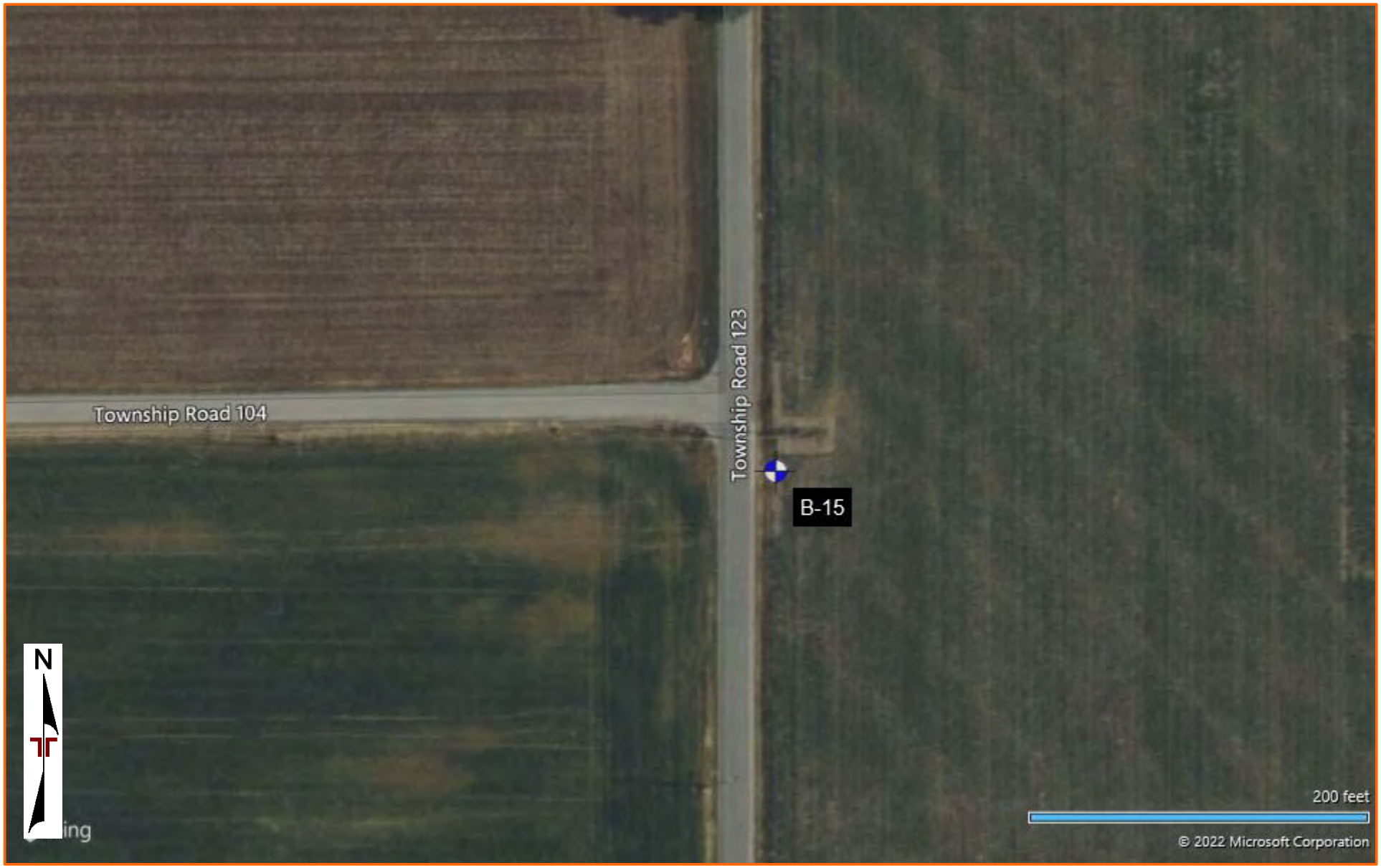

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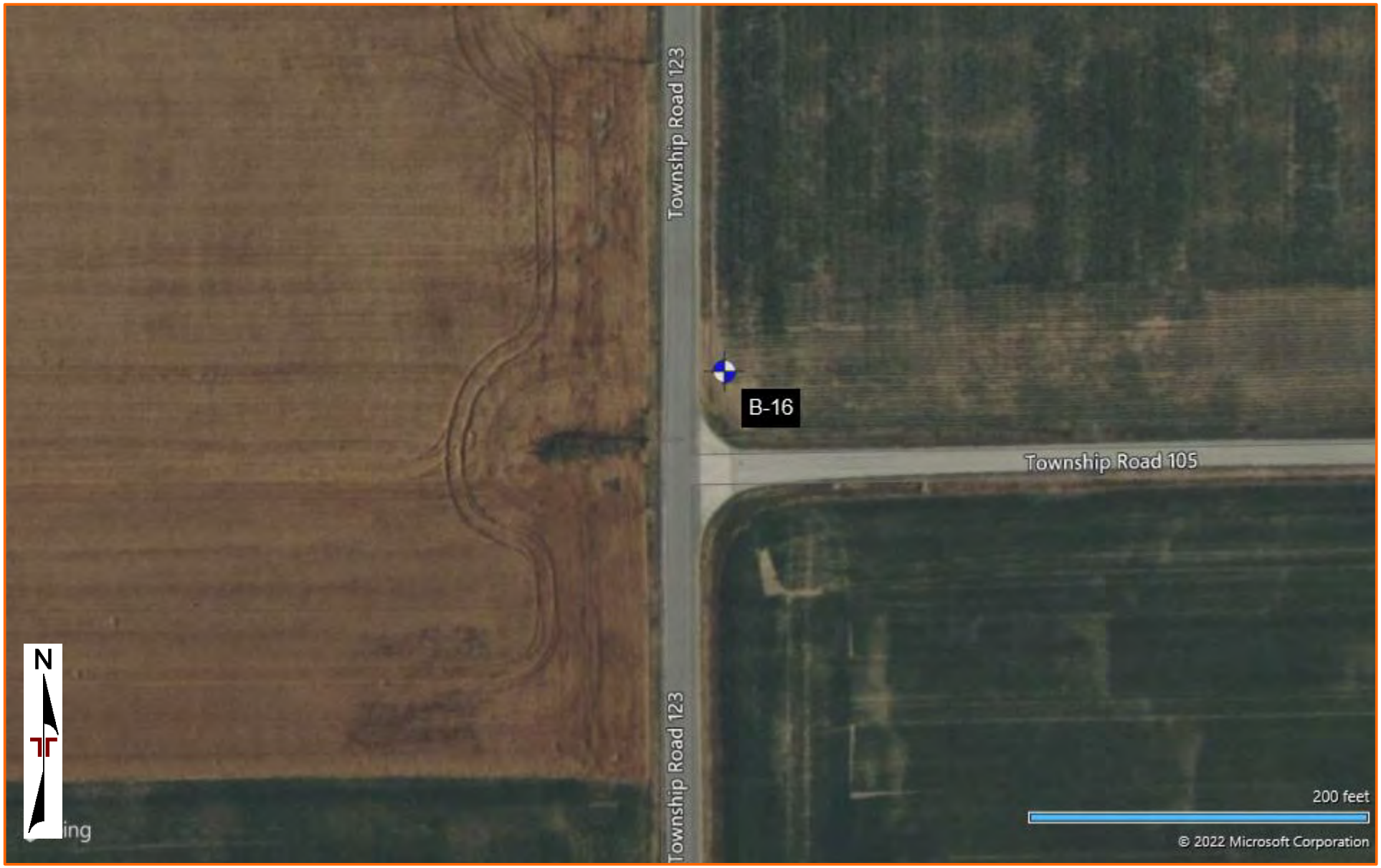

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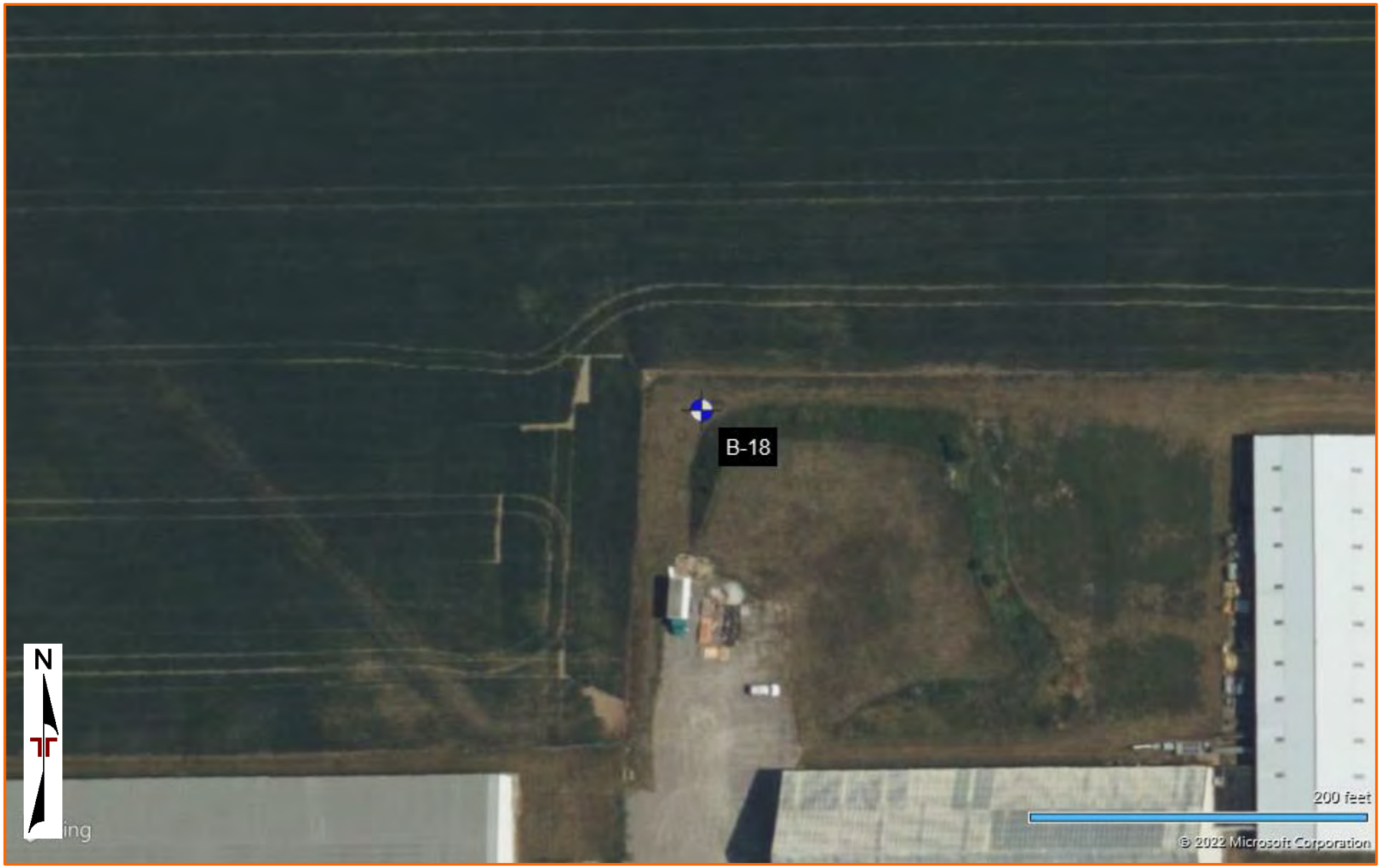

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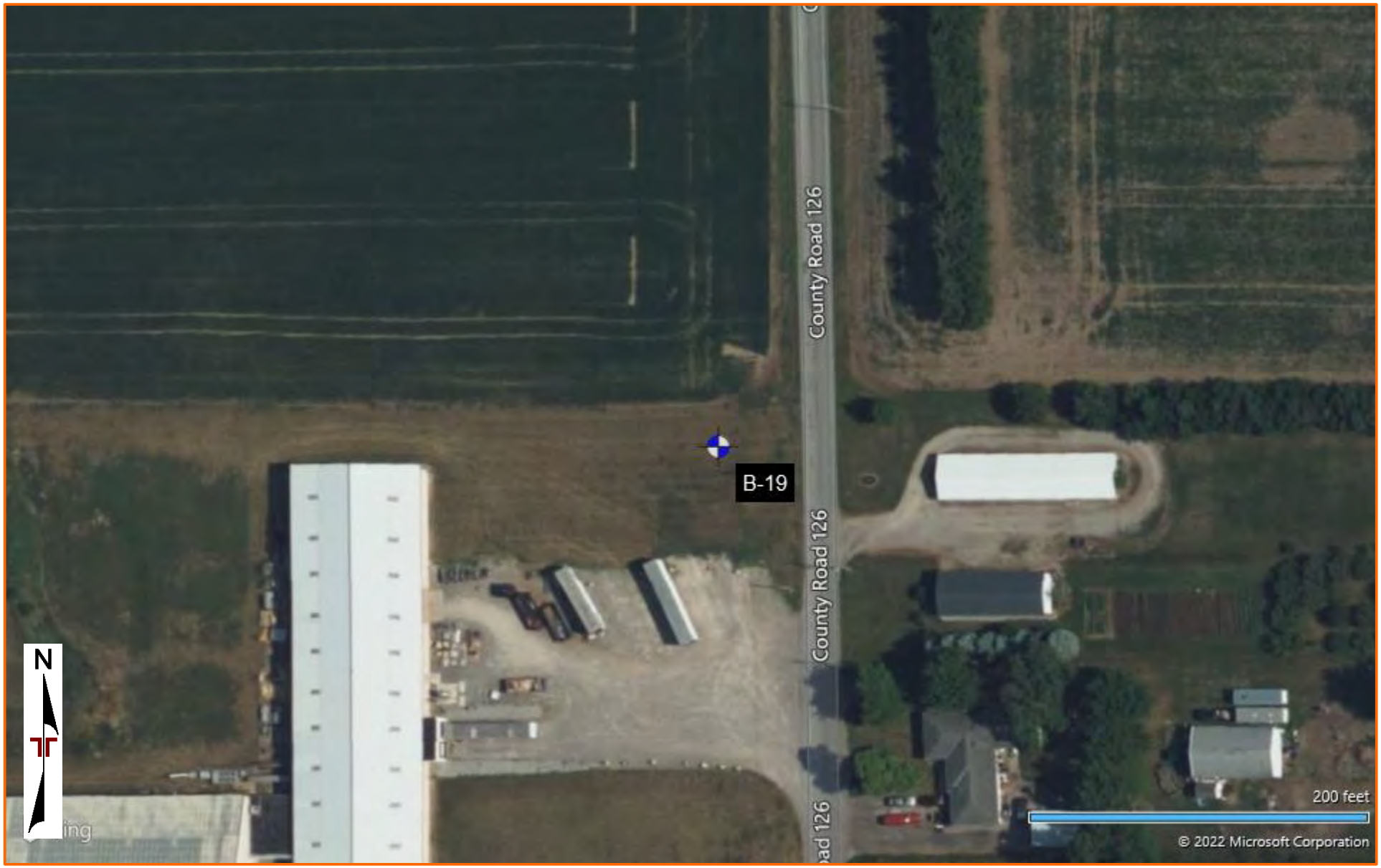

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August 9, 2022 ■ Terracon Project No. N4225114

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EXPLORATION RESULTS

Contents:

Boring Logs (B-1 through B-20)
Atterberg Limits (4 pages)
Grain Size Distribution (13 pages)

Note: All attachments are one page unless noted above.

BORING LOG NO. B-1

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1115° Longitude: -83.9635°

Approximate Surface Elev.: 748 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DESCRIPTION	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	747.5+/-	**TOPSOIL (4.0")**							
		LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff to stiff - rootlets observed from 0' to 1.5'			14	2-3-3 N=6	1.0	18.0	
					14	2-4-5 N=9	1.5	17.0	
					12	1-3-5 N=8	1.0	22.0	
			5		12	3-6-5 N=11	1.5	19.0	43-13-30
					10	2-6-6 N=12	2.0	21.0	
		- color changes to gray below 7.5'			12	2-3-7 N=10	2.5	16.0	
			10		18	3-5-9 N=14	3.5	16.0	
					16	4-6-8 N=14	4.0	16.0	36-13-23
			15						
		- encountered possible cobbles/boulders			1	2-4-6 N=10	-	4.0	
			20						
23.5	724.5+/-								
		LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff			16	3-3-6 N=9	2.5	17.0	
			25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-18-2022 | Boring Completed: 04-18-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-1

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1115° Longitude: -83.9635°

Approximate Surface Elev.: 748 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
			30		X	18	4-5-7 N=12	3.0			18.0	29-13-16
			35		X	18	7-9-13 N=22	4.5			20.0	
			40		X	18	3-5-8 N=13	3.0			23.0	
			45		X	18	5-7-10 N=17	3.5			28.0	
50.0	698+/-		50		X	18	4-8-11 N=19	4.0			26.0	

LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff *(continued)*

Boring Terminated at 50 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-18-2022 | Boring Completed: 04-18-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-2

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1091° Longitude: -83.9639°

Approximate Surface Elev.: 748 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3 **TOPSOIL (3.0")**	748+/-										
1.5 **LEAN CLAY WITH SAND (CL)**, trace gravel, brown, medium stiff	746.5+/-				12	2-3-4 N=7	1.0			21.0	
LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff					10	2-4-5 N=9	1.5			23.0	
					12	2-4-6 N=10	2.0			18.0	
		5			10	5-8-12 N=20	4.5			18.0	36-16-20
					12	4-8-9 N=17	3.5			17.0	
					14	4-7-11 N=18	4.0			16.0	
		10			12	4-8-13 N=21	4.5			17.0	
					12	5-9-10 N=19	4.5			18.0	
		15									
- color changes to gray below 18.5'					14	3-4-6 N=10	2.0			17.0	32-14-18
		20									
					14	2-5-7 N=12	2.5			18.0	
		25									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-19-2022 | Boring Completed: 04-19-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-2

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1091° Longitude: -83.9639°

Approximate Surface Elev.: 748 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
30				X	14	4-7-9 N=16	4.0			18.0	36-13-23
35				X	1	4-6-10 N=16	4.0			17.0	
40				X	18	3-6-8 N=14	3.5			20.0	
45				X	16	6-6-10 N=16	3.5			26.0	
50				X	18	5-9-18 N=27	3.5			24.0	
50.0	698+/-										

LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff *(continued)*

Boring Terminated at 50 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-19-2022 | Boring Completed: 04-19-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-3

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1092° Longitude: -83.9581°

Approximate Surface Elev.: 746 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DESCRIPTION
0.2	746+/-	**TOPSOIL (2.0")**
		FAT CLAY WITH SAND (CH), trace gravel, brown, medium stiff to stiff
3.0	743+/-	
		LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff to stiff
7.5	738.5+/-	
		LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff
		- color changes to gray below 13.5'

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		4	3-3-4 N=7	1.0			36.0	
		8	2-4-5 N=9	1.5			24.0	
		10	1-3-5 N=8	2.0			21.0	
5		8	2-3-4 N=7	2.0			23.0	41-17-24
		10	3-4-7 N=11	3.0			19.0	
		12	4-10-16 N=26	4.5			16.0	
10		10	3-9-10 N=19	4.5			16.0	
		14	3-6-9 N=15	3.5			17.0	32-16-16
15								
		16	1-4-8 N=12	3.0			17.0	
20								
		18	3-7-10 N=17	4.0			15.0	
25								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-19-2022 | Boring Completed: 04-19-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-3

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1092° Longitude: -83.9581°

Approximate Surface Elev.: 746 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
			30									
					X	18	4-4-8 N=12	2.5			16.0	29-14-15
			35									
					X	18	4-7-9 N=16	3.5			21.0	
			40									
					X	18	3-5-7 N=12	3.0			26.0	
			45									
					X	18	4-7-11 N=18	3.5			18.0	
			50									
					X	18	5-8-12 N=20	4.5			15.0	

LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff *(continued)*

50.0 696+/-

Boring Terminated at 50 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-19-2022 | Boring Completed: 04-19-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-4

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1020° Longitude: -83.9582°

Approximate Surface Elev.: 753 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	753+/-							
TOPSOIL (3.0")								
FAT CLAY WITH SAND (CH), trace gravel, brown, medium stiff to stiff				8	1-2-4 N=6	1.0	33.0	
				12	4-4-5 N=9	1.5	25.0	
				10	2-3-4 N=7	1.0	32.0	
4.5	748.5+/-							
LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff to stiff		5		14	3-3-4 N=7	1.5	21.0	38-17-21
				12	3-5-9 N=14	3.0	25.0	
				14	2-4-7 N=11	2.5	17.0	
- color changes to gray mottled with brown between 9' to 10.5'		10		16	4-4-7 N=11	2.5	16.0	
- color changes to gray below 13.5'		15		16	3-5-9 N=14	3.0	16.0	
18.5	734.5+/-							
LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff		20		14	3-6-11 N=17	4.0	18.0	32-16-16
		25		14	3-3-7 N=10	3.5	18.0	

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-19-2022 | Boring Completed: 04-19-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-4

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1020° Longitude: -83.9582°

Approximate Surface Elev.: 753 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
			30		X	16	3-6-8 N=14	3.0			17.0	30-14-16
			35		X	16	4-5-7 N=12	2.5			18.0	
			40		X	16	4-4-6 N=10	2.0			19.0	
			45		X	18	4-6-8 N=14	2.5			17.0	
			50		X	18	5-7-10 N=17	3.5			15.0	

LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff *(continued)*

50.0 703+/-

Boring Terminated at 50 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-19-2022 | Boring Completed: 04-19-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-5

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1021° Longitude: -83.9387°

Approximate Surface Elev.: 749 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DESCRIPTION
0.3	748.5+/-	**TOPSOIL (4.0")**
		FAT CLAY WITH SAND (CH), trace gravel, brown, medium stiff - rootlets observed between 0' to 3'
3.0	746+/-	
		LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff
6.0	743+/-	
		LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		8	2-2-3 N=5	0.5			24.0	
		8	2-3-3 N=6	0.5			27.0	
		10	2-3-3 N=6	1.0			24.0	
5		10	1-2-4 N=6	1.0			25.0	44-19-25
		12	6-10-16 N=26	4.5			16.0	
		16	3-7-11 N=18	4.0			15.0	
10		16	4-7-10 N=17	3.5			16.0	
		16	3-4-7 N=11	1.5			17.0	
15								
		16	3-3-5 N=8	2.0			18.0	35-12-23
20								
		14	4-4-8 N=12	2.5			17.0	
25								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-19-2022 | Boring Completed: 04-19-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-5

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1021° Longitude: -83.9387°

Approximate Surface Elev.: 749 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff *(continued)*							
28.5	720.5+/-							
	LEAN CLAY WITH SAND (CL), trace gravel, gray, medium stiff to stiff	30		16	3-5-6 N=11	2.5	19.0	34-13-21
		35		16	2-3-5 N=8	1.0	17.0	
		40		16	2-3-4 N=7	1.5	17.0	
		45		18	2-4-5 N=9	1.5	20.0	
		50		16	3-5-5 N=10	2.0	22.0	
50.0	699+/-							
	Boring Terminated at 50 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-19-2022 | Boring Completed: 04-19-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-6

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1093° Longitude: -83.9382°

Approximate Surface Elev.: 744 (Ft.) +/-

DEPTH	ELEVATION (Ft.)
0.3	743.5+/-
6.0	738+/-

TOPSOIL (4.0")

FAT CLAY WITH SAND (CH), trace gravel, brown, medium stiff to stiff
- rootlets observed between 0 to 1.5'

LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		10	2-2-4 N=6	1.0			46.0	
		8	2-4-5 N=9	2.0			23.0	
		10	2-3-5 N=8	1.5			22.0	52-17-35
5		8	1-3-3 N=6	1.5			29.0	
		10	2-4-7 N=11	2.5			23.0	
		12	3-4-6 N=10	3.0			16.0	
10		10	3-6-9 N=15	3.5			18.0	
		12	3-8-9 N=17	4.0			16.0	
15								
		14	2-7-7 N=14	4.0			17.0	34-14-20
20								
		16	3-5-10 N=15	3.5			17.0	
25								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-19-2022 | Boring Completed: 04-19-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-6

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1093° Longitude: -83.9382°

Approximate Surface Elev.: 744 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff *(continued)*									
				X	16	2-4-6 N=10	2.5			15.0	31-14-17
30											
				X	16	3-3-8 N=11	2.5			17.0	
35											
				X	16	4-6-9 N=15	3.5			18.0	
40											
				X	18	4-5-11 N=16	3.5			19.0	
45											
				X	16	3-7-11 N=18	4.0			19.0	
50											
50.0	694+/-	***Boring Terminated at 50 Feet***									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-19-2022 | Boring Completed: 04-19-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-7

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1095° Longitude: -83.9278°

Approximate Surface Elev.: 743 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	743+/-							
TOPSOIL (3.0")								
FAT CLAY WITH SAND (CH), trace gravel, brown, medium stiff								
- rootlets observed from 0 to 1.5'				6	2-2-4 N=6	1.0	38.0	
				8	2-3-4 N=7	1.0	25.0	
3.0	740+/-							
SANDY LEAN CLAY (CL), trace gravel, brown, medium stiff				8	1-3-3 N=6	1.0	24.0	
		5		14	1-2-4 N=6	1.0	22.0	44-16-28
				12	2-2-5 N=7	1.5	18.0	
7.5	735.5+/-							
LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff				16	4-7-9 N=16	3.5	17.0	
				14	3-5-8 N=13	2.5	18.0	
		10						
- color changes to gray below 13.5'				14	3-4-6 N=10	2.0	17.0	32-13-19
		15						
				16	2-4-6 N=10	2.0	17.0	
		20						
				14	2-4-5 N=9	1.5	18.0	
		25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-20-2022 | Boring Completed: 04-20-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-7

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1095° Longitude: -83.9278°

Approximate Surface Elev.: 743 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
			30									
					X	16	3-4-7 N=11	2.0			17.0	31-14-17
			35									
					X	18	4-5-8 N=13	3.0			18.0	
			40									
					X	18	2-4-8 N=12	2.5			24.0	
			45									
					X	18	3-5-7 N=12	2.5			27.0	
			50									
					X	18	4-8-10 N=18	3.5			26.0	

LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff *(continued)*

50.0 693+/-

Boring Terminated at 50 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-20-2022 | Boring Completed: 04-20-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-8

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1093° Longitude: -83.9196°

Approximate Surface Elev.: 743 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DESCRIPTION
0.3	742.5+/-	**TOPSOIL (4.0")**
		FAT CLAY WITH SAND (CH), trace gravel, brown, medium stiff to stiff
6.0	737+/-	**LEAN CLAY WITH SAND (CL)**, trace gravel, brown, stiff to very stiff
		- color changes to gray below 13.5'

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		10	3-3-5 N=8	1.0	21.0	
		8	1-3-3 N=6	1.0	25.0	
		12	2-3-5 N=8	1.5	22.0	
5		8	2-2-4 N=6	1.0	22.0	56-16-40
		10	2-4-6 N=10	1.5	20.0	
		14	4-8-10 N=18	4.0	16.0	
10		12	3-5-9 N=14	3.0	17.0	
		14	3-5-7 N=12	2.5	16.0	
15						
		16	3-3-6 N=9	2.0	18.0	31-14-17
20						
		16	3-6-8 N=14	3.0	16.0	
25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-20-2022 | Boring Completed: 04-20-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-8

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1093° Longitude: -83.9196°

Approximate Surface Elev.: 743 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff *(continued)*							
			14	2-3-6 N=9	2.0	16.0	33-13-20
		30					
			16	3-4-8 N=12	2.5	20.0	
		35					
38.5	704.5+/-						
LEAN CLAY (CL), trace gravel, gray, stiff			16	3-4-5 N=9	2.0	26.0	43-15-28
		40					
43.5	699.5+/-						
SANDY LEAN CLAY (CL), trace gravel, gray, stiff to very stiff			16	3-6-10 N=16	3.5	11.0	
		45					
			16	4-7-7 N=14	3.0	11.0	
50.0	693+/-	50					
Boring Terminated at 50 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-20-2022 | Boring Completed: 04-20-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-9

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1092° Longitude: -83.8998°

Approximate Surface Elev.: 742 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	742+/-							
TOPSOIL (3.0")								
SANDY FAT CLAY (CH), trace gravel, brown, medium stiff				10	2-3-4 N=7	1.5	29.0	
- rootlets observed between 0' to 1.5'				8	1-3-3 N=6	1.0	24.0	
				10	1-3-4 N=7	1.0	22.0	
		5		10	1-2-4 N=6	1.5	23.0	57-16-41
				14	2-2-5 N=7	2.0	24.0	
7.5	734.5+/-							
LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff				18	2-6-13 N=19	4.0	16.0	
		10		16	2-5-8 N=13	2.5	17.0	
- color changes to gray below 13.5'				14	2-4-6 N=10	2.0	15.0	
		15						
18.5	723.5+/-							
LEAN CLAY WITH SAND (CL), trace gravel, gray, medium stiff to stiff				16	2-3-5 N=8	1.5	18.0	30-14-16
		20						
				14	2-3-4 N=7	1.5	18.0	
		25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-20-2022 | Boring Completed: 04-20-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-9

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1092° Longitude: -83.8998°

Approximate Surface Elev.: 742 (Ft.) +/-

DEPTH	ELEVATION (Ft.)		DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		LEAN CLAY WITH SAND (CL), trace gravel, gray, medium stiff to stiff *(continued)*							
			30	X	18	2-3-5 N=8	2.0	20.0	38-13-25
			35	X	16	1-3-6 N=9	1.5	23.0	
		- changes to very stiff below 38.5'		X	18	3-7-11 N=18	3.5	12.0	
43.5	698.5+/-		40						
		SANDY LEAN CLAY (CL), trace gravel, gray, very stiff	45	X	18	6-11-14 N=25	4.5	17.0	
48.5	693.5+/-								
50.0	692+/-	**SANDY SILT (ML)**, gray, very dense	50	X	16	22-28-29 N=57	-	19.0	
		Boring Terminated at 50 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-20-2022 | Boring Completed: 04-20-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-10

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1094° Longitude: -83.8812°

Approximate Surface Elev.: 742 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	742+/-							
TOPSOIL (3.0")								
LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff				8	2-3-3 N=6	1.0	26.0	
				10	2-3-4 N=7	1.5	21.0	
3.0	739+/-							
LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff				8	1-3-5 N=8	2.0	23.0	48-18-30
		5		10	2-4-6 N=10	2.5	23.0	
				10	2-3-6 N=9	1.5	18.0	
				12	4-9-11 N=20	4.0	17.0	
		10		12	3-6-10 N=16	3.5	16.0	
				14	4-7-8 N=15	3.5	17.0	30-13-17
		15						
				12	3-7-9 N=16	3.5	16.0	
		20						
				14	2-3-6 N=9	1.5	19.0	
		25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-21-2022 | Boring Completed: 04-21-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-10

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1094° Longitude: -83.8812°

Approximate Surface Elev.: 742 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff *(continued)*							
28.5	713.5+/-						
LEAN CLAY (CL), trace gravel, gray, medium stiff to stiff		30	16	1-2-5 N=7	1.0	22.0	39-14-25
			14	3-3-7 N=10	2.0	22.0	
		35	16	2-2-5 N=7	1.5	19.0	
43.5	698.5+/-	40					
LEAN CLAY WITH SAND (CL), trace gravel, gray, very stiff			18	4-6-11 N=17	4.0	13.0	
50.0	692+/-	45					
			16	3-7-9 N=16	3.5	14.0	
Boring Terminated at 50 Feet		50					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-21-2022 | Boring Completed: 04-21-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-11

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1095° Longitude: -83.8708°

Approximate Surface Elev.: 745 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DESCRIPTION
0.3	745+/-	**TOPSOIL (3")**
		LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff to stiff
9.0	736+/-	**LEAN CLAY WITH SAND (CL)**, trace gravel, brown, stiff to very stiff
		- color changes to gray at 13.5' and below

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		6	2-2-3 N=5	3.0	18.0	
		18	3-3-3 N=6	3.0	17.0	
		18	3-4-5 N=9	3.5	18.0	
5		18	4-5-4 N=9	4.5	17.0	38-17-21
		18	3-5-5 N=10	4.5	17.0	
		18	3-6-7 N=13	4.5	17.0	
10		18	4-7-10 N=17	3.5	17.0	
		18	4-5-6 N=11	3.5	16.0	31-13-18
15						
		18	5-5-7 N=12	3.5	16.0	
20						
		18	4-5-6 N=11	1.5	17.0	32-15-17
25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 07-18-2022 | Boring Completed: 07-18-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 8/9/22

BORING LOG NO. B-11

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1095° Longitude: -83.8708°

Approximate Surface Elev.: 745 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
			30		X	18	5-5-6 N=11	3.5			17.0	
			35		X	18	6-7-8 N=15	4.0			17.0	
			40		X	18	6-8-10 N=18	4.0			18.0	
			45		X	18	6-9-9 N=18	4.0			18.0	
50.0	695+/-		50		X	18	6-9-10 N=19	4.0			18.0	

LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff *(continued)*

Boring Terminated at 50 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 07-18-2022 | Boring Completed: 07-18-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 8/9/22

BORING LOG NO. B-12

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1093° Longitude: -83.8669°

Approximate Surface Elev.: 741 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DESCRIPTION	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	741+/-	**TOPSOIL (3.0")**						
		LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff		10	2-3-7 N=10	2.0	21.0	
				10	1-3-5 N=8	1.5	23.0	
				12	1-4-6 N=10	2.0	17.0	
			5	14	1-4-7 N=11	2.0	18.0	35-16-19
				12	2-5-7 N=12	2.5	17.0	
				18	3-7-11 N=18	3.5	17.0	
		- cobble fragments observed between 9' to 10.5'	10	14	3-5-9 N=14	3.0	16.0	
				16	2-4-6 N=10	2.5	16.0	
			15					
18.5	722.5+/-							
		LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff		18	2-6-7 N=13	2.5	18.0	30-15-15
			20					
				16	3-4-5 N=9	1.5	19.0	
			25					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water encountered at 43.5' while drilling

Water observed at 45.0' upon completion

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-21-2022 | Boring Completed: 04-21-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-12

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1093° Longitude: -83.8669°

Approximate Surface Elev.: 741 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff *(continued)*											
		30			18	4-6-8 N=14	3.5			21.0	
		35			18	3-4-6 N=10	2.5			24.0	36-19-17
38.5	702.5+/-										
SANDY LEAN CLAY (CL), trace gravel, gray, very stiff to hard		40			16	8-13-20 N=33	4.5			13.0	
			▽								
		45	▽		18	9-11-14 N=25	4.0			19.0	
48.5	692.5+/-										
SILTY SAND (SM), trace gravel, gray, medium dense					18	20-17-8 N=25	-			7.0	
50.0	691+/-	50									
Boring Terminated at 50 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Water encountered at 43.5' while drilling*

▽ *Water observed at 45.0' upon completion*

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-21-2022 | Boring Completed: 04-21-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-13

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1093° Longitude: -83.8424°

Approximate Surface Elev.: 744 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.2	744+/-							
TOPSOIL (2.0")								
SANDY LEAN CLAY (CL), trace gravel, brown, medium stiff to stiff				10	3-5-7 N=12	2.0	26.0	
				8	3-4-3 N=7	1.5	24.0	
				12	3-3-3 N=6	1.0	29.0	
		5		12	2-4-5 N=9	1.5	29.0	44-20-24
				10	3-5-5 N=10	1.5	23.0	
7.5	736.5+/-							
LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff				12	4-9-16 N=25	4.5	17.0	
		10		14	5-7-9 N=16	3.5	17.0	
				14	3-5-8 N=13	2.5	16.0	
		15						
				16	3-7-10 N=17	4.0	16.0	33-14-19
		20						
- organic odor observed between 23.5' and 25'				10	8-12-10 N=22	4.5	24.0	
		25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-21-2022 | Boring Completed: 04-21-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-13

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1093° Longitude: -83.8424°

Approximate Surface Elev.: 744 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff *(continued)*								
28.5	715.5+/-							
LEAN CLAY (CL), trace gravel, gray, very stiff		30		16	5-7-9 N=16	3.5	16.0	28-12-16
33.5	710.5+/-							
LEAN CLAY (CL), trace gravel, gray, very stiff, completely weathered Dolomite Bedrock		35		16	10-25-39 N=64	-	7.0	
38.8	705+/-			3	50/3"	-	9.0	
Auger Refusal on Dolomite Bedrock at 38.8 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-21-2022 | Boring Completed: 04-21-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-14

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1165° Longitude: -83.8421°

Approximate Surface Elev.: 742 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	741.5+/-							
TOPSOIL (4.0")								
FAT CLAY WITH SAND (CH), trace gravel, brown, medium stiff				8	1-2-4 N=6	1.0	28.0	
				8	1-2-4 N=6	1.0	52.0	
				6	1-2-5 N=7	1.5	23.0	
		5		8	2-3-3 N=6	1.0	40.0	50-20-30
6.0	736+/-							
LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff to stiff				10	1-3-4 N=7	1.5	23.0	
				14	3-5-7 N=12	2.5	18.0	
		10		12	2-4-8 N=12	2.0	18.0	
				14	3-4-6 N=10	1.5	16.0	35-13-22
		15						
				14	2-5-9 N=14	3.5	15.0	
		20						
				16	2-4-5 N=9	1.5	19.0	
		25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-21-2022 | Boring Completed: 04-21-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-14

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1165° Longitude: -83.8421°

Approximate Surface Elev.: 742 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff to stiff *(continued)*								
28.5	713.5+/-							
LEAN CLAY (CL), trace gravel, gray, stiff		30		18	3-4-7 N=11	2.5	20.0	39-14-25
		35		18	3-6-7 N=13	3.0	26.0	
38.5	703.5+/-							
SANDY LEAN CLAY (CL), trace gravel, gray, stiff		40		18	3-5-9 N=14	3.0	12.0	
43.6 - possible cobbles/boulder encountered at 43.5'	698.5+/-			0	50/2"			
Auger Refusal on Dolomite Bedrock at 43.6 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-21-2022 | Boring Completed: 04-21-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-15

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1167° Longitude: -83.8131°

Approximate Surface Elev.: 744 (Ft.) +/-

DEPTH	ELEVATION (Ft.)
0.3	744+/-
7.5	736.5+/-

TOPSOIL (3.0")

FAT CLAY WITH SAND (CH), trace gravel, brown, medium stiff to stiff

LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff

- color changes to gray below 13.5'

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		8	2-3-3 N=6	1.5			21.0	
		10	3-4-5 N=9	2.0			26.0	
		10	2-4-6 N=10	2.0			23.0	
5		12	1-3-5 N=8	1.5			29.0	53-16-37
		10	2-2-4 N=6	1.0			23.0	
		12	3-6-7 N=13	3.0			18.0	
10		12	3-5-9 N=14	3.5			19.0	
		14	3-6-5 N=11	2.5			16.0	
15								
		14	2-5-8 N=13	3.0			15.0	28-12-16
20								
		16	1-4-6 N=10	1.5			20.0	
25								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-22-2022 | Boring Completed: 04-22-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-15

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1167° Longitude: -83.8131°

Approximate Surface Elev.: 744 (Ft.) +/-

GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff *(continued)*										
	28.5	715.5+/-										
		CLAYEY GRAVEL WITH SAND (GC), gray, dense to very dense, completely weathered Dolomite Bedrock	30			16	3-10-15 N=25	-			11.0	22-11-11
			35			3	18-50/3"	-			9.0	
	38.7	705.5+/-				2	50/3"	-			3.0	
		Auger Refusal on Possible Bedrock at 38.7 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-22-2022 | Boring Completed: 04-22-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-16

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1133° Longitude: -83.8131°

Approximate Surface Elev.: 751 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	751+/-							
TOPSOIL (3.0")								
LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff				8	1-3-4 N=7	1.0	25.0	
				5	2-2-4 N=6	1.0	25.0	
				3	1-2-4 N=6	1.0	23.0	
		5		8	2-3-5 N=8	1.5	23.0	41-18-23
				8	3-3-5 N=8	1.5	20.0	
7.5	743.5+/-							
LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff				16	3-6-11 N=17	3.5	18.0	
- color changes to gray mottled with brown between 9' and 10.5'		10		12	3-4-6 N=10	2.5	18.0	
- color changes to gray below 13.5'				14	3-5-9 N=14	3.0	18.0	31-15-16
		15						
				16	3-6-7 N=13	3.0	18.0	
		20						
				16	3-5-6 N=11	2.0	20.0	
		25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-22-2022 | Boring Completed: 04-22-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-16

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1133° Longitude: -83.8131°

Approximate Surface Elev.: 751 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff *(continued)*										
			30		X	18	2-4-7 N=11	2.5			17.0	30-15-15
			35		X	16	2-4-4 N=8	1.0			26.0	
			40		X	18	3-4-4 N=8	1.5			18.0	
43.5	707.5+/-											
		LEAN CLAY WITH SAND (CL), trace gravel, gray, very stiff to hard	45		X	18	10-12-17 N=29	4.5			11.0	
50.0	701+/-		50		X	18	7-11-19 N=30	4.5			21.0	
		Boring Terminated at 50 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-22-2022 | Boring Completed: 04-22-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-17

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1136° Longitude: -83.8033°

Approximate Surface Elev.: 752 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	751.5+/-						
TOPSOIL (4.0")							
LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff to stiff			10	1-3-4 N=7	1.0	28.0	
			10	2-2-4 N=6	1.0	21.0	
			8	1-3-5 N=8	1.5	22.0	
- organic odor observed between 5' and 6.5'		5	10	3-3-6 N=9	1.5	26.0	43-17-26
			10	2-3-4 N=7	1.5	21.0	
- very stiff between 7.5' and 9'			16	3-7-10 N=17	3.5	19.0	
		10	14	3-5-5 N=10	2.0	18.0	
13.5	738.5+/-						
LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff			16	2-4-7 N=11	1.5	18.0	36-13-23
		15					
			16	2-5-6 N=11	2.0	18.0	
		20					
			18	3-6-8 N=14	2.5	21.0	
		25					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-26-2022 | Boring Completed: 04-26-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-17

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1136° Longitude: -83.8033°

Approximate Surface Elev.: 752 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	Description	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff *(continued)*							
			16	3-7-11 N=18	4.0			28.0	40-17-23
			16	3-8-9 N=17	3.5			16.0	
		- dolomite fragments encountered between 38.5' and 40'	1	50/2"	-			1.0	
40.0	712+/-	**DOLOMITE**, moderately severely weathered, hard, moderately close joints, thin bedded, fair RQD, moderately open joints, gray							
			106			54	3277	1.0	
							4260	0.9	
50.0	702+/-	***Boring Terminated at 50 Feet***							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-26-2022 | Boring Completed: 04-26-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-18

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1150° Longitude: -83.8011°

Approximate Surface Elev.: 761 (Ft.) +/-

DEPTH	ELEVATION (Ft.)
0.3	760.5+/-
6.0	755+/-

TOPSOIL (4.0")

SANDY SILTY CLAY (CL-ML), trace gravel, brown, medium stiff to stiff

LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff

- medium stiff between 18.5' and 20'

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		6	3-3-4 N=7	1.0			18.0	
		3	3-2-4 N=6	1.0			17.0	
		10	3-3-3 N=6	1.0			25.0	20-14-6
5		10	2-3-5 N=8	1.5			18.0	
		14	3-6-8 N=14	3.5			15.0	
		12	3-5-5 N=10	2.5			15.0	
10		12	3-6-7 N=13	3.5			17.0	
		10	3-4-6 N=10	2.0			18.0	
15								
		12	3-3-4 N=7	1.5			22.0	32-13-19
20								
		18	3-6-9 N=15	2.5			21.0	
25								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water encountered at 13.5' while drilling

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-27-2022 | Boring Completed: 04-27-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-18

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1150° Longitude: -83.8011°

Approximate Surface Elev.: 761 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DESCRIPTION
		LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff *(continued)*
33.5	727.5+/-	
		SANDY LEAN CLAY (CL), trace gravel, gray, hard
38.5	722.5+/-	
		DOLOMITE, moderately severely weathered, hard, moderately close joints, thin bedded, fair RQD, moderately open joints, gray
48.5	712.5+/-	
		Boring Terminated at 48.5 Feet

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
30								
		18	4-8-10 N=18	3.5			22.0	
35								
		18	9-13-17 N=30	4.5			11.0	21-12-9
40								
		107			64	6988	0.8	
45						2375	0.9	

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water encountered at 13.5' while drilling

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-27-2022 | Boring Completed: 04-27-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-19

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1150° Longitude: -83.7990°

Approximate Surface Elev.: 753 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	753+/-							
TOPSOIL (3.0")								
LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff				8	1-3-3 N=6	1.0	21.0	
				12	2-3-3 N=6	1.0	18.0	
3.0	750+/-							
LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff				12	2-5-7 N=12	2.5	27.0	
		5		10	2-4-7 N=11	2.0	18.0	37-14-23
- color changes to gray below 6'				18	3-4-5 N=9	1.5	18.0	
				16	3-5-7 N=12	2.0	17.0	
		10		16	3-6-9 N=15	2.5	17.0	
				8	3-3-6 N=9	1.5	19.0	37-13-24
		15						
18.5	734.5+/-							
SANDY LEAN CLAY (CL), trace gravel, brown, stiff to very stiff, contains gaseous odor				4	3-5-8 N=13	3.0	22.0	
		20						
				16	7-5-12 N=17	4.0	16.0	
		25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-27-2022 | Boring Completed: 04-27-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-19

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1150° Longitude: -83.7990°

Approximate Surface Elev.: 753 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
SANDY LEAN CLAY (CL), trace gravel, brown, stiff to very stiff, contains gaseous odor *(continued)*							
28.5	724.5+/-						
LEAN CLAY (CL), trace gravel, gray, hard		30	18	10-13-18 N=31	4.5	16.0	27-14-13
32.2	721+/-		0	50/2"	-		
Auger Refusal on Possible Bedrock at 32.2 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-27-2022 | Boring Completed: 04-27-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 5/25/22

BORING LOG NO. B-20

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1136° Longitude: -83.7989°

Approximate Surface Elev.: 751 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	751+/-						
TOPSOIL (3.0")							
FAT CLAY WITH SAND (CH), trace gravel, brown, medium stiff to stiff			6	1-3-4 N=7	1.5	40.0	
			8	2-4-4 N=8	2.0	23.0	
			10	2-3-5 N=8	2.0	24.0	
		5	14	2-3-4 N=7	1.5	23.0	
			10	2-4-6 N=10	2.0	22.0	50-16-34
7.5	743.5+/-						
LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff			14	3-7-12 N=19	3.5	18.0	
		10	12	3-6-8 N=14	2.5	17.0	
13.5	737.5+/-						
LEAN CLAY WITH GRAVEL (CL), trace sand, brown, stiff to very stiff, possible cobbles/boulders encountered			3	3-4-6 N=10	1.5	40.0	
		15					
- color changes to gray below 18.5'			16	3-6-11 N=17	3.5	19.0	35-17-18
		20					
23.5	727.5+/-						
SANDY LEAN CLAY (CL), trace gravel, gray, very stiff			16	9-13-15 N=28	4.5	11.0	22-12-10
		25					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-27-2022 | Boring Completed: 04-27-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

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BORING LOG NO. B-20

PROJECT: East Leipsic - Rader Road 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: Putnam and Hancock Counties, OH

LOCATION See Exploration Plan

Latitude: 41.1136° Longitude: -83.7989°

Approximate Surface Elev.: 751 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	Lab H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	SANDY LEAN CLAY (CL), trace gravel, gray, very stiff *(continued)*											
29.0	722+/-					2	50/2"	-			19.0	
	DOLOMITE, moderately severely weathered, hard, moderately close joints, thin bedded, fair RQD, moderately open joints, gray		30			107			60	8361	0.6	
			35							5671	1.0	
39.0	712+/-											
	Boring Terminated at 39 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic (Hammer Efficiency : 88.9%)

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement bentonite grout

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-27-2022 | Boring Completed: 04-27-2022

Drill Rig: Track # 614 | Driller: K. Reinhart

Project No.: N4225114

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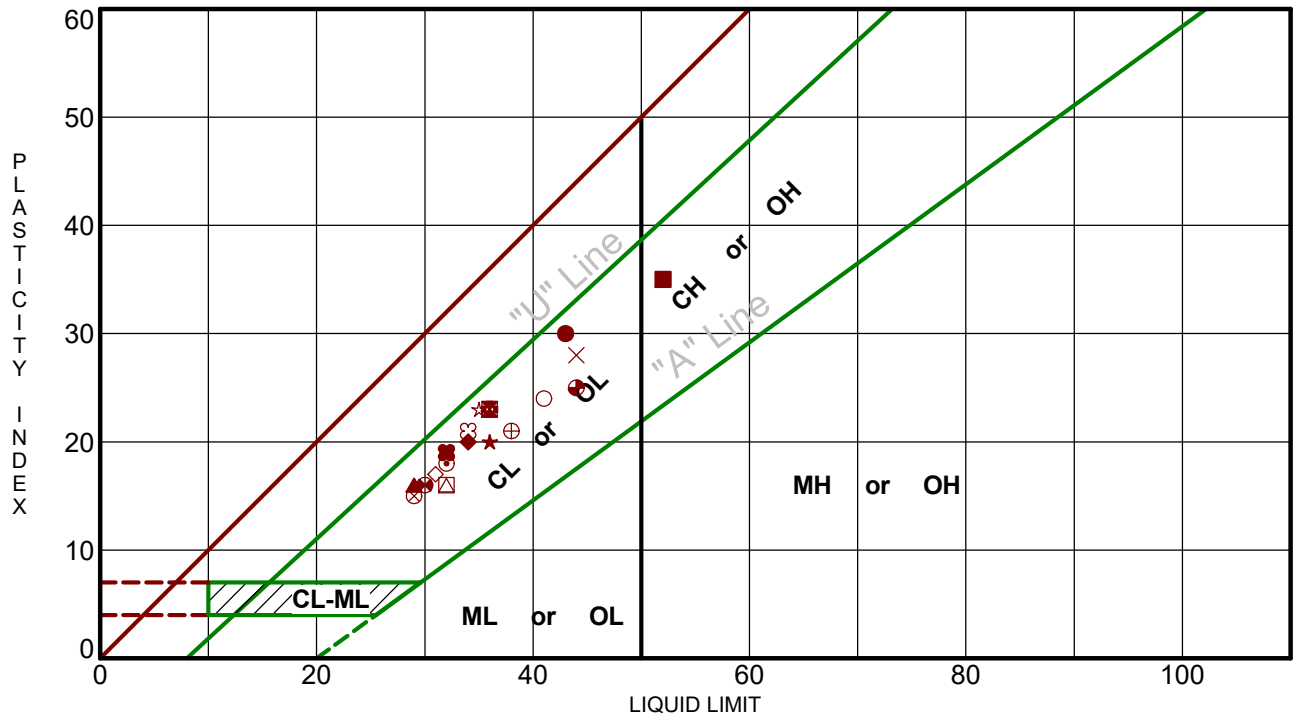
ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	B-1	4.5 - 6	43	13	30	81.2	CL	LEAN CLAY with SAND
⊠	B-1	13.5 - 15	36	13	23	79.7	CL	LEAN CLAY with SAND
▲	B-1	28.5 - 30	29	13	16	74.9	CL	LEAN CLAY with SAND
★	B-2	4.5 - 6	36	16	20	81.7	CL	LEAN CLAY with SAND
⊙	B-2	18.5 - 20	32	14	18	79.7	CL	LEAN CLAY with SAND
✿	B-2	28.5 - 30	36	13	23	81.2	CL	LEAN CLAY with SAND
○	B-3	4.5 - 6	41	17	24	76.8	CL	LEAN CLAY with SAND
△	B-3	13.5 - 15	32	16	16	81.4	CL	LEAN CLAY with SAND
⊗	B-3	28.5 - 30	29	14	15	77.2	CL	LEAN CLAY with SAND
⊕	B-4	4.5 - 6	38	17	21	81.9	CL	LEAN CLAY with SAND
□	B-4	18.5 - 20	32	16	16	79.9	CL	LEAN CLAY with SAND
⊛	B-4	28.5 - 30	30	14	16	78.3	CL	LEAN CLAY with SAND
◕	B-5	4.5 - 6	44	19	25	80.9	CL	LEAN CLAY with SAND
☆	B-5	18.5 - 20	35	12	23	83.3	CL	LEAN CLAY with SAND
❀	B-5	28.5 - 30	34	13	21	80.8	CL	LEAN CLAY with SAND
■	B-6	3 - 4.5	52	17	35	84.9	CH	FAT CLAY with SAND
◆	B-6	18.5 - 20	34	14	20	92.5	CL	LEAN CLAY
◇	B-6	28.5 - 30	31	14	17	77.2	CL	LEAN CLAY with SAND
×	B-7	4.5 - 6	44	16	28	69.8	CL	SANDY LEAN CLAY
✖	B-7	13.5 - 15	32	13	19	77.9	CL	LEAN CLAY with SAND

PROJECT: East Leipsic - Rader Road 138 kV T Line

SITE: Putnam and Hancock Counties, OH

Terracon
800 Morrison Rd
Gahanna, OH

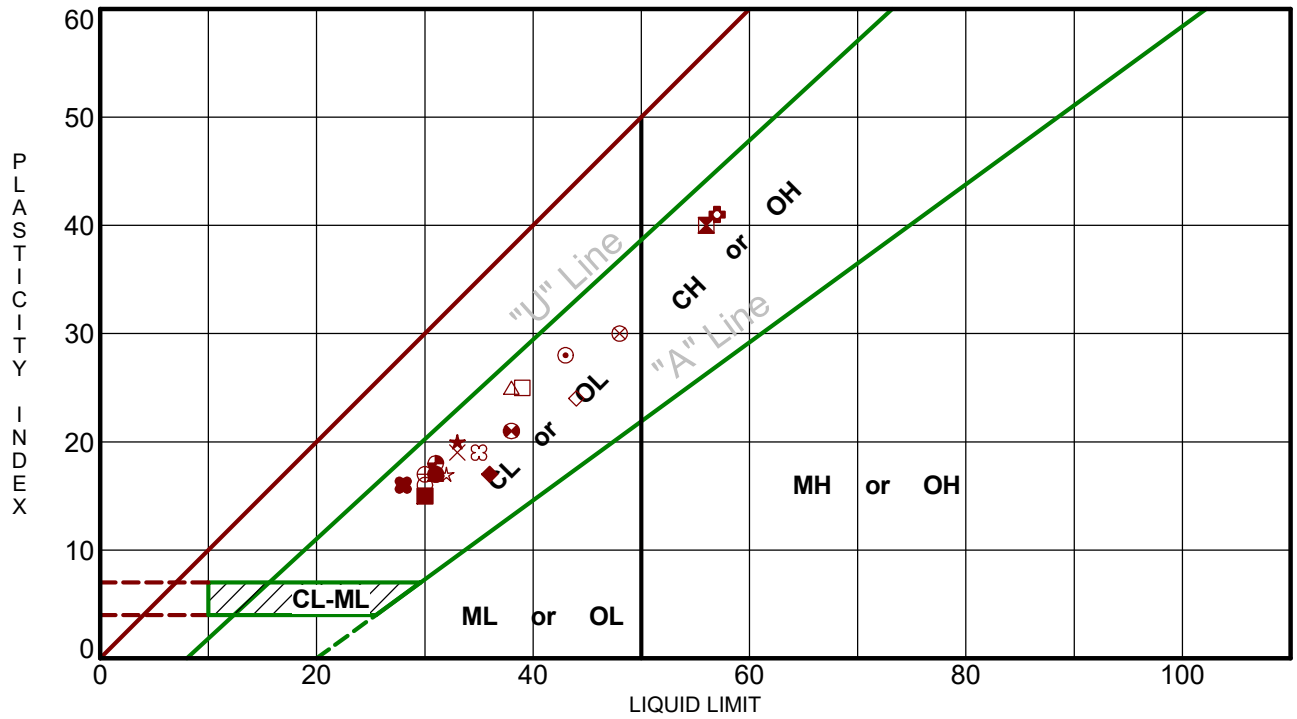
PROJECT NUMBER: N4225114

CLIENT: American Electric Power
New Albany, OH

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 8/9/22

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	B-7	28.5 - 30	31	14	17	81.0	CL	LEAN CLAY with SAND
⊠	B-8	4.5 - 6	56	16	40	75.2	CH	FAT CLAY with SAND
▲	B-8	18.5 - 20	31	14	17	78.8	CL	LEAN CLAY with SAND
★	B-8	28.5 - 30	33	13	20	79.3	CL	LEAN CLAY with SAND
⊙	B-8	38.5 - 40	43	15	28	88.0	CL	LEAN CLAY
✿	B-9	4.5 - 6	57	16	41	61.0	CH	SANDY FAT CLAY
○	B-9	18.5 - 20	30	14	16	77.3	CL	LEAN CLAY with SAND
△	B-9	28.5 - 30	38	13	25	83.0	CL	LEAN CLAY with SAND
⊗	B-10	3 - 4.5	48	18	30	74.3	CL	LEAN CLAY with SAND
⊕	B-10	13.5 - 15	30	13	17	77.9	CL	LEAN CLAY with SAND
□	B-10	28.5 - 30	39	14	25	85.1	CL	LEAN CLAY
⊛	B-11	4.5 - 6	38	17	21	75.7	CL	LEAN CLAY with SAND
◕	B-11	13.5 - 15	31	13	18	77.6	CL	LEAN CLAY with SAND
☆	B-11	23.5 - 25	32	15	17	76.1	CL	LEAN CLAY with SAND
❀	B-12	4.5 - 6	35	16	19	79.1	CL	LEAN CLAY with SAND
■	B-12	18.5 - 20	30	15	15	79.8	CL	LEAN CLAY with SAND
◆	B-12	33.5 - 35	36	19	17	92.7	CL	LEAN CLAY
◇	B-13	4.5 - 6	44	20	24	68.7	CL	SANDY LEAN CLAY
╳	B-13	18.5 - 20	33	14	19	81.9	CL	LEAN CLAY with SAND
✖	B-13	28.5 - 30	28	12	16	86.3	CL	LEAN CLAY

PROJECT: East Leipsic - Rader Road 138 kV T Line

PROJECT NUMBER: N4225114

SITE: Putnam and Hancock Counties, OH

Terracon
800 Morrison Rd
Gahanna, OH

CLIENT: American Electric Power
New Albany, OH

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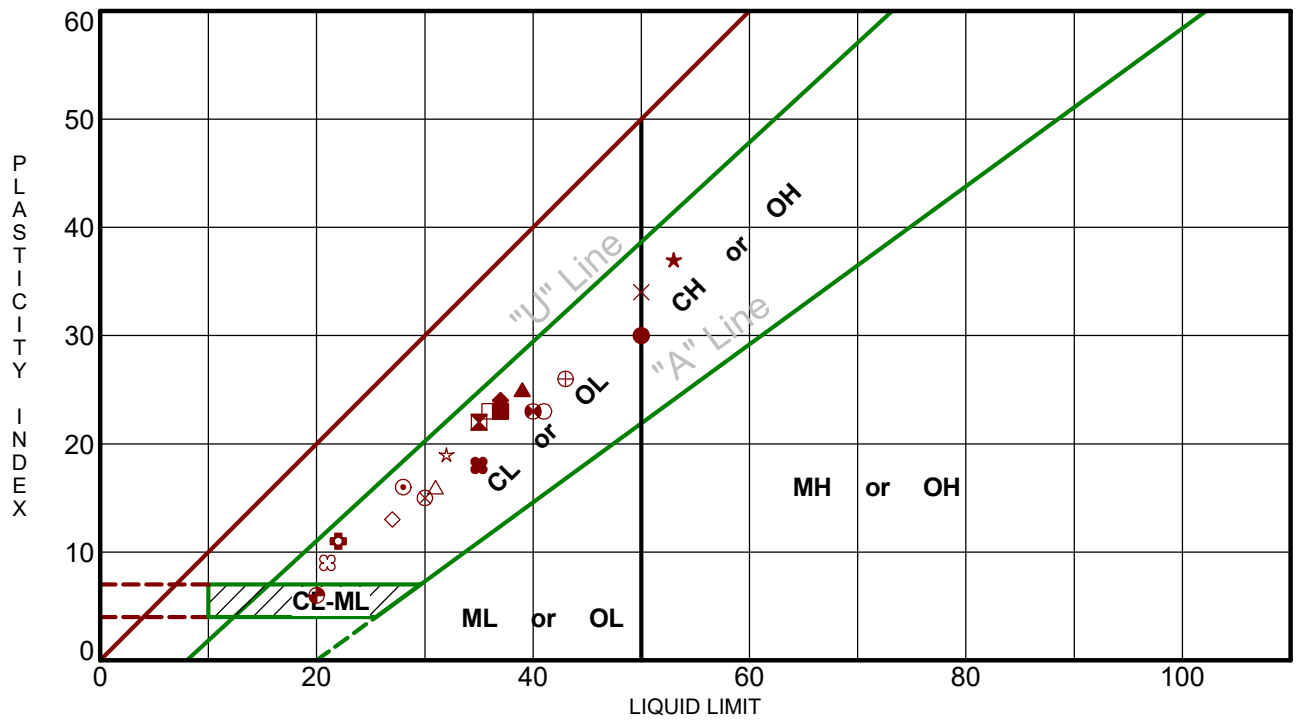
ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	B-14	4.5 - 6	50	20	30	74.1	CH	FAT CLAY with SAND
⊠	B-14	13.5 - 15	35	13	22	79.5	CL	LEAN CLAY with SAND
▲	B-14	28.5 - 30	39	14	25	86.3	CL	LEAN CLAY
★	B-15	4.5 - 6	53	16	37	74.1	CH	FAT CLAY with SAND
⊙	B-15	18.5 - 20	28	12	16	70.8	CL	LEAN CLAY with SAND
✿	B-15	28.5 - 30	22	11	11	43.1	GC	CLAYEY GRAVEL with SAND
○	B-16	4.5 - 6	41	18	23	74.8	CL	LEAN CLAY with SAND
△	B-16	13.5 - 15	31	15	16	81.4	CL	LEAN CLAY with SAND
⊗	B-16	28.5 - 30	30	15	15	77.2	CL	LEAN CLAY with SAND
⊕	B-17	4.5 - 6	43	17	26	73.5	CL	LEAN CLAY with SAND
□	B-17	13.5 - 15	36	13	23	80.1	CL	LEAN CLAY with SAND
⊠	B-17	28.5 - 30	40	17	23	94.2	CL	LEAN CLAY
◕	B-18	3 - 4.5	20	14	6	52.5	CL-ML	SANDY SILTY CLAY
☆	B-18	18.5 - 20	32	13	19	83.0	CL	LEAN CLAY with SAND
✿	B-18	33.5 - 35	21	12	9	67.6	CL	SANDY LEAN CLAY
■	B-19	4.5 - 6	37	14	23	78.3	CL	LEAN CLAY with SAND
◆	B-19	13.5 - 15	37	13	24	82.0	CL	LEAN CLAY with SAND
◇	B-19	28.5 - 30	27	14	13	92.2	CL	LEAN CLAY
×	B-20	6 - 7.5	50	16	34	79.9	CH	FAT CLAY with SAND
■	B-20	18.5 - 20	35	17	18	71.9	CL	LEAN CLAY with GRAVEL

PROJECT: East Leipsic - Rader Road 138 kV T Line

PROJECT NUMBER: N4225114

SITE: Putnam and Hancock Counties, OH

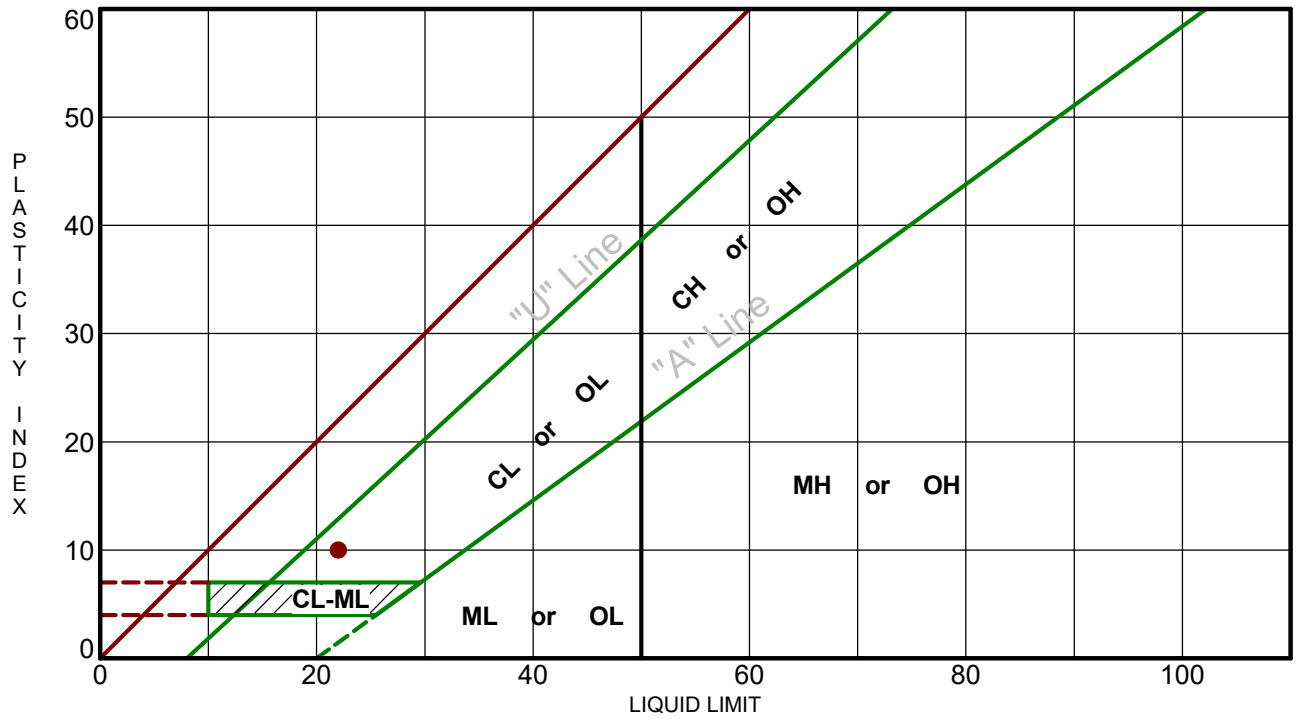
Terracon
800 Morrison Rd
Gahanna, OH

CLIENT: American Electric Power
New Albany, OH

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 8/9/22

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
● B-20	23.5 - 25	22	12	10	63.2	CL	SANDY LEAN CLAY

PROJECT: East Leipsic - Rader Road 138 kV T Line

SITE: Putnam and Hancock Counties, OH

Terracon
800 Morrison Rd
Gahanna, OH

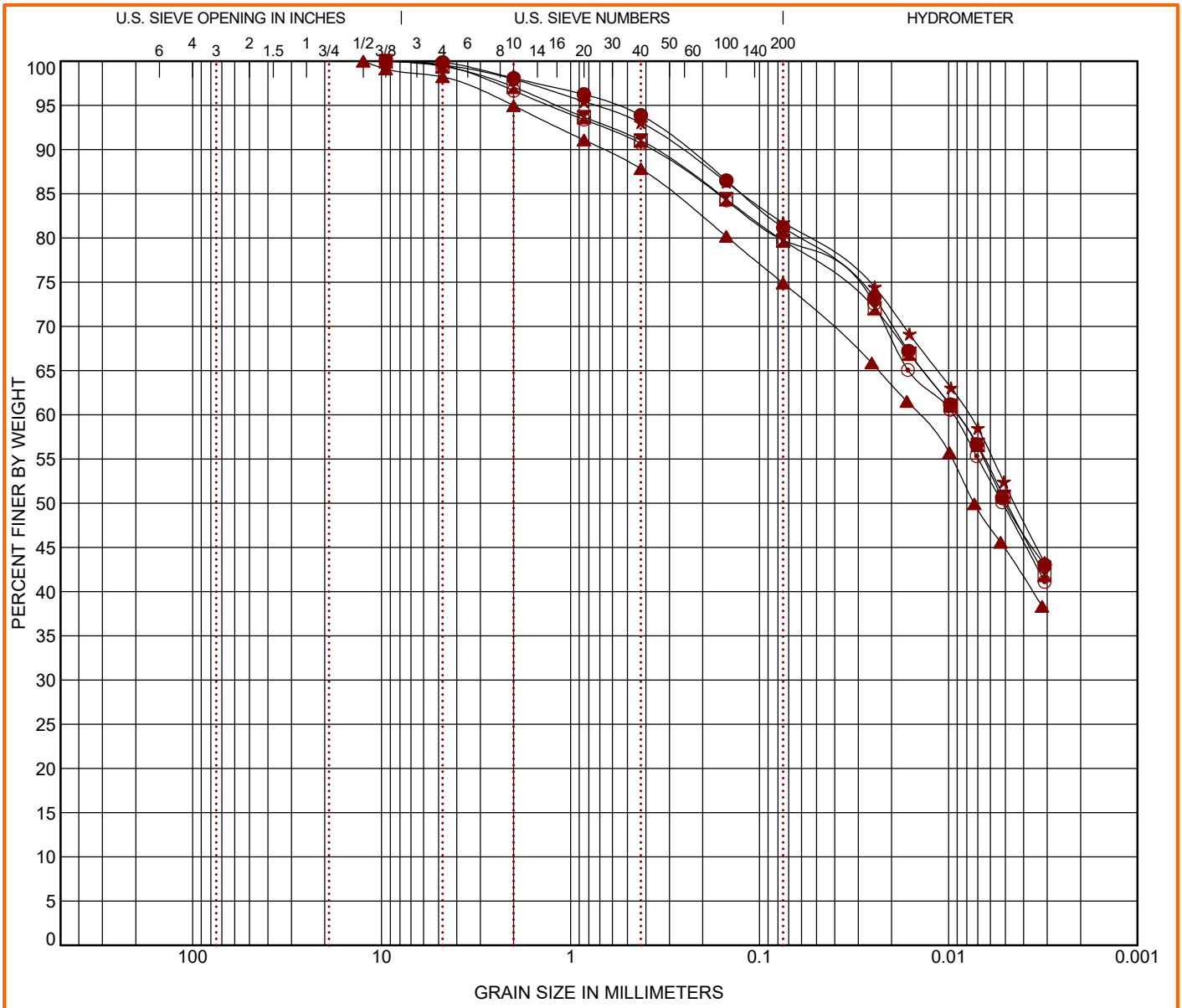
PROJECT NUMBER: N4225114

CLIENT: American Electric Power
New Albany, OH

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 8/9/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-1	4.5 - 6	LEAN CLAY with SAND (CL)	19.0	43	13	30		
⊠	B-1	13.5 - 15	LEAN CLAY with SAND (CL)	16.0	36	13	23		
▲	B-1	28.5 - 30	LEAN CLAY with SAND (CL)	18.0	29	13	16		
★	B-2	4.5 - 6	LEAN CLAY with SAND (CL)	18.0	36	16	20		
⊙	B-2	18.5 - 20	LEAN CLAY with SAND (CL)	17.0	32	14	18		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-1	4.5 - 6	9.5	0.009			0.0	0.1	18.7	31.2		50.0
⊠	B-1	13.5 - 15	9.5	0.009			0.0	0.6	19.7	29.3		50.4
▲	B-1	28.5 - 30	12.5	0.014			0.0	1.8	23.3	30.1		44.7
★	B-2	4.5 - 6	9.5	0.008			0.0	0.4	17.8	29.7		52.0
⊙	B-2	18.5 - 20	9.5	0.009			0.0	0.4	19.8	30.3		49.4

PROJECT: East Leipsic - Rader Road 138 kV T Line

PROJECT NUMBER: N4225114

SITE: Putnam and Hancock Counties, OH

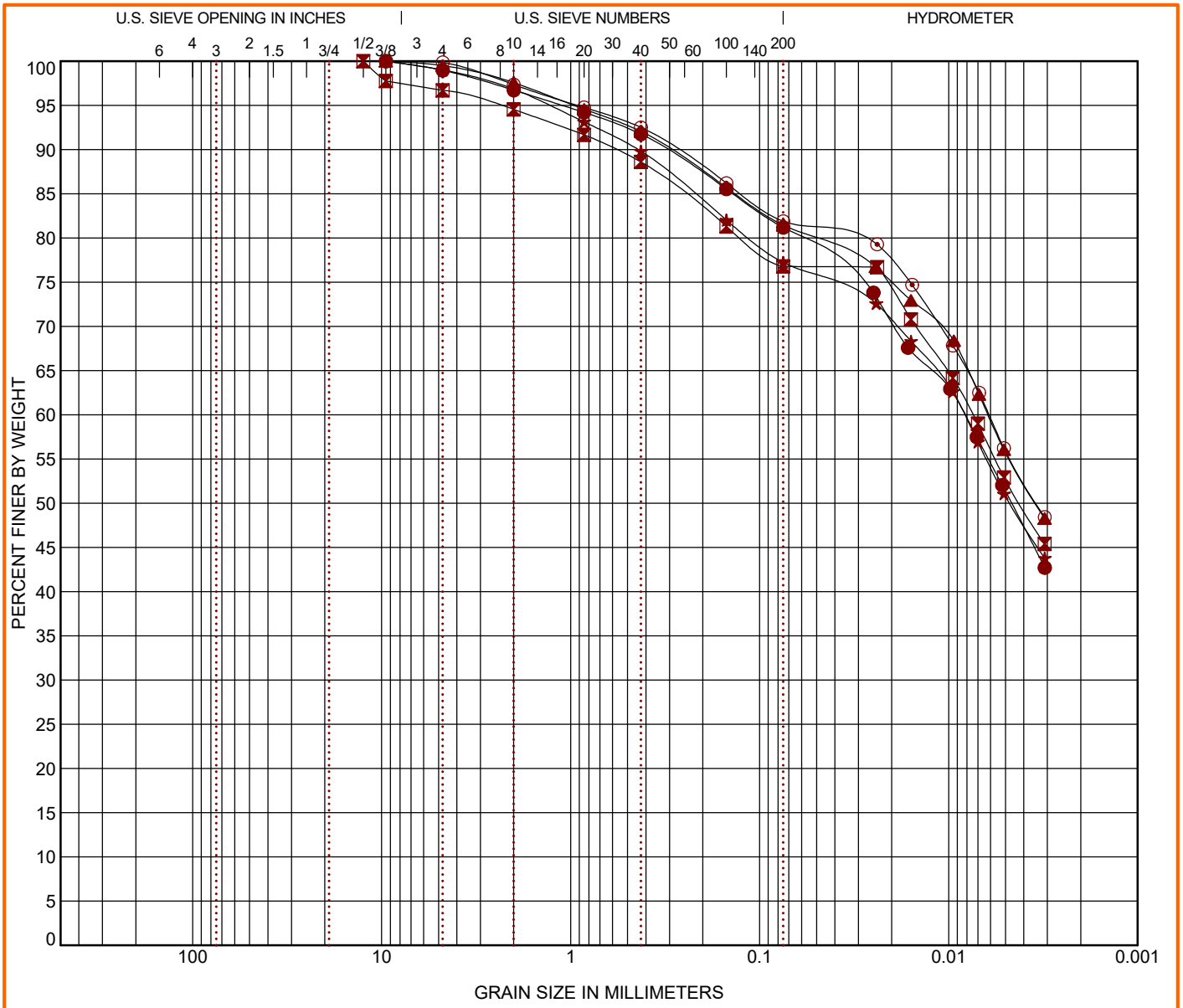
Terracon
800 Morrison Rd
Gahanna, OH

CLIENT: American Electric Power
New Albany, OH

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 8/9/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-2	28.5 - 30	LEAN CLAY with SAND (CL)	18.0	36	13	23		
⊠	B-3	4.5 - 6	LEAN CLAY with SAND (CL)	23.0	41	17	24		
▲	B-3	13.5 - 15	LEAN CLAY with SAND (CL)	17.0	32	16	16		
★	B-3	28.5 - 30	LEAN CLAY with SAND (CL)	16.0	29	14	15		
⊙	B-4	4.5 - 6	LEAN CLAY with SAND (CL)	21.0	38	17	21		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-2	28.5 - 30	9.5	0.008			0.0	1.0	17.8	29.9		51.3
⊠	B-3	4.5 - 6	12.5	0.007			0.0	3.3	19.9	24.2		52.6
▲	B-3	13.5 - 15	9.5	0.006			0.0	0.5	18.0	25.7		55.7
★	B-3	28.5 - 30	9.5	0.008			0.0	1.0	21.8	26.4		50.8
⊙	B-4	4.5 - 6	9.5	0.006			0.0	0.1	18.0	26.0		55.9

PROJECT: East Leipsic - Rader Road 138 kV T Line

PROJECT NUMBER: N4225114

SITE: Putnam and Hancock Counties, OH

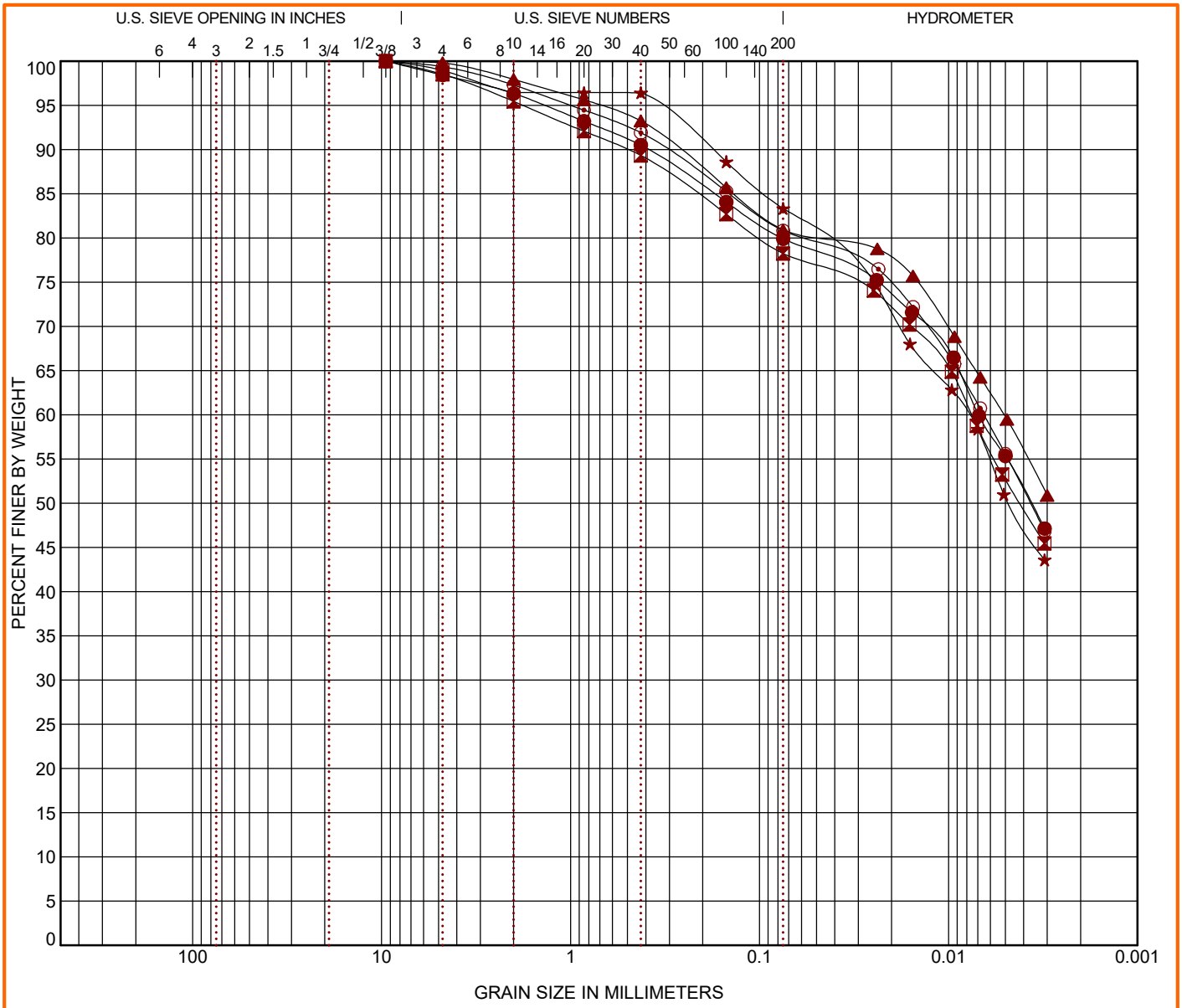
Terracon
800 Morrison Rd
Gahanna, OH

CLIENT: American Electric Power
New Albany, OH

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 8/9/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-4	18.5 - 20	LEAN CLAY with SAND (CL)	18.0	32	16	16		
⊠	B-4	28.5 - 30	LEAN CLAY with SAND (CL)	17.0	30	14	16		
▲	B-5	4.5 - 6	LEAN CLAY with SAND (CL)	25.0	44	19	25		
★	B-5	18.5 - 20	LEAN CLAY with SAND (CL)	18.0	35	12	23		
⊙	B-5	28.5 - 30	LEAN CLAY with SAND (CL)	19.0	34	13	21		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-4	18.5 - 20	9.5	0.007			0.0	1.6	18.5	24.6		55.3
⊠	B-4	28.5 - 30	9.5	0.008			0.0	1.5	20.3	25.6		52.7
▲	B-5	4.5 - 6	9.5	0.005			0.0	0.2	18.9	21.2		59.8
★	B-5	18.5 - 20	9.5	0.008			0.0	1.1	15.6	32.6		50.7
⊙	B-5	28.5 - 30	9.5	0.007			0.0	0.6	18.5	25.3		55.6

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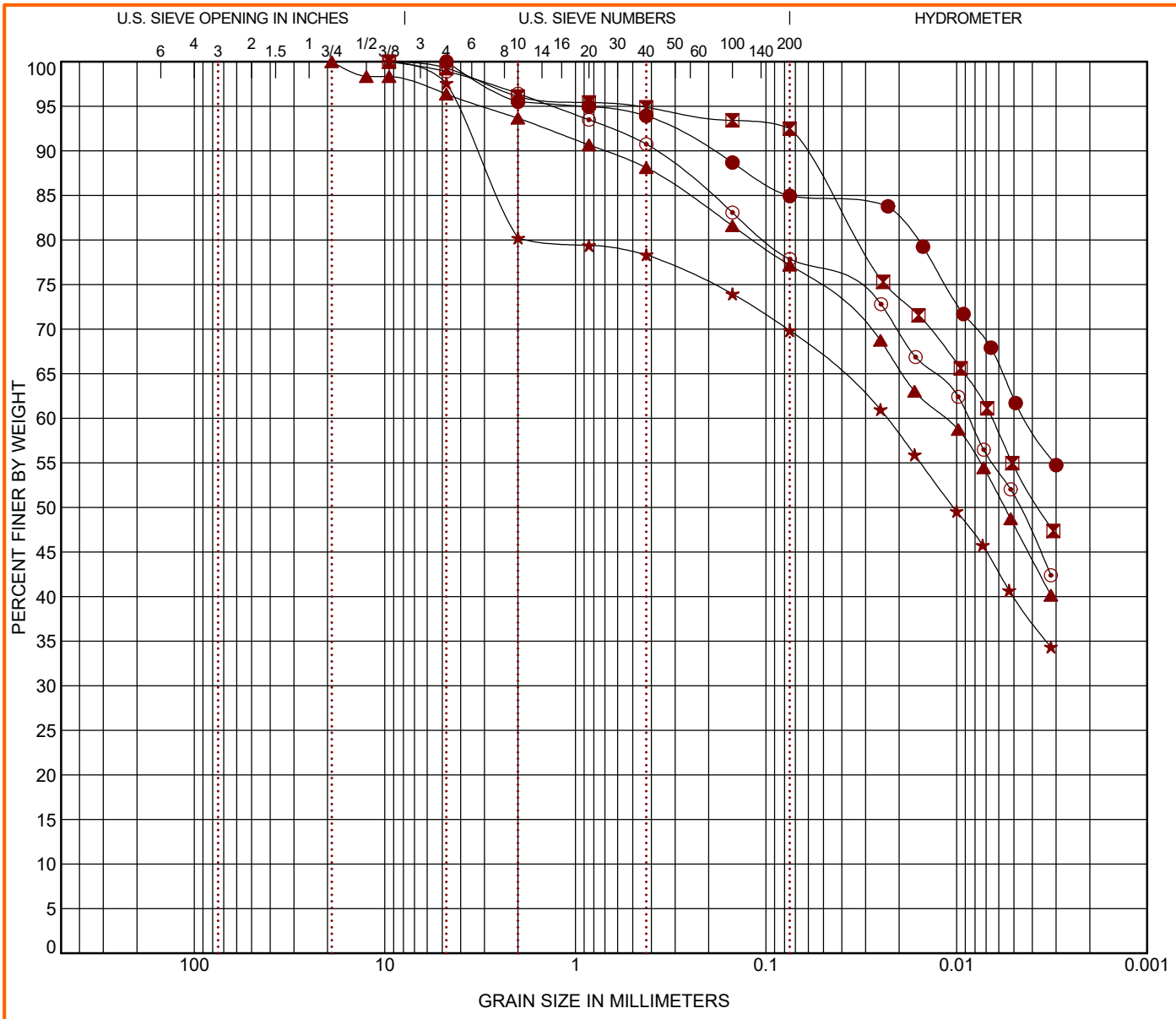

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-6	3 - 4.5	FAT CLAY with SAND (CH)	22.0	52	17	35		
⊠	B-6	18.5 - 20	LEAN CLAY (CL)	17.0	34	14	20		
▲	B-6	28.5 - 30	LEAN CLAY with SAND (CL)	15.0	31	14	17		
★	B-7	4.5 - 6	SANDY LEAN CLAY (CL)	22.0	44	16	28		
⊙	B-7	13.5 - 15	LEAN CLAY with SAND (CL)	17.0	32	13	19		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-6	3 - 4.5	4.75	0.004			0.0	0.0	15.1	22.8		62.1
⊠	B-6	18.5 - 20	9.5	0.007			0.0	0.7	6.8	37.8		54.7
▲	B-6	28.5 - 30	19	0.011			0.0	3.6	19.2	29.1		48.0
★	B-7	4.5 - 6	9.5	0.023			0.0	2.4	27.8	29.9		40.0
⊙	B-7	13.5 - 15	9.5	0.009			0.0	1.1	21.0	26.6		51.3

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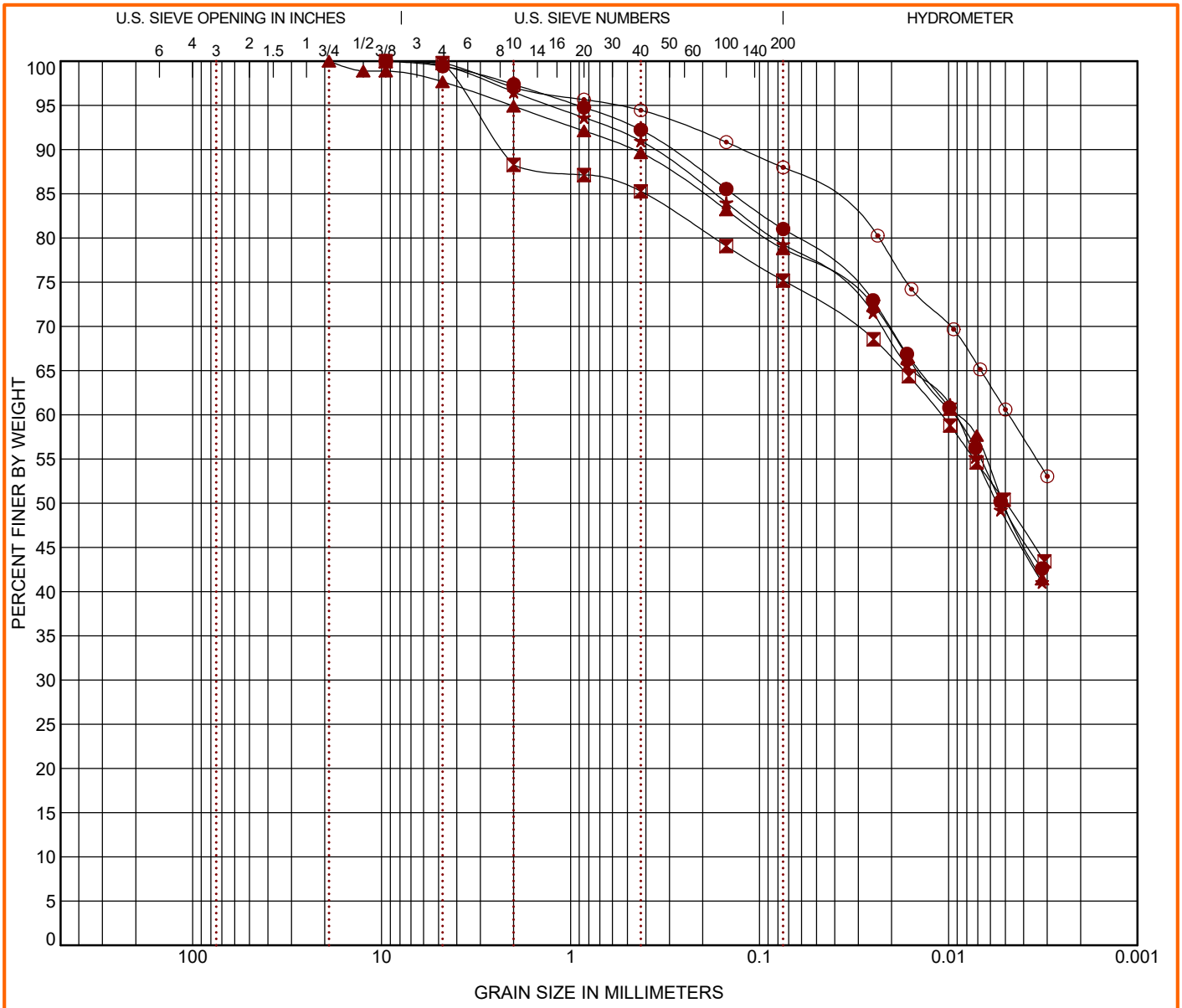

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-7	28.5 - 30	LEAN CLAY with SAND (CL)	17.0	31	14	17		
⊠	B-8	4.5 - 6	FAT CLAY with SAND (CH)	22.0	56	16	40		
▲	B-8	18.5 - 20	LEAN CLAY with SAND (CL)	18.0	31	14	17		
★	B-8	28.5 - 30	LEAN CLAY with SAND (CL)	16.0	33	13	20		
⊙	B-8	38.5 - 40	LEAN CLAY (CL)	26.0	43	15	28		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-7	28.5 - 30	9.5	0.009			0.0	0.6	18.4	31.7		49.3
⊠	B-8	4.5 - 6	9.5	0.011			0.0	0.2	24.6	25.1		50.1
▲	B-8	18.5 - 20	19	0.009			0.0	2.3	18.9	29.2		49.6
★	B-8	28.5 - 30	9.5	0.009			0.0	0.5	20.2	31.0		48.3
⊙	B-8	38.5 - 40	9.5	0.005			0.0	0.2	11.8	27.4		60.6

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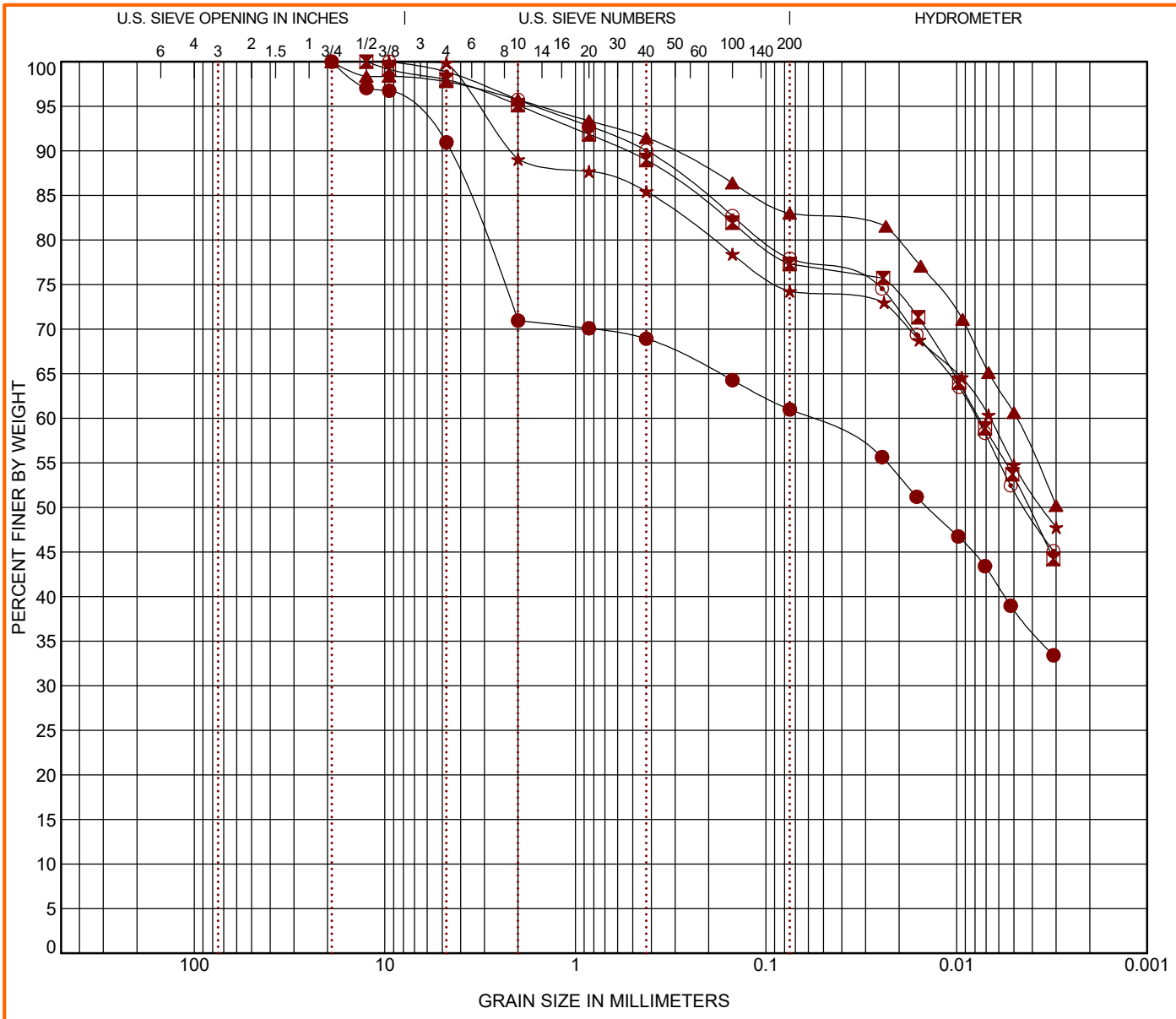

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-9	4.5 - 6	SANDY FAT CLAY (CH)	23.0	57	16	41		
⊠	B-9	18.5 - 20	LEAN CLAY with SAND (CL)	18.0	30	14	16		
▲	B-9	28.5 - 30	LEAN CLAY with SAND (CL)	20.0	38	13	25		
★	B-10	3 - 4.5	LEAN CLAY with SAND (CL)	23.0	48	18	30		
⊙	B-10	13.5 - 15	LEAN CLAY with SAND (CL)	17.0	30	13	17		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-9	4.5 - 6	19	0.061			0.0	9.0	30.0	22.4		38.6
⊠	B-9	18.5 - 20	12.5	0.008			0.0	2.0	20.7	24.0		53.4
▲	B-9	28.5 - 30	19	0.005			0.0	2.2	14.8	22.3		60.6
★	B-10	3 - 4.5	9.5	0.007			0.0	0.1	25.6	19.5		54.8
⊙	B-10	13.5 - 15	9.5	0.008			0.0	1.1	20.9	26.0		51.9

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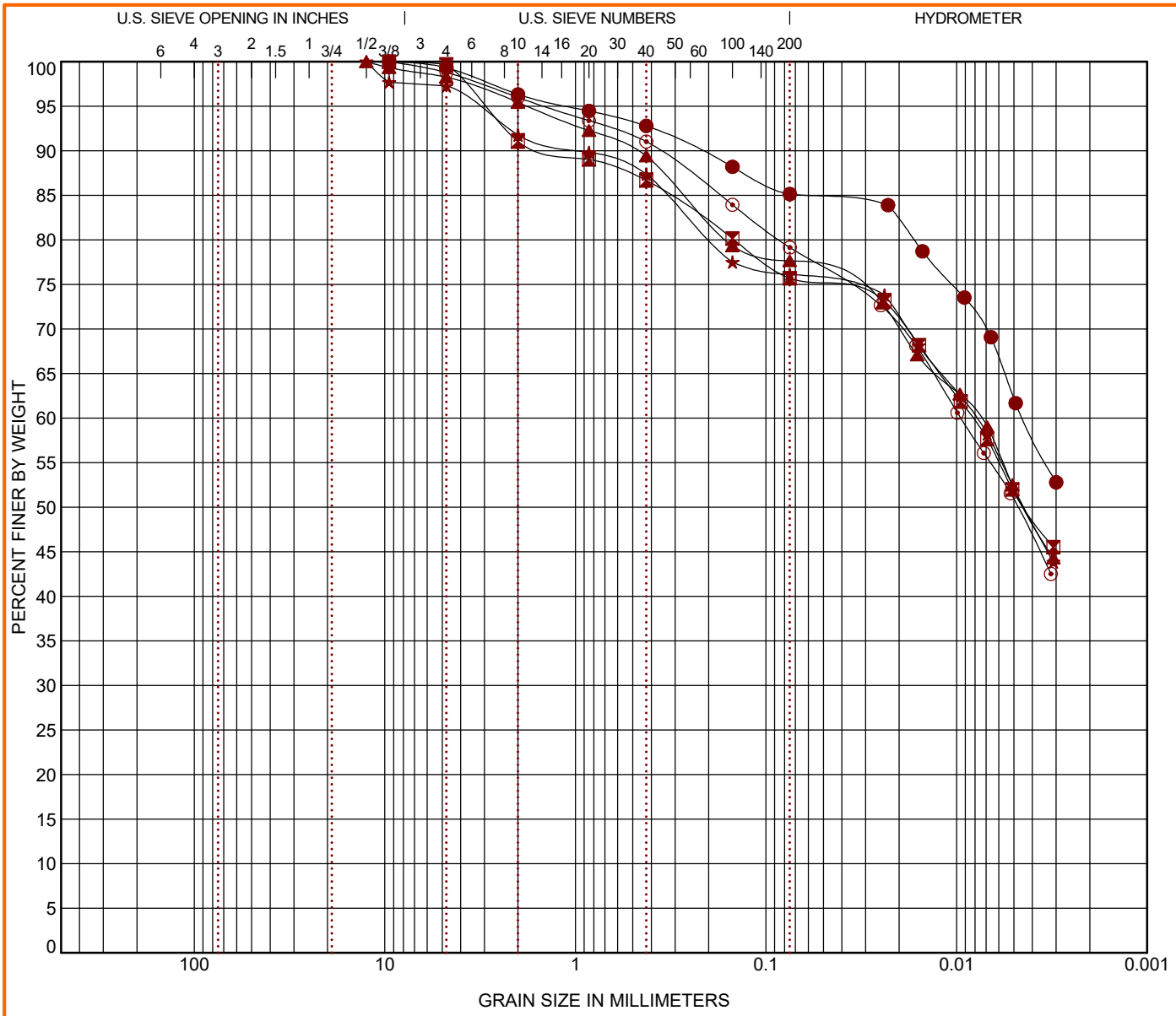

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-10	28.5 - 30	LEAN CLAY (CL)	22.0	39	14	25		
⊠	B-11	4.5 - 6	LEAN CLAY with SAND (CL)	17.0	38	17	21		
▲	B-11	13.5 - 15	LEAN CLAY with SAND (CL)	16.0	31	13	18		
★	B-11	23.5 - 25	LEAN CLAY with SAND (CL)	17.0	32	15	17		
⊙	B-12	4.5 - 6	LEAN CLAY with SAND (CL)	18.0	35	16	19		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-10	28.5 - 30	9.5	0.004			0.0	0.7	14.2	23.0		62.2
⊠	B-11	4.5 - 6	9.5	0.008			0.0	0.3	24.0	24.0		51.7
▲	B-11	13.5 - 15	12.5	0.008			0.0	1.7	20.6	25.5		52.2
★	B-11	23.5 - 25	12.5	0.008			0.0	2.7	21.1	24.0		52.2
⊙	B-12	4.5 - 6	9.5	0.009			0.0	1.2	19.6	28.3		50.8

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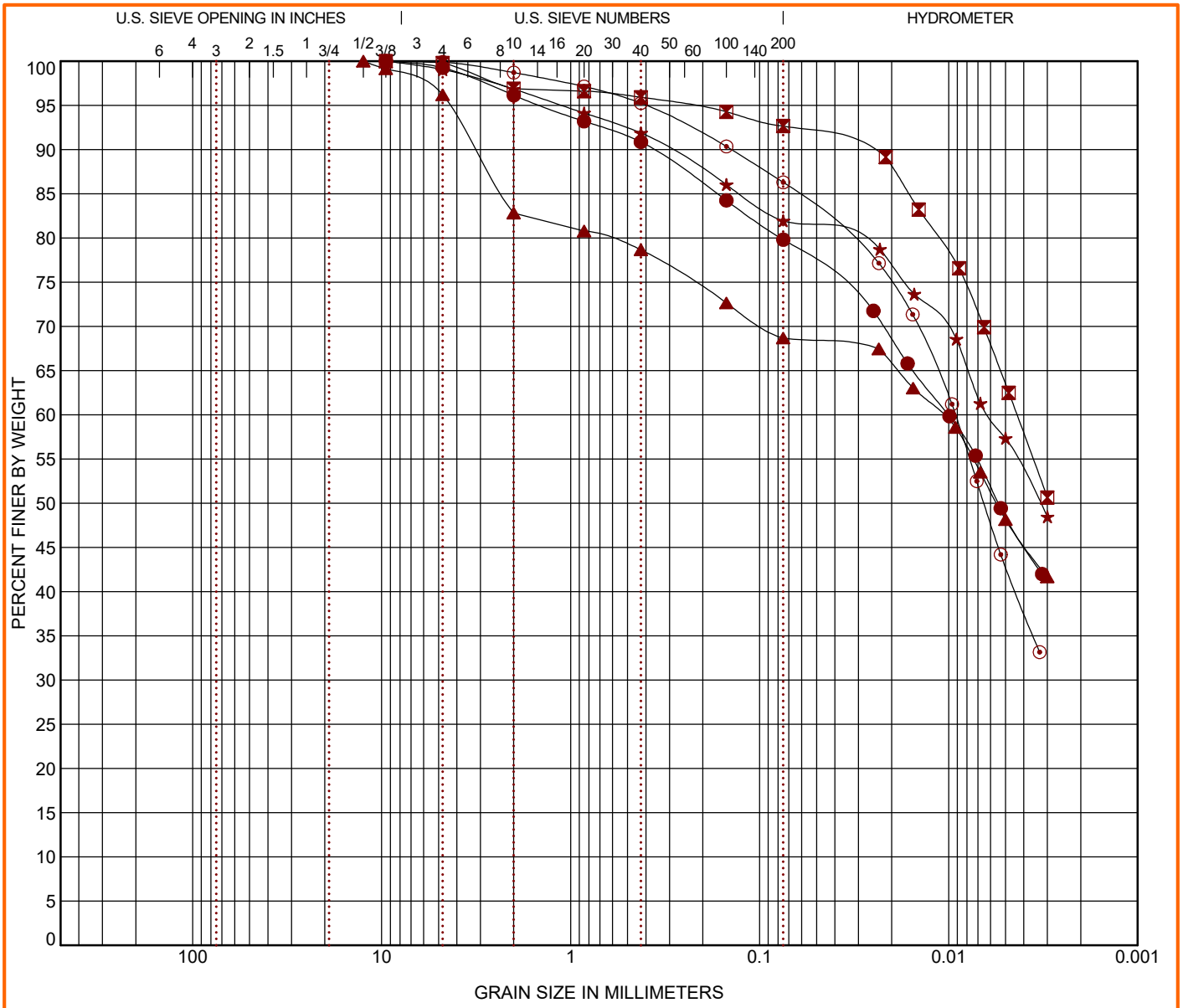

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-12	18.5 - 20	LEAN CLAY with SAND (CL)	18.0	30	15	15		
⊠	B-12	33.5 - 35	LEAN CLAY (CL)	24.0	36	19	17		
▲	B-13	4.5 - 6	SANDY LEAN CLAY (CL)	29.0	44	20	24		
★	B-13	18.5 - 20	LEAN CLAY with SAND (CL)	16.0	33	14	19		
⊙	B-13	28.5 - 30	LEAN CLAY (CL)	16.0	28	12	16		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-12	18.5 - 20	9.5	0.01			0.0	0.7	19.4	31.2		48.6
⊠	B-12	33.5 - 35	9.5	0.004			0.0	0.2	7.1	29.2		63.5
▲	B-13	4.5 - 6	12.5	0.011			0.0	3.8	27.5	20.5		48.1
★	B-13	18.5 - 20	9.5	0.006			0.0	1.0	17.1	24.6		57.3
⊙	B-13	28.5 - 30	9.5	0.009			0.0	0.1	13.6	43.5		42.8

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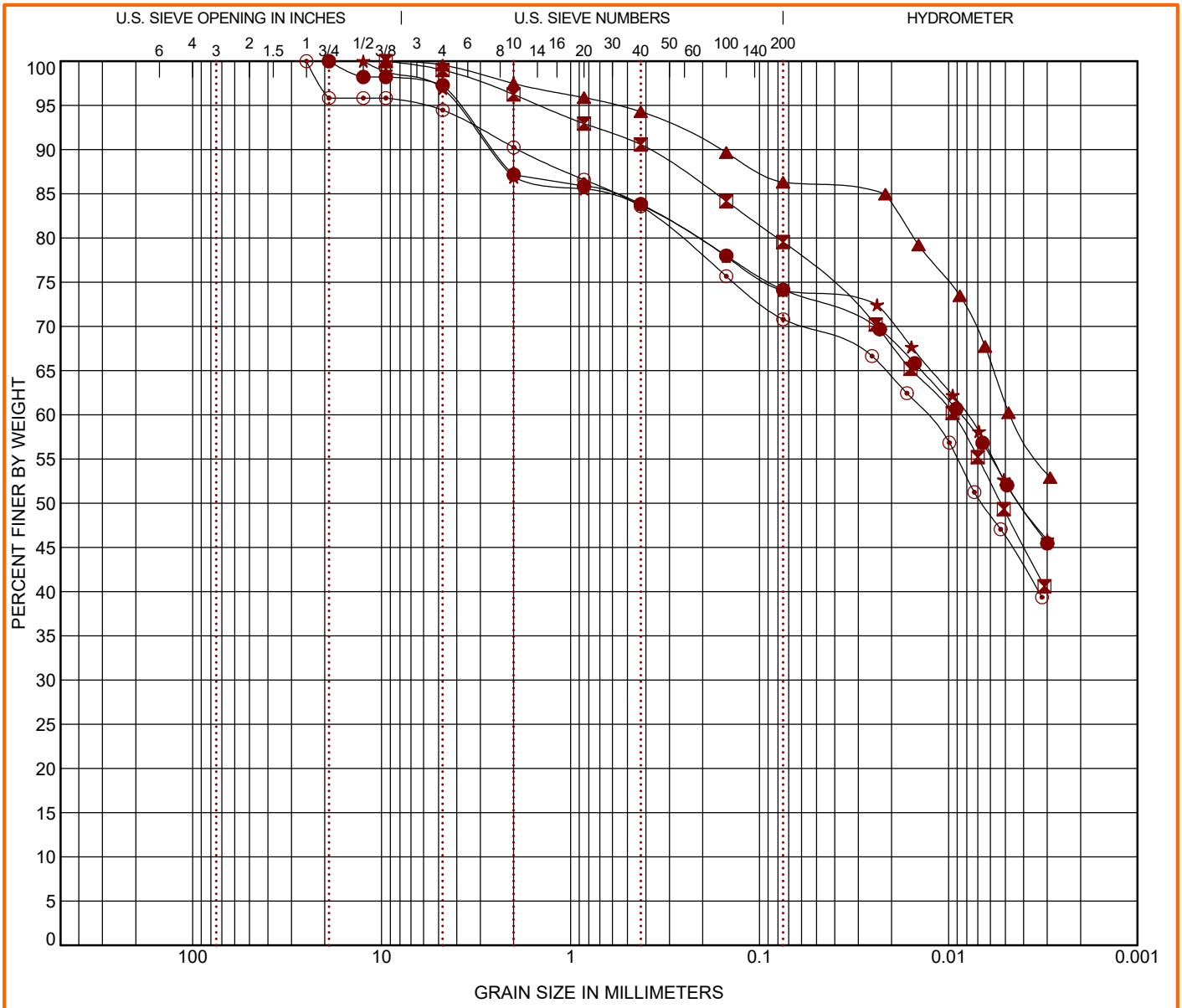

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-14	4.5 - 6	FAT CLAY with SAND (CH)	40.0	50	20	30		
⊠	B-14	13.5 - 15	LEAN CLAY with SAND (CL)	16.0	35	13	22		
▲	B-14	28.5 - 30	LEAN CLAY (CL)	20.0	39	14	25		
★	B-15	4.5 - 6	FAT CLAY with SAND (CH)	29.0	53	16	37		
⊙	B-15	18.5 - 20	LEAN CLAY with SAND (CL)	15.0	28	12	16		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-14	4.5 - 6	19	0.009			0.0	2.7	23.1	21.8		52.4
⊠	B-14	13.5 - 15	9.5	0.009			0.0	1.0	19.5	30.5		49.0
▲	B-14	28.5 - 30	9.5	0.005			0.0	0.4	13.3	25.0		61.3
★	B-15	4.5 - 6	12.5	0.008			0.0	3.1	22.8	21.6		52.4
⊙	B-15	18.5 - 20	25	0.013			0.0	5.5	23.7	24.6		46.2

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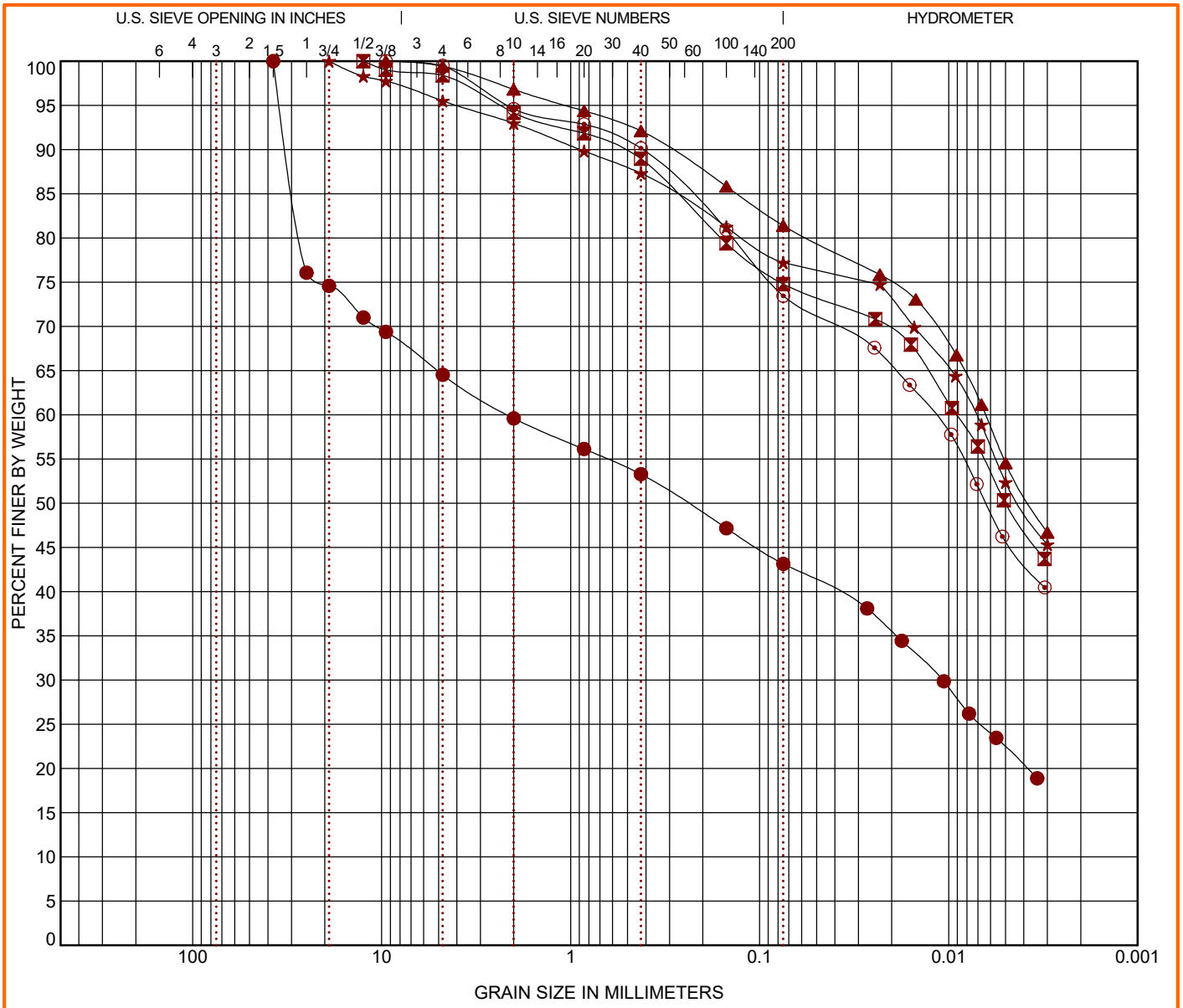

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-15	28.5 - 30	CLAYEY GRAVEL with SAND (GC)	11.0	22	11	11		
⊠	B-16	4.5 - 6	LEAN CLAY with SAND (CL)	23.0	41	18	23		
▲	B-16	13.5 - 15	LEAN CLAY with SAND (CL)	18.0	31	15	16		
★	B-16	28.5 - 30	LEAN CLAY with SAND (CL)	17.0	30	15	15		
⊙	B-17	4.5 - 6	LEAN CLAY with SAND (CL)	26.0	43	17	26		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-15	28.5 - 30	37.5	2.15	0.011		0.0	35.5	21.4	20.7		22.4
⊠	B-16	4.5 - 6	12.5	0.009			0.0	1.6	23.6	24.7		50.1
▲	B-16	13.5 - 15	9.5	0.006			0.0	0.6	18.0	26.8		54.5
★	B-16	28.5 - 30	19	0.007			0.0	4.5	18.3	24.8		52.4
⊙	B-17	4.5 - 6	9.5	0.012			0.0	0.5	26.0	27.7		45.8

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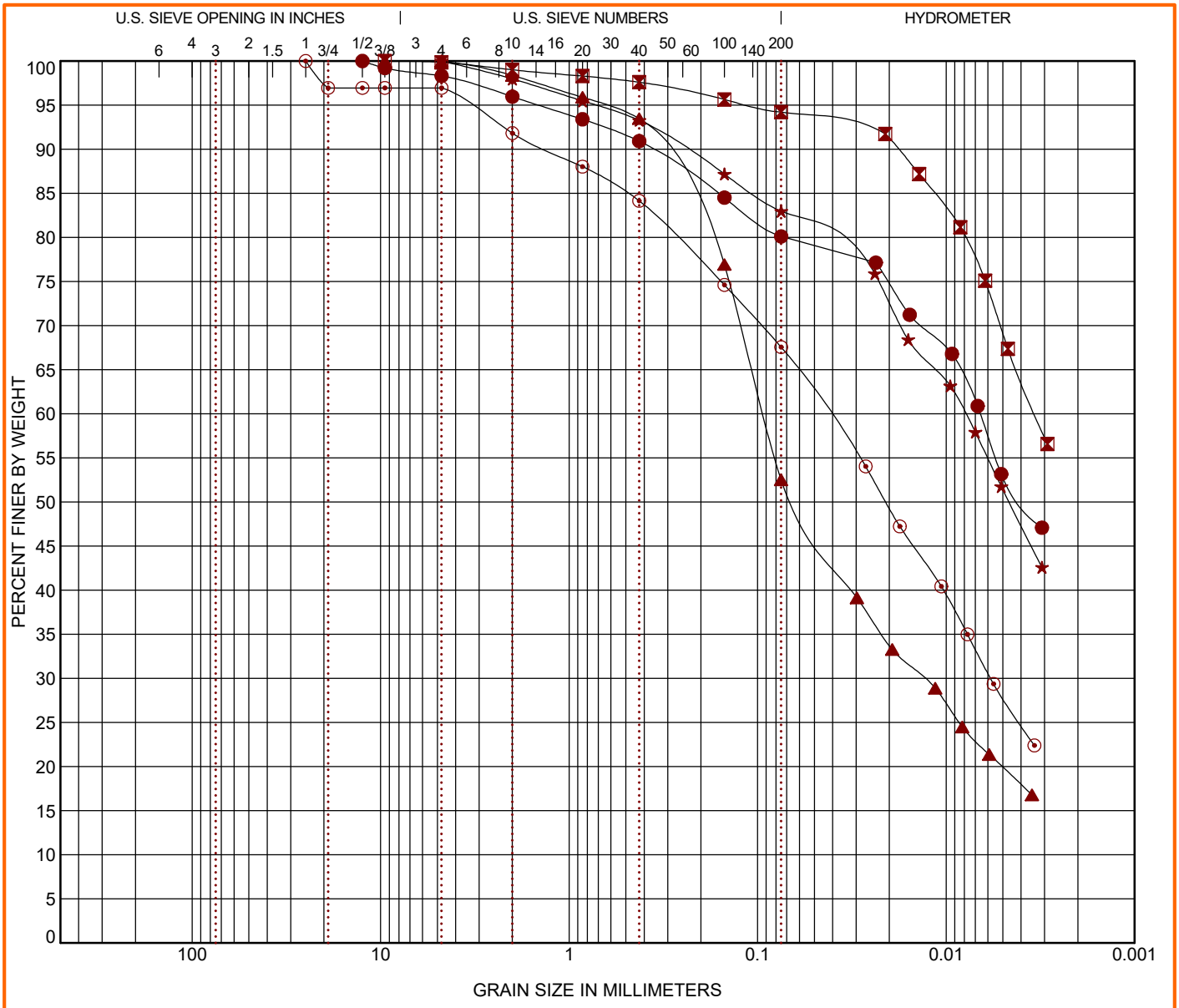

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-17	13.5 - 15	LEAN CLAY with SAND (CL)	18.0	36	13	23		
⊠	B-17	28.5 - 30	LEAN CLAY (CL)	28.0	40	17	23		
▲	B-18	3 - 4.5	SANDY SILTY CLAY (CL-ML)	25.0	20	14	6		
★	B-18	18.5 - 20	LEAN CLAY with SAND (CL)	22.0	32	13	19		
⊙	B-18	33.5 - 35	SANDY LEAN CLAY (CL)	11.0	21	12	9		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-17	13.5 - 15	12.5	0.007			0.0	1.7	18.2	27.2		52.9
⊠	B-17	28.5 - 30	9.5	0.003			0.0	0.1	5.7	25.1		69.1
▲	B-18	3 - 4.5	9.5	0.093	0.013		0.0	0.0	47.4	32.6		19.9
★	B-18	18.5 - 20	4.75	0.008			0.0	0.0	17.0	31.6		51.4
⊙	B-18	33.5 - 35	25	0.042	0.006		0.0	3.0	29.4	39.8		27.8

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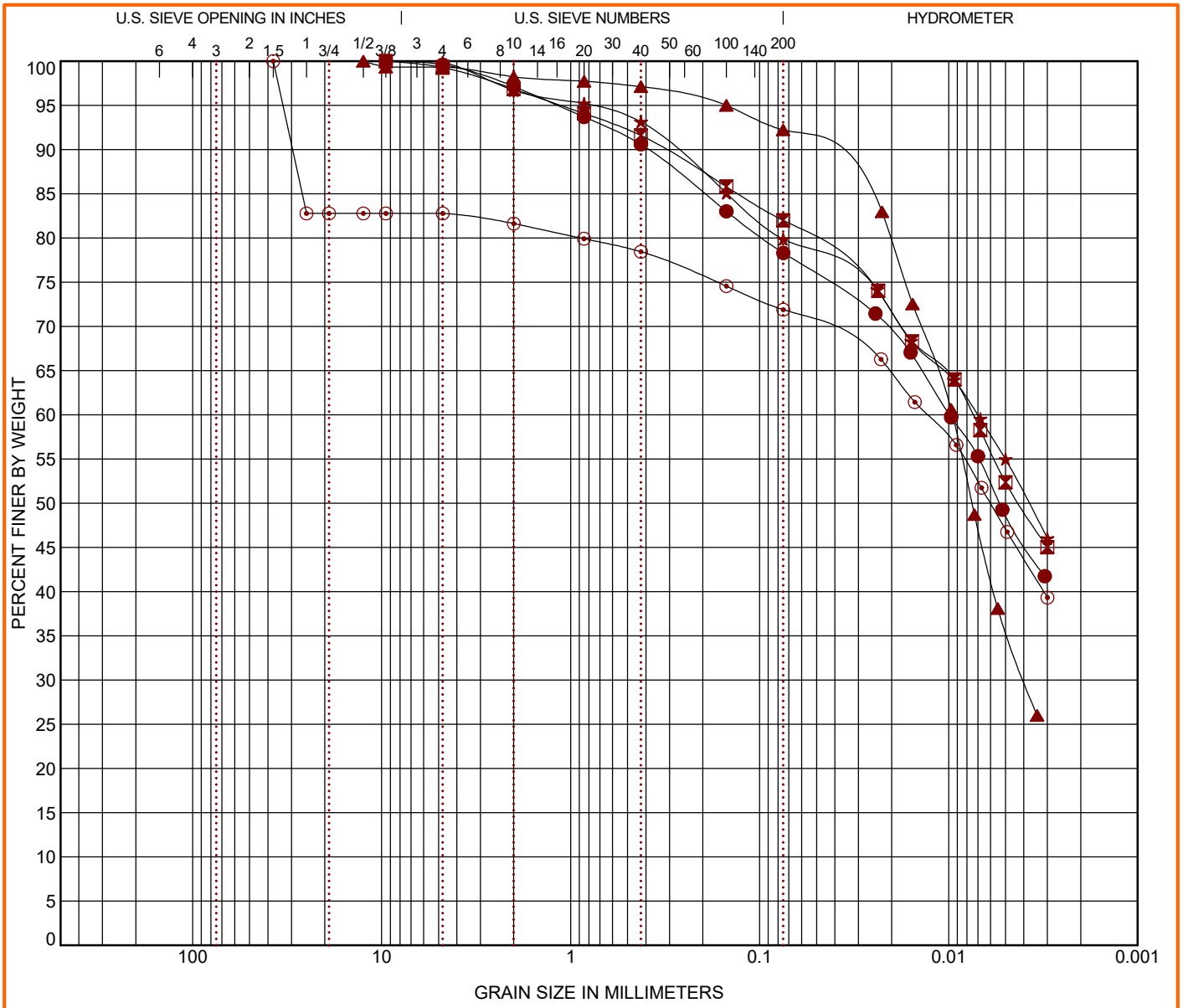


COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-19	4.5 - 6	LEAN CLAY with SAND (CL)	18.0	37	14	23		
⊠	B-19	13.5 - 15	LEAN CLAY with SAND (CL)	19.0	37	13	24		
▲	B-19	28.5 - 30	LEAN CLAY (CL)	16.0	27	14	13		
★	B-20	6 - 7.5	FAT CLAY with SAND (CH)	22.0	50	16	34		
⊙	B-20	18.5 - 20	LEAN CLAY with GRAVEL (CL)	19.0	35	17	18		

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-19	4.5 - 6	9.5	0.01			0.0	0.4	21.3	29.6		48.7
⊠	B-19	13.5 - 15	9.5	0.007			0.0	0.7	17.3	29.6		52.4
▲	B-19	28.5 - 30	12.5	0.01	0.004		0.0	0.7	7.1	56.5		35.7
★	B-20	6 - 7.5	9.5	0.007			0.0	0.1	20.0	24.9		55.0
⊙	B-20	18.5 - 20	37.5	0.013			0.0	17.2	10.9	24.8		47.1

PROJECT: East Leipsic - Rader Road 138 kV T Line

PROJECT NUMBER: N4225114

SITE: Putnam and Hancock Counties, OH

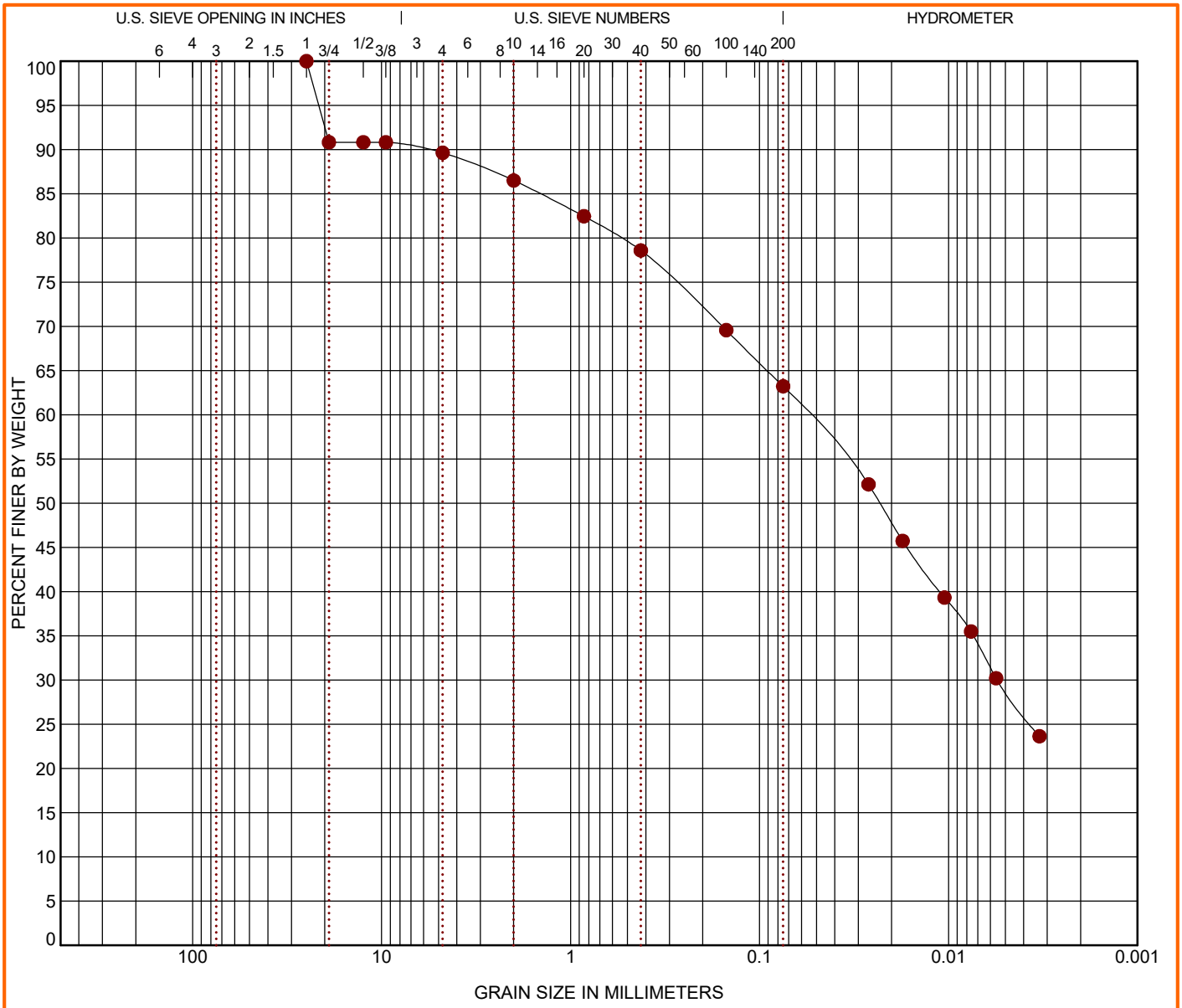
Terracon
800 Morrison Rd
Gahanna, OH

CLIENT: American Electric Power
New Albany, OH

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 N4225114 EAST LEIPSIC - RA.GPJ TERRACON_DATATEMPLATE.GDT 8/9/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID	Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
● B-20	23.5 - 25	SANDY LEAN CLAY (CL)	11.0	22	12	10		

Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
● B-20	23.5 - 25	25	0.055	0.006		0.0	10.4	26.4	34.4		28.8

PROJECT: East Leipsic - Rader Road 138 kV T Line

PROJECT NUMBER: N4225114

SITE: Putnam and Hancock Counties, OH

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SUPPORTING INFORMATION

Contents:

General Notes
Unified Soil Classification System
Description of Rock Properties

Note: All attachments are one page unless noted above.

GENERAL NOTES
DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING	WATER LEVEL	FIELD TESTS
Rock Core Standard Penetration Test	**Water Initially Encountered** **Water Level After a Specified Period of Time** **Water Level After a Specified Period of Time** Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	**N** Standard Penetration Test Resistance (Blows/Ft.) **(HP)** Hand Penetrometer **(T)** Torvane **(DCP)** Dynamic Cone Penetrometer **UC** Unconfined Compressive Strength **(PID)** Photo-Ionization Detector **(OVA)** Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no ctual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (tsf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL		RELATIVE PROPORTIONS OF FINES	
Descriptive Term(s) of other constituents	Percent of Dry Weight	**Descriptive Term(s) of other constituents**	**Percent of Dry Weight**
Trace	<15	Trace	<5
With	15-29	With	5-12
Modifier	>30	Modifier	>12

GRAIN SIZE TERMINOLOGY		PLASTICITY DESCRIPTION	
Major Component of Sample	**Particle Size**	**Term**	**Plasticity Index**
Boulders	Over 12 in. (300 mm)	Non-plastic	0
Cobbles	12 in. to 3 in. (300mm to 75mm)	Low	1 - 10
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)	Medium	11 - 30
Sand	#4 to #200 sieve (4.75mm to 0.075mm	High	> 30
Silt or Clay	Passing #200 sieve (0.075mm)		

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or [Cc<1 or Cc>3.0] [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or [Cc<1 or Cc>3.0] [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"		CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K, L, M, N]
			Liquid limit - not dried			Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K, L, M]
			PI plots below "A" line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K, L, M, P]
			Liquid limit - not dried			Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

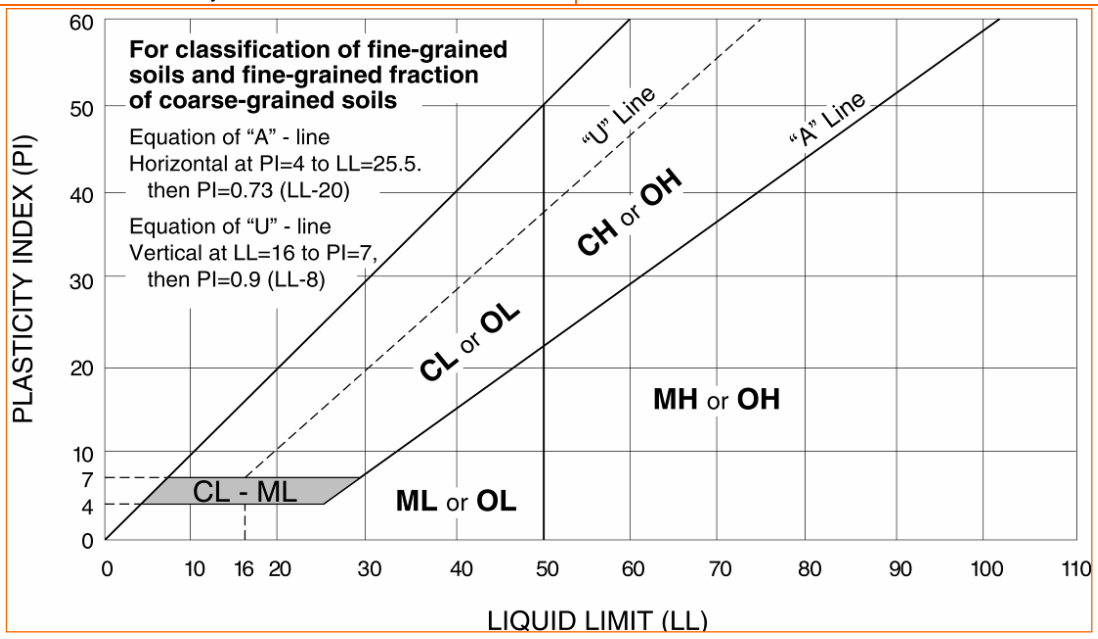
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



DESCRIPTION OF ROCK PROPERTIES

Terracon GeoReport

WEATHERING

Fresh	Rock fresh, crystals bright, few joints may show slight staining. Rock rings under hammer if crystalline.
Very slight	Rock generally fresh, joints stained, some joints may show thin clay coatings, crystals in broken face show bright. Rock rings under hammer if crystalline.
Slight	Rock generally fresh, joints stained, and discoloration extends into rock up to 1 in. Joints may contain clay. In granitoid rocks some occasional feldspar crystals are dull and discolored. Crystalline rocks ring under hammer.
Moderate	Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some show clayey. Rock has dull sound under hammer and shows significant loss of strength as compared with fresh rock.
Moderately severe	All rock except quartz discolored or stained. In granitoid rocks, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick.
Severe	All rock except quartz discolored or stained. Rock "fabric" clear and evident, but reduced in strength to strong soil. In granitoid rocks, all feldspars kaolinized to some extent. Some fragments of strong rock usually left.
Very severe	All rock except quartz discolored or stained. Rock "fabric" discernible, but mass effectively reduced to "soil" with only fragments of strong rock remaining.
Complete	Rock reduced to "soil". Rock "fabric" not discernible or discernible only in small, scattered locations. Quartz may be present as dikes or stringers.

HARDNESS (for engineering description of rock – not to be confused with Moh's scale for minerals)

Very hard	Cannot be scratched with knife or sharp pick. Breaking of hand specimens requires several hard blows of geologist's pick.
Hard	Can be scratched with knife or pick only with difficulty. Hard blow of hammer required to detach hand specimen.
Moderately hard	Can be scratched with knife or pick. Gouges or grooves to ¼ in. deep can be excavated by hard blow of point of a geologist's pick. Hand specimens can be detached by moderate blow.
Medium	Can be grooved or gouged 1/16 in. deep by firm pressure on knife or pick point. Can be excavated in small chips to pieces about 1-in. maximum size by hard blows of the point of a geologist's pick.
Soft	Can be gouged or grooved readily with knife or pick point. Can be excavated in chips to pieces several inches in size by moderate blows of a pick point. Small thin pieces can be broken by finger pressure.
Very soft	Can be carved with knife. Can be excavated readily with point of pick. Pieces 1-in. or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.

Joint, Bedding, and Foliation Spacing in Rock [a]		
Spacing	**Joints**	**Bedding/Foliation**
Less than 2 in.	Very close	Very thin
2 in. – 1 ft.	Close	Thin
1 ft. – 3 ft.	Moderately close	Medium
3 ft. – 10 ft.	Wide	Thick
More than 10 ft.	Very wide	Very thick

a. Spacing refers to the distance normal to the planes, of the described feature, which are parallel to each other or nearly so.

Rock Quality Designator (RQD) a	
RQD, as a percentage	**Diagnostic description**
Exceeding 90	Excellent
90 – 75	Good
75 – 50	Fair
50 – 25	Poor
Less than 25	Very poor

a. RQD (given as a percentage) = length of core in pieces 4 in. and longer/length of run.

Joint Openness Descriptors	
Openness	**Descriptor**
No Visible Separation	Tight
Less than 1/32 in.	Slightly Open
1/32 to 1/8 in.	Moderately Open
1/8 to 3/8 in.	Open
3/8 in. to 0.1 ft.	Moderately Wide
Greater than 0.1 ft.	Wide

References: American Society of Civil Engineers. Manuals and Reports on Engineering Practice - No. 56. Subsurface Investigation for Design and Construction of Foundations of Buildings. New York: American Society of Civil Engineers, 1976. U.S. Department of the Interior, Bureau of Reclamation, Engineering Geology Field Manual.

Transmittal Letter Report

Rader Road – New Liberty 138 kV T Line
McComb, Ohio
April 28, 2023
Terracon Project No. N4225115

Prepared for:
American Electric Power
New Albany, Ohio

Prepared by:
Terracon Consultants, Inc.
Columbus, Ohio

April 28, 2023

American Electric Power
8600 Smiths Mill Road
New Albany, Ohio 43054

Attn: Mr. Kyle A. Oberster
P: (614) 933-2661
E: kaoberster@aep.com

Re: Transmittal Letter Report for Geotechnical Engineering Services
Rader Road – New Liberty 138 kV T Line
Hancock County, Ohio
Terracon Project No. N4225115

Dear Mr. Oberster:

We have completed the geotechnical engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. PN4225115 dated March 21, 2022.The AEP work order number for this project is T10160389002 and BPID number is P20017006.

This transmittal letter presents the findings of the subsurface exploration conducted for seventeen (17) test borings designated B-21 through B-37. Maps showing the site and boring locations are presented in the **Site Location and Exploration Plans** section of this report. The boring logs and results of the laboratory testing performed on selected soil samples obtained during the field exploration are included in the **Exploration Results** section of this report.

The recommended soil parameters for design of drilled shafts using the computer programs MFAD and SHAFT have been developed for each test boring and are included in the **MFAD™ Design Parameters** and **SHAFT™ Design Parameters** sections of this report, respectively.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Ganesh Vairavan
Senior Staff Engineer

Yogesh S. Rege, P.E.
Senior Principal, Office Manager

CONTENTS

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SHAFT™ DESIGN PARAMETERS 9
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Note: This report was originally delivered in a web-based format. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES
SITE LOCATION AND EXPLORATION PLANS
EXPLORATION RESULTS
SUPPORTING INFORMATION

Note: Refer to each individual Attachment for a listing of contents.

DESIGN PARAMETERS FOR DEEP FOUNDATIONS

MFAD™ DESIGN PARAMETERS

Parameters provided in tables below for each boring are ultimate values and designer should apply adequate applicable factor of safety aligned with its use.

Test Boring: B-21

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength (ksf)
1[2]	Clay	7.5	123	0.35	--	0.5
2	Clay	9.0	130	2.0	--	3.5
3	Clay	23.5	126	1.0	--	1.5
4	Clay	28	131	2.5	--	4.0
5	Dolomite	38	See table below for rock properties			

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Layer Number	Material Type	Approximate Depth to Bottom of Layer (feet) [1]	Effective Rock Cohesion (ksf)	Effective Friction Angle for Rock (degrees)	Rock/ Concrete Bond Strength (ksf)	Deformation Modulus (ksi)
5	Dolomite	38	3.2	35	20	336

Test Boring: B-22

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength (ksf)
1[2]	Clay	6.0	124	0.5	--	0.75
2	Clay	7.5	130	2.0	--	3.5
3	Clay	23.5	126	1.0	--	1.5
4	Clay	25.0	131	2.5	--	4.0

Static long-term groundwater table anticipated at about 9 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-23

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength (ksf)
1[2]	Clay	7.5	124	0.5	--	0.75
2	Clay	18.5	128	1.2	--	2.0
3	Clay	28.5	129	1.5	--	2.5
4	Clay	38.5	126	1.0	--	1.5
5	Clay	48.5	130	2.0	--	3.5
6	Clay	50	131	2.5	--	4.0

Static long-term groundwater table anticipated at about 28.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-24

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	1.5	123	0.35	--	0.5
2	Sand	4.5	113	0.5	29	--
3	Sand	9.0	120	0.9	32	--
4	Sand	13.5	125	1.5	34	--
5	Clay	48.5	130	1.75	--	3.0
6	Clay	50	130	2.0	--	3.5

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-25

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	4.5	123	0.35	--	0.5
2	Clay	6.0	131	2.5	--	4.0
3	Clay	7.5	126	1.0	--	1.5
4	Clay	23.5	130	1.75	--	3.0
5	Clay	28.5	126	1.0	--	1.5
6	Clay	33.5	129	1.5	--	2.5

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
7	Clay	38.5	126	1.0	--	1.5
8	Clay	50	130	1.75	--	3.0

Static long-term groundwater table anticipated at about 23.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-26

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength (ksf)
1[2]	Clay	7.5	123	0.35	--	0.5
2	Clay	13.5	128	1.2	--	2.0
3	Clay	38.5	125	0.6	--	1.0
4	Clay	50	128	1.2	--	2.0

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-27

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength (ksf)
1[2]	Clay	4.5	125	0.6	--	1.0
2	Clay	13.5	128	1.2	--	2.0
3	Clay	28.5	126	1.0	--	1.5
4	Clay	38.5	130	2.0	--	3.5
5	Clay	48.5	126	1.0	--	1.5
6	Clay	50	130	2.0	--	3.5

Static long-term groundwater table anticipated at about 6 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-28

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Fill modelled as Clay	1.5	122	--	--	--
2	Clay	38.5	124	0.5	--	0.75
3	Clay	48.5	126	1.0	--	1.5
4	Clay	50	128	1.2	--	2.0

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-29

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	7.5	124	0.5	--	0.75
2	Clay	9	128	1.2	--	2.0
3	Clay	13.5	125	0.6	--	1.0
4	Clay	23.5	128	1.2	--	2.0
5	Clay	33.5	124	0.5	--	0.75
6	Clay	38.5	128	1.2	--	2.0
7	Clay	43.5	130	1.75	--	3.0
8	Clay	48.5	126	1	--	1.5
9	Clay	50	130	1.75	--	3.0

Static long-term groundwater table anticipated at about 29.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-30

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	4.5	124	0.5	--	0.75
2	Clay	7.5	126	1.0	--	1.5
3	Clay	13.5	130	2.0	--	3.5
4	Clay	18.5	125	0.6	--	1.0

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
5	Clay	38.5	126	1	--	1.5
6	Clay	43.5	130	2	--	3.5
7	Clay	48.5	129	1.5	--	2.5
8	Clay	50	130	2	--	3.5

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-31

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength (ksf)
1[2]	Clay	1.5	124	0.5	--	0.75
2	Clay	4.5	125	0.6	--	1.0
3	Clay	13.5	130	1.75	--	3.0
4	Clay	33.5	126	1	--	1.5
5	Clay	50	129	1.5	--	2.5

Static long-term groundwater table anticipated at about 18.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-32

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength (ksf)
1[2]	Clay	9	124	0.5	--	0.75
2	Clay	13.5	130	1.75	--	3.0
3	Clay	33.5	126	1	--	1.5
4	Clay	38.5	128	1.2	--	2.0
5	Clay	43.5	126	1	--	1.5
6	Clay	48.5	128	1.2	--	2.0
7	Clay	50	131	2.5	--	4.0

Static long-term groundwater table anticipated at about 28.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-33

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength (ksf)
1[2]	Clay	7.5	124	0.5	--	0.75
2	Clay	13.5	128	1.2	--	2.0
3	Clay	33.5	124	0.5	--	0.75
4	Clay	43.5	130	2.0	--	3.5
5	Clay (Shale modelled as Clay)	50	131	2.75	--	4.5

Static long-term groundwater table anticipated at about 7.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-34

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Clay	4.5	124	0.5	--	0.75
2	Sand	7.5	118	0.75	31	--
3	Clay	9.0	128	1.2	--	2.0
4	Clay	18.5	126	1	--	1.5
5	Clay	23.5	128	1.2	--	2.0
6	Sand	28.5	125	1.5	34	--
7	Clay (Shale modelled as Clay)	39.2	131	2.75	--	4.5

Static long-term groundwater table anticipated at about 9 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-35

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength (ksf)
1[2]	Clay	4.5	123	0.35	--	0.5
2	Clay	6.0	129	1.5	--	2.5
3	Clay	9.0	130	2	--	3.5

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength (ksf)
4	Clay	18.5	131	2.5	--	4.0
5	Sand	28.5	125	1.5	34	--
6	Clay	43.5	130	1.75	--	3.0
7	Sand	48.5	130	7.0	36	--
8	Clay	49.3	131	2.75	--	4.5

Static long-term groundwater table anticipated at about 23.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[3].

Test Boring: B-36

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength[4] (ksf)
1[2]	Sand	4.5	113	0.5	29	--
2	Sand	7.5	118	0.75	31	--
3	Clay	13.5	122	0.18	--	0.25
4	Sand	23.5	118	0.75	31	--
5	Clay	28.5	130	1.75	--	3.0
6	Clay	48.9	131	2.75	--	4.5

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was encountered at 14.5 feet while drilling[33].

Test Boring: B-37

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength (ksf)
1[2]	Clay	3.0	124	0.5	--	0.75
2	Clay	6.0	130	1.75	--	3.5
3	Clay	13.5	131	2.5	--	4.0
4	Clay	18.5	125	0.6	--	1.0
5	Clay	23.5	130	1.75	--	3.0
6	Sand	28.5	113	0.5	29	--
7	Clay	38.5	131	2.5	--	4.0

Layer Number	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (degrees)	Undrained Shear Strength (ksf)
8	Clay (Shale modelled as Clay)	50	131	2.75	--	4.5

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was encountered at 24 feet while drilling[3].

Notes:

1. Depth referenced to existing ground surface.
2. The resistance of the uppermost 2 feet of the soil should be ignored due to the potential for disturbance caused during the drilled shaft construction operation.
3. Groundwater level fluctuations occur due to the change in water level and other factors not evident at the time the borings were performed, hence may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.
4. Our borings encountered variability in soil strength, with generally higher strength soils overlying lower strength soils. Therefore, we recommend that when calculating the end bearing capacity of the drilled shaft, in order to be able to use the prescribed soil parameters of the subject soil bearing stratum, that soil stratum should extend at least three times the drilled shaft diameter below the bottom of the drilled shaft. If this condition is not met, and the strength parameters of the soil stratum below the bearing soil stratum are less than those of the bearing stratum, then the soil parameters of the lowest strength layer below within the three diameters depth, should be used in calculating the end bearing capacity.
5. A casing if used during construction of the shaft, should be removed after concrete is poured. Casing should not be left in place permanently as during the shaft construction process, voids/gaps could get created between the casing and the surrounding soils. If the casing cannot be removed for some reason, jet grouting should be performed to completely fill the gaps/voids between the casing and the surrounding soils. In that case there may still be a reduction in the skin friction capacity of the shaft, which will have to be evaluated by the project geotechnical and structural engineers.

SHAFT™ DESIGN PARAMETERS

Parameters provided in tables below for each boring are ultimate values and designer should apply adequate applicable factor of safety aligned with its use.

Test Boring: B-21

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	7.5	123	500	0.55	--	--	--	--
2	Clay	9.0	130	3,500	0.53	--	--	--	--
3	Clay	23.5	126	1,500	0.55	--	--	7.0	--
4	Clay	28	131	4,000	0.51	--	--	7.0	--
5	Strong rock (Dolomite)	38	See table below for rock properties						

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Layer No.	Rock Type	Depth to Bottom of Layer [1] (feet)	Rock Compressive Strength (psi)	Elastic Modulus (psi)	Discontinuity Spacing (feet)	Discontinuity Thickness (feet)	RQD (%)
5	Strong rock (Dolomite)	38	2,400	96,000	2.0	0.1	69

Test Boring: B-22

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	6.0	124	750	0.55	--	--	--	--
2	Clay	7.5	130	4,000	0.51	--	--	--	--
3	Clay	23.5	126	1,500	0.55	--	--	7.0	--
4	Clay	25.0	131	4,000	0.51	--	--	7.0	--

Static long-term groundwater table anticipated at about 9 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-23

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	7.5	124	750	0.55	--	--	--	--
2	Clay	18.5	128	2,000	0.55	--	--	7.0	--
3	Clay	28.5	129	2,500	0.55	--	--	7.0	--
4	Clay	38.5	126	1,500	0.55	--	--	7.0	--
5	Clay	48.5	130	3,500	0.53	--	--	7.0	--
6	Clay	50	131	4,000	0.51	--	--	7.0	--

Static long-term groundwater table anticipated at about 28.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-24

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	1.5	123	500	0.55	--	--	--	--
2	Sand	4.5	113	--	--	29	0.41	--	--
3	Sand	9.0	120	--	--	32	0.45	--	--
4	Sand	13.5	125	--	--	34	0.47	--	62
5	Clay	48.5	130	3,000	0.55	--	--	7.0	--
6	Clay	50	130	3,500	0.53	--	--	7.0	--

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-25

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	4.5	123	500	0.55	--	--	--	--
2	Clay	6.0	131	4,000	0.51	--	--	--	--
3	Clay	7.5	126	1,500	0.55	--	--	--	--
4	Clay	23.5	130	3,500	0.53	--	--	7.0	--
5	Clay	28.5	126	1,500	0.55	--	--	7.0	--
6	Clay	33.5	129	2,500	0.55	--	--	7.0	--
7	Clay	38.5	126	1,500	0.55	--	--	7.0	--
8	Clay	50	130	3,000	0.55				

Static long-term groundwater table anticipated at about 23.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-26

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	7.5	123	500	0.55	--	--	--	--
2	Clay	13.5	128	2,000	0.55	--	--	7.0	--
3	Clay	38.5	125	1,000	0.55	--	--	7.0	--
4	Clay	50	128	2,000	0.55	--	--	7.0	--

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-27

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	4.5	125	1,000	0.55	--	--	--	--
2	Clay	13.5	128	2,000	0.55	--	--	7.0	--
3	Clay	28.5	126	1,500	0.55	--	--	7.0	--

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
4	Clay	38.5	130	3,500	0.53	--	--	7.0	--
5	Clay	48.5	126	1,500	0.55	--	--	7.0	--
6	Clay	50	130	3,500	0.53	--	--	7.0	--

Static long-term groundwater table anticipated at about 6 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-28

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Fill modelled as Clay	1.5	122	250	0.55	--	--	--	--
2	Clay	38.5	124	750	0.55	--	--	7.0	--
3	Clay	48.5	126	1,500	0.55	--	--	7.0	--
4	Clay	50	128	2,000	0.55	--	--	7.0	--

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-29

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	7.5	124	750	0.55	--	--	--	--
2	Clay	9	128	2,000	0.55	--	--	--	--
3	Clay	13.5	125	1,000	0.55	--	--	7.0	--
4	Clay	23.5	128	2,000	0.55	--	--	7.0	--
5	Clay	33.5	124	750	0.55	--	--	7.0	--
6	Clay	38.5	128	2,000	0.55	--	--	7.0	--

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
7	Clay	43.5	130	3,000	0.55	--	--	7.0	--
8	Clay	48.5	126	1,500	0.55	--	--	7.0	--
9	Clay	50	130	3,000	0.55	--	--	7.0	--

Static long-term groundwater table anticipated at about 29.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-30

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	4.5	124	750	0.55	--	--	--	--
2	Clay	7.5	126	1,500	0.55	--	--	--	--
3	Clay	13.5	130	3,500	0.53	--	--	7.0	--
4	Clay	18.5	125	1,000	0.55	--	--	7.0	--
5	Clay	38.5	126	1,500	0.55	--	--	7.0	--
6	Clay	43.5	130	3,500	0.53	--	--	7.0	--
7	Clay	48.5	129	2,500	0.55	--	--	7.0	--
8	Clay	50	130	3,500	0.53				

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-31

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	1.5	124	750	0.55	--	--	--	--
2	Clay	4.5	125	1,000	0.55	--	--	7.0	--
3	Clay	13.5	130	3.0	0.55	--	--	7.0	--
4	Clay	33.5	126	1.5	0.55	--	--	7.0	--
5	Clay	50	129	2.5	0.55	--	--	7.0	--

Static long-term groundwater table anticipated at about 18.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-32

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	9	124	750	0.55	--	--	--	--
2	Clay	13.5	130	3,000	0.55	--	--	7.0	--
3	Clay	33.5	126	1,500	0.55	--	--	7.0	--
4	Clay	38.5	128	2,000	0.55	--	--	7.0	--
5	Clay	43.5	126	1,500	0.55	--	--	7.0	--
6	Clay	48.5	128	2,000	0.55	--	--	7.0	--
7	Clay	50	131	4,000	0.51	--	--	7.0	--

Static long-term groundwater table anticipated at about 28.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-33

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	7.5	124	750	0.55	--	--	--	--
2	Clay	13.5	128	2,000	0.55	--	--	7.0	--
3	Clay	33.5	124	750	0.55	--	--	7.0	--
4	Clay	43.5	130	3,500	0.53	--	--	7.0	--
5	Clay (Shale modelled as Clay)	50	131	4,500	0.49	--	--	7.0	--

Static long-term groundwater table anticipated at about 7.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-34

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	4.5	124	750	0.55	--	--	--	--
2	Sand	7.5	118	--	--	31	0.44	--	--
3	Clay	9.0	128	2,000	0.55	--	--	--	--
4	Clay	18.5	126	1,500	0.55	--	--	7.0	--
5	Clay	23.5	128	2,000	0.55	--	--	7.0	--
6	Sand	28.5	125	--	--	34	0.47	--	62
7	Clay (Shale modelled as Clay)	39.2	131	4,500	0.49	--	--	7.0	--

Static long-term groundwater table anticipated at about 9 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-35

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	4.5	123	500	0.55	--	--	--	--
2	Clay	6.0	129	2,500	0.55	--	--	--	--
3	Clay	9.0	130	3,500	0.53	--	--	--	--
4	Clay	18.5	131	4,000	0.51	--	--	7.0	--
5	Sand	28.5	125	--	--	34	0.47	--	62
6	Clay	43.5	130	3,500	0.53	--	--	7.0	--
7	Sand	48.5	130	--	--	36	0.50	--	87
8	Clay	49.3	131	4,500	0.49	--	--	7.0	--

Static long-term groundwater table anticipated at about 23.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater not encountered while drilling and upon completion[4].

Test Boring: B-36

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength[5] (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Sand	4.5	113	--	--	29	0.41	--	--
2	Sand	7.5	118	--	--	31	0.44	--	--
3	Clay	13.5	122	250	0.55	--	--	7.0	--
4	Sand	23.5	118	--	--	31	0.44	--	37
5	Clay	28.5	130	3,500	0.53	--	--	7.0	--
6	Clay	48.9	131	4,500	0.49	--	--	7.0	--

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater encountered at 14.5 feet while drilling[4].

Test Boring: B-37

Layer No.	Material Type	Depth to Bottom of Layer[1] (feet)	Total Unit Weight (pcf)	Undrained Shear Strength (psf)	Adhesion Factor	Friction Angle (degrees)	Horizontal Stress Coefficient	Bearing Capacity Factor	
								N_c[3]	N_q
1[2]	Clay	3.0	124	750	0.55	--	--	--	--
2	Clay	6.0	130	3,500	0.53	--	--	--	--
3	Clay	13.5	131	4,000	0.51	--	--	7.0	--
4	Clay	18.5	125	1,000	0.55	--	--	7.0	--
5	Clay	23.5	130	3,500	0.53	--	--	7.0	--
6	Sand	28.5	113	--	--	29	0.41	--	28
7	Clay	38.5	131	4,000	0.51	--	--	7.0	--
8	Clay (Shale modelled as Clay)	50	131	4,500	0.49	--	--	7.0	--

Static long-term groundwater table anticipated at about 13.5 feet below existing ground surface based on transition in soil color from brown to gray at this depth. Groundwater was encountered at 24 feet while drilling[4].

Notes:

1. Depth referenced to existing ground surface.
2. The resistance of the uppermost 2 feet of the soil should be ignored due to the potential for disturbance caused during the drilled shaft construction operation.

3. Bearing capacity factor N_c = 7 is based on assumption that drilled shaft are constructed by the slurry displacement method. This value could be increased to 8 when drilled shafts are constructed using dry casing method.
4. Groundwater level fluctuations occur due to change in water level in the nearby creek and other factors not evident at the time the boring was performed, hence may be higher or lower than the levels indicated on the boring log. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.
5. Our borings encountered variability in soil strengths, with generally higher strength soils overlying lower strength soils. Therefore, we recommend that when calculating the end bearing capacity of the drilled shaft, in order to be able to use the recommended soil parameters of the subject soil bearing stratum, that soil stratum should extend at least three times the drilled shaft diameter below the proposed bottom of the drilled shaft. If this condition is not met, and the strength parameters of the soil stratum below the bearing soil stratum are less than those of the bearing stratum, then the soil parameters of the lowest strength layer below within the three diameters depth, should be used in calculating the end bearing capacity.
6. A casing if used during construction of the shaft, should be removed after concrete is poured. Casing should not be left in place permanently as during the shaft construction process, voids/gaps could get created between the casing and the surrounding soils. If the casing cannot be removed for some reason, jet grouting should be performed to completely fill the gaps/voids between the casing and the surrounding soils. In that case there may still be a reduction in the skin friction capacity of the shaft, which will have to be evaluated by the project geotechnical and structural engineers.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES
SITE LOCATION AND EXPLORATION PLANS
EXPLORATION RESULTS
SUPPORTING INFORMATION

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Number of Borings	Boring Depth (feet)	Planned Location
17	25 to 50	Transmission Line Structure

Boring Layout and Elevations: The subsurface exploration consisted of drilling and sampling of five test borings designated as B-21 through B-37 to an approximate depths ranging from 25 to 50 feet below existing surface grade. Boring locations and elevations were determined in field by Terracon personnel with a hand-held survey grade GPS unit. The locations and elevations of the test borings should be considered accurate only to the degree implied by the means and methods used to define them.

Subsurface Exploration Procedures: We advanced the borings with an ATV mounted rig, using continuous flight hollow-stem augers. The soil encountered in the borings was generally sampled continuously to 10.5 feet and at 5-foot intervals thereafter using a 2-inch outside diameter split-barrel Standard Penetration Test (SPT) sampler. The soil samples were obtained by driving the SPT sampler 18 inches into the soil with a 140-pound automatic hammer free-falling 30 inches. The number of blows required for each 6 inches of penetration was recorded. The blow count "N-value" of the soil was calculated as the number of blows required for the final 12 inches of the typical total 18-inch-penetration. This SPT resistance value, or N-value, provides a measure of the relative density of granular soils and the relative consistency of cohesive soils. The field recorded blow counts and N-values are shown on the boring logs at the respective sample depths

An automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A greater efficiency is typically achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. Published correlations between the SPT values and soil properties are based on the lower efficiency cathead and rope method. This higher efficiency affects the standard penetration resistance blow count (N) value by increasing the penetration per hammer blow over what would be obtained using the cathead and rope method.

The spilt-barrel samples were sealed in watertight glass jars. All samples were returned to Terracon's laboratory for testing and classification. Upon completion, the borings were backfilled with a cement-bentonite grout.

Rock coring was performed in the borings using NQ2-size double tube-swivel core barrel tooling. Percentage recovery and rock quality designation (RQD) were calculated for the core samples and is noted at its depth of occurrence on the boring logs.

A field log for the borings was prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The final boring logs included in this report represents the engineer's interpretation of the field logs and includes modifications based on laboratory observation and testing of select samples. Observations of groundwater conditions made during drilling included on the boring logs represents a short-term condition and may or may not be representative of the long-term groundwater conditions at the site.

Laboratory Testing

Descriptive classifications of the soil indicated on the boring logs are in accordance with the enclosed General Notes, and the Unified Soil Classification System presented in Attachments. Atterberg Limits, grain size distribution, moisture content, and hand penetrometer tests were performed on select soil samples. The tests were performed in general accordance with the test methods of ASTM procedures. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods are applied because of local practice or professional judgment.

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D4318 Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- ASTM D422 Standard Test Method for Particle-Size Analysis of Soils
- ASTM D7012 Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under varying States of Stress and Temperatures

The laboratory testing program often included examination of soil samples by an engineer. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System.

Rock classification was conducted using locally accepted practices for engineering purposes; petrographic analysis may reveal other rock types. Rock core samples typically provide an improved specimen for this classification. Boring log rock classification was determined using the Description of Rock Properties.

SITE LOCATION AND EXPLORATION PLAN

Contents:

Site Location Plan
Exploration Plan (6 pages)

Note: All attachments are one page unless noted above.

SITE LOCATION

East Leipsic - Rader Road 138 kV T Line ■ McComb, OH
July 11, 2022 ■ Terracon Project No. N4225114

Terracon GeoReport

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Rader Road – New Liberty 138 kV T Line ■ McComb, OH
July 11, 2022 ■ Terracon Project No. N4225115

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Rader Road – New Liberty 138 kV T Line ■ McComb, OH
July 11, 2022 ■ Terracon Project No. N4225115

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Rader Road – New Liberty 138 kV T Line ■ McComb, OH

July 11, 2022 ■ Terracon Project No. N4225115

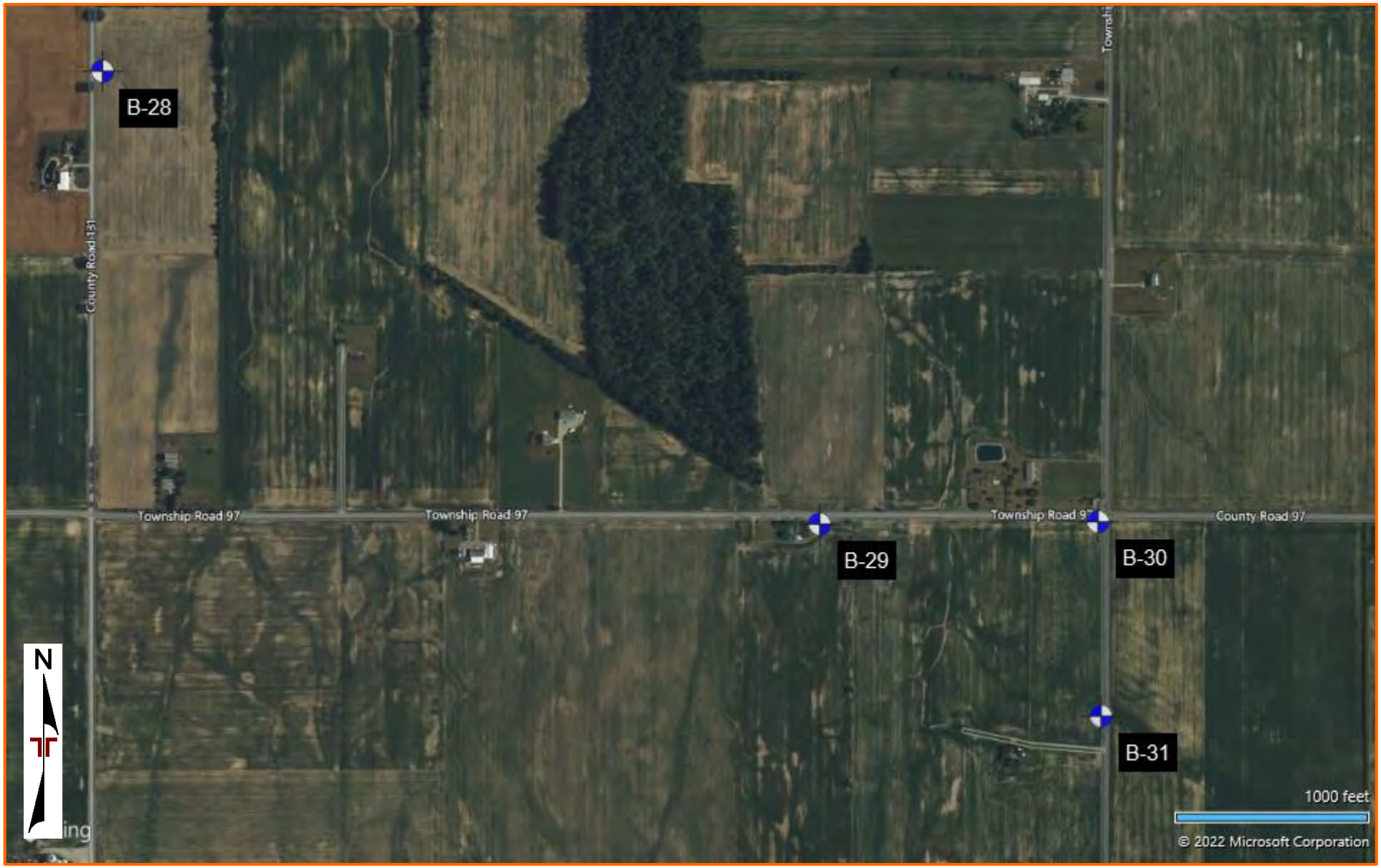

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Rader Road – New Liberty 138 kV T Line ■ McComb, OH
July 11, 2022 ■ Terracon Project No. N4225115

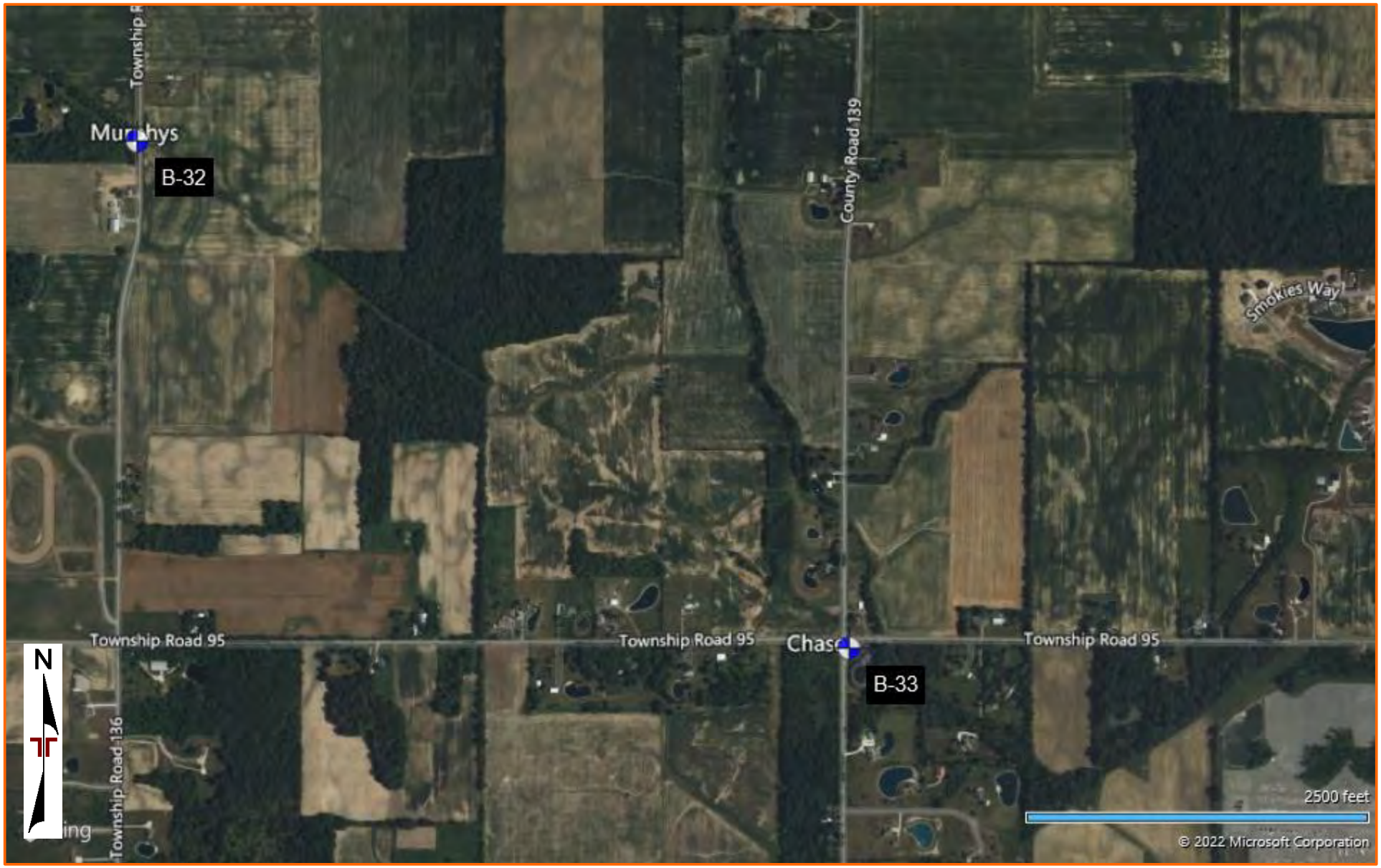

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Rader Road – New Liberty 138 kV T Line ■ McComb, OH
July 11, 2022 ■ Terracon Project No. N4225115

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Rader Road – New Liberty 138 kV T Line ■ McComb, OH
July 11, 2022 ■ Terracon Project No. N4225115

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

Boring Logs (B-21 through B-37)
Atterberg Limits (3 pages)
Grain Size Distribution (9 pages)
Unconfined Compression Tests Results (3 pages)

Note: All attachments are one page unless noted above.

BORING LOG NO. B-21

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.1138° Longitude: -83.7980°

Approximate Surface Elev.: 752 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	Description	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.4	751.6+/-	**TOPSOIL (5")**						
		SANDY LEAN CLAY (CL), trace gravel, dark brown, medium stiff, contains organic odor		5	1-3-3 N=6	1.0	32.0	
				4	1-2-4 N=6	1.0	36.0	
				5	2-2-3 N=5	1.0	26.0	49-26-23
			5	6	1-3-3 N=6	1.0	27.0	
				6	2-3-4 N=7	1.5	33.0	
7.5	744.5+/-							
		LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff		12	2-7-13 N=20	4.0	20.0	
			10	10	2-4-6 N=10	2.0	16.0	
		- color changes to gray below 13.5'		16	3-6-7 N=13	2.5	18.1	37-21-16
			15					
				16	3-5-8 N=13	2.5	21.0	
			20					
23.5	728.5+/-							
		LEAN CLAY (CL), trace gravel, gray, very stiff		14	6-10-12 N=22	4.0	18.5	40-18-22
			25					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-26-2022 | Boring Completed: 04-26-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-21

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.1138° Longitude: -83.7980°

Approximate Surface Elev.: 752 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
LEAN CLAY (CL), trace gravel, gray, very stiff *(continued)*											
28.0	724+/-										
DOLOMITE, moderately severely weathered, hard, moderately close joints, medium bedded, fair RQD, moderately open joints		30			93			69	3757	1.3	
		35							2405	0.7	
38.0	714+/-										
Auger Refusal at 38 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-26-2022 | Boring Completed: 04-26-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-22

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.1134° Longitude: -83.7977°

Approximate Surface Elev.: 752 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	751.7+/-						
TOPSOIL (4")							
LEAN CLAY WITH SAND (CL), dark brown, medium stiff, contains rootlets			8	2-3-3 N=6	1.0	22.0	
			10	2-3-4 N=7	1.0	20.0	
3.0	749+/-						
SANDY LEAN CLAY (CL), trace gravel, brown, stiff to very stiff			12	3-4-6 N=10	1.5	21.0	45-23-22
		5	12	3-4-4 N=8	1.5	22.0	
			16	3-8-11 N=19	3.5	18.0	
			14	4-6-7 N=13	2.5	18.0	
9.0	743+/-						
LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff			12	3-5-6 N=11	1.5	19.0	33-18-15
		10					
			3	3-6-6 N=12	2.0	20.0	
		15					
18.5	733.5+/-						
LEAN CLAY (CL), trace gravel, gray, very stiff			6	2-7-8 N=15	3.5	15.4	33-20-13
		20					
			14	8-11-13 N=24	4.5	12.0	
25.0	727+/-	25					
Auger Refusal at 25 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-27-2022 | Boring Completed: 04-27-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-23

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.1133° Longitude: -83.7794°

Approximate Surface Elev.: 749 (Ft.) +/-

DEPTH	ELEVATION (Ft.)
0.3	748.8+/-
6.0	743+/-

TOPSOIL (3")

LEAN CLAY WITH SAND (CL), brown, medium stiff to stiff

LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		10	3-5-4 N=9	1.5	18.0	
		6	2-3-5 N=8	1.0	19.0	
		4	2-3-4 N=7	1.0	20.0	
5		6	3-3-4 N=7	1.0	17.7	41-21-20
		8	2-4-6 N=10	1.5	17.0	
		12	4-7-9 N=16	3.5	18.0	
10		10	3-5-6 N=11	2.0	19.0	
		1	2-5-7 N=12	-	17.0	
15						
		1	3-6-8 N=14	-	15.9	35-19-16
20						
		2	3-5-10 N=15	3.0	18.0	
25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-28-2022 | Boring Completed: 04-28-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-23

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.1133° Longitude: -83.7794°

Approximate Surface Elev.: 749 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff *(continued)*										
28.5	720.5+/-										
	LEAN CLAY (CL), trace sand, gray, stiff to very stiff	30		X	14	5-4-6 N=10	2.0			27.9	46-27-19
		35		X	16	4-5-7 N=12	2.5			20.0	
		40		X	2	6-8-9 N=17	3.5			14.0	
		45		X	16	5-8-11 N=19	3.5			14.0	
	- encountered possible cobbles/boulder at 48.5' -turning hard at 48.5'			X	18	14-17-19 N=36	4.5			15.0	
50.0	699+/-	50									
	Boring Terminated at 50 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-28-2022 | Boring Completed: 04-28-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-24

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.1097° Longitude: -83.7794°

Approximate Surface Elev.: 768 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DESCRIPTION
0.3	767.8+/-	**TOPSOIL (3")**
1.5	766.5+/-	**LEAN CLAY WITH SAND (CL)**, trace gravel, brown, medium stiff
		CLAYEY SAND (SC), trace gravel, brown, loose to medium dense
13.5	754.5+/-	**LEAN CLAY WITH SAND (CL)**, trace gravel, gray, very stiff
23.5	744.5+/-	**GRAVELLY LEAN CLAY WITH SAND (CL)**, gray, stiff to very stiff

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
			12	2-3-3 N=6	1.0			10.0	
			8	3-3-3 N=6	-			14.0	
			8	3-4-3 N=7	-			9.0	
5			6	5-6-8 N=14	-			6.7	43-24-19
			8	3-5-7 N=12	-			4.0	
			10	4-8-10 N=18	-			14.0	
10			10	7-13-15 N=28	-			8.0	
			12	4-7-10 N=17	2.5			15.2	30-17-13
15									
			10	3-6-9 N=15	3.0			15.0	
20									
			16	4-7-7 N=14	3.0			15.9	29-17-12
25									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water encountered at 29.0' while drilling

Water observed at 33.0' upon completion

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-28-2022 | Boring Completed: 04-28-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-24

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.1097° Longitude: -83.7794°

Approximate Surface Elev.: 768 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
			30	▽	X	10	4-5-9 N=14	3.0			20.0	
				▽								
			35		X	1	4-5-8 N=13	-			20.0	
			40		X	0	3-6-9 N=15	-				
			45		X	2	3-6-7 N=13	2.0			20.0	
					X	8	4-8-10 N=18	3.5			22.0	
50.0	718+/-		50									

GRAVELLY LEAN CLAY WITH SAND (CL), gray, stiff to very stiff *(continued)*

Boring Terminated at 50 Feet

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Water encountered at 29.0' while drilling*

▽ *Water observed at 33.0' upon completion*

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-28-2022 | Boring Completed: 04-28-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-25

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.1082° Longitude: -83.7794°

Approximate Surface Elev.: 767 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	766.7+/-							
TOPSOIL (4")								
LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff - rootlets encountered between 0' and 3'				12	1-3-3 N=6	1.0	28.0	
				12	2-2-4 N=6	1.0	29.0	
				10	2-3-4 N=7	1.5	17.2	35-19-16
4.5	762.5+/-							
LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff		5		14	3-9-12 N=21	4.0	17.0	
				12	3-5-7 N=12	2.0	17.0	
				12	4-8-10 N=18	3.5	18.0	
		10		14	3-7-8 N=15	3.5	17.5	33-18-15
		15		14	4-6-9 N=15	3.5	18.0	
		20		16	4-7-12 N=19	3.0	18.0	
- color changes to gray below 23.5		25		16	3-5-6 N=11	2.0		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-02-2022 | Boring Completed: 05-02-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-25

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.1082° Longitude: -83.7794°

Approximate Surface Elev.: 767 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)
	LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff *(continued)*						
		30	X	18	3-6-10 N=16	3.5	20.0
	- encountered cobble fragments between 33.5' to 35'	35	X	16	3-4-6 N=10	2.0	20.0
		40	X	16	4-8-12 N=20	2.5	20.0
		45	X	18	4-5-8 N=13	2.0	31.0
50.0	717+/-	50	X	18	3-8-11 N=19	3.5	30.0
	Boring Terminated at 50 Feet						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-02-2022 | Boring Completed: 05-02-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-26

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.1089° Longitude: -83.7749°

Approximate Surface Elev.: 772 (Ft.) +/-

DEPTH	ELEVATION (Ft.)
0.3	771.7+/-
7.5	764.5+/-

TOPSOIL (4")

LEAN CLAY (CL), trace sand and trace gravel, brown, medium stiff
- rootlets observed between 0' and 1.5'

LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff

- color changes to gray below 13.5'

DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	6	2-3-3 N=6	0.5	26.0	
	8	1-3-3 N=6	1.0	27.0	
	8	1-2-4 N=6	1.0	21.0	
5	10	1-3-4 N=7	1.0	29.1	40-24-16
	10	2-2-5 N=7	1.0	25.0	
	14	4-7-10 N=17	3.5	16.0	
10	12	3-5-8 N=13	2.5	16.0	
	16	2-4-5 N=9	1.5	19.7	31-18-13
15					
	14	3-6-5 N=11	2.0	21.0	
20					
	16	2-2-5 N=7	1.5	21.0	
25					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-29-2022 | Boring Completed: 04-29-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-26

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.1089° Longitude: -83.7749°

Approximate Surface Elev.: 772 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff *(continued)*							
		30	X	18	3-4-5 N=9	1.5	21.0	
		35	X	16	3-3-6 N=9	1.0	19.2	29-17-12
		40	X	18	3-5-7 N=12	2.0	20.0	
		45	X	18	3-6-8 N=14	2.5	23.0	
50.0	722+/-	50	X	18	2-4-6 N=10	1.5	23.0	
	Boring Terminated at 50 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-29-2022 | Boring Completed: 04-29-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-27

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.1066° Longitude: -83.7750°

Approximate Surface Elev.: 772 (Ft.) +/-

DEPTH	ELEVATION (Ft.)
0.3	771.8+/-
6.0	766+/-

TOPSOIL (3")

SANDY SILTY CLAY (CL-ML), trace gravel, brown, stiff

LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		12	3-4-5 N=9	1.5	17.0	
		16	3-5-6 N=11	2.0	20.0	
		14	3-5-7 N=12	2.0	18.0	
5		16	4-6-8 N=14	3.0	15.3	19-13-6
		16	3-5-9 N=14	3.0	15.0	
		18	3-7-11 N=18	4.0	15.0	
10		16	4-6-9 N=15	3.5	16.0	
		14	4-4-8 N=12	2.0	21.0	
15						
		14	4-7-9 N=16	4.0	15.9	30-17-13
20						
		14	3-5-6 N=11	2.5	17.0	
25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-29-2022 | Boring Completed: 04-29-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-27

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.1066° Longitude: -83.7750°

Approximate Surface Elev.: 772 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	LEAN CLAY WITH SAND (CL), trace gravel, gray, stiff to very stiff *(continued)*										
		30		X	16	3-7-10 N=17	3.5			18.1	27-18-9
		35		X	18	4-8-10 N=18	4.0			18.0	
		40		X	16	3-5-7 N=12	2.0			18.0	
		45		X	18	4-4-8 N=12	2.0			20.0	
50.0	722+/-	50		X	16	4-8-10 N=18	4.0			21.0	
	Boring Terminated at 50 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 04-29-2022 | Boring Completed: 04-29-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-28

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.1019° Longitude: -83.7651°

Approximate Surface Elev.: 776 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	775.8+/-	**TOPSOIL (3")**										
1.5	774.5+/-	**FILL - SANDY LEAN CLAY WITH GRAVEL**, brown, contains aggregate fragments										
		LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff to stiff										
		@ 1.5' - 3.0', contains organic odor				1	2-2-3 N=5	-			13.0	
						5	2-3-3 N=6	0.5			23.0	
						6	1-3-3 N=6	1.0			25.0	
			5			5	1-3-3 N=6	1.0			25.4	41-24-17
						8	2-3-4 N=7	1.0			28.0	
						10	2-3-6 N=9	1.5			20.0	
			10			8	2-2-4 N=6	1.0			18.0	
		@ 13.5', color changes to gray				14	3-3-5 N=8	1.5			18.0	
			15									
						16	2-4-5 N=9	1.5			18.2	29-18-11
			20									
						16	2-2-5 N=7	1.0			21.0	
			25									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-02-2022 | Boring Completed: 05-02-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-28

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.1019° Longitude: -83.7651°

Approximate Surface Elev.: 776 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff to stiff *(continued)*							
		30	16	3-2-4 N=6	1.0	20.0	
		35	18	1-3-3 N=6	1.0	21.5	30-18-12
		40	18	2-4-6 N=10	2.0	22.0	
		45	18	3-4-7 N=11	2.0	20.0	
		50	18	3-5-9 N=14	3.0	21.0	
50.0	726+/-						
Boring Terminated at 50 Feet							

WATER LEVEL OBSERVATIONS; SAMPLE TYPE; RQD %; UNCONFINED COMPRESSIVE STRENGTH (psi)

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-02-2022 | Boring Completed: 05-02-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-29

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0953° Longitude: -83.7515°

Approximate Surface Elev.: 790 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	789.8+/-							
TOPSOIL (3")								
LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff to stiff			X	10	1-3-3 N=6	1.0	18.0	
			X	8	2-3-3 N=6	1.5	20.0	
			X	10	1-3-4 N=7	1.5	26.0	
		5	X	12	2-4-4 N=8	1.5	23.1	41-23-18
			X	10	2-3-3 N=6	1.0	26.0	
			X	14	4-5-9 N=14	3.0	16.0	
		10	X	12	3-3-5 N=8	1.5	17.0	
@ 13.5', color changes to gray			X	14	3-6-8 N=14	3.0	16.0	28-17-11
		15						
18.5	771.5+/-							
LEAN CLAY WITH SAND (CL), trace gravel, gray, very stiff			X	14	3-7-10 N=17	3.5	16.0	
		20						
23.5	766.5+/-							
LEAN CLAY WITH SAND (CL), trace gravel, gray, medium stiff			X	16	2-3-4 N=7	1.5	19.2	29-16-13
		25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-02-2022 | Boring Completed: 05-02-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-29

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0953° Longitude: -83.7515°

Approximate Surface Elev.: 790 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)
28.5	761.5+/-						
LEAN CLAY WITH SAND (CL), trace gravel, gray, medium stiff *(continued)*							
		30					
				16	3-3-6 N=9	1.5	19.0
		35					
				18	4-6-8 N=14	3.5	14.0
		40					
				18	4-9-11 N=20	4.0	16.0
		45					
				18	3-5-5 N=10	2.0	19.0
48.5	741.5+/-						
SANDY LEAN CLAY (CL), trace gravel, gray, very stiff		50					
				18	3-6-9 N=15	3.5	10.0
50.0	740+/-						
Boring Terminated at 50 Feet							

ATTERBERG LIMITS: LL-PL-PI

RQD %

UNCONFINED COMPRESSIVE STRENGTH (psi)

WATER LEVEL OBSERVATIONS

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-02-2022 | Boring Completed: 05-02-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-30

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0953° Longitude: -83.7463°

Approximate Surface Elev.: 790 (Ft.) +/-

DEPTH	ELEVATION (Ft.)
0.2	789.8+/-
4.5	785.5+/-

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		8	1-2-4 N=6	1.0	24.0	
		6	1-3-3 N=6	1.0	22.0	
		10	2-2-4 N=6	1.0	16.0	
5		14	3-6-7 N=13	2.5	15.5	29-19-10
		12	5-7-9 N=16	3.5	16.0	
		14	3-7-11 N=18	4.0	15.0	
10		14	3-9-12 N=21	4.0	14.0	
		16	2-3-5 N=8	1.5	17.7	29-17-12
15						
		16	3-6-9 N=15	3.0	19.0	
20						
		16	2-4-6 N=10	1.5	18.0	
25						

TOPSOIL (2")

SANDY LEAN CLAY (CL), trace gravel, brown, medium stiff

LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff

@13.5, color changes to gray

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-03-2022 | Boring Completed: 05-03-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-30

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0953° Longitude: -83.7463°

Approximate Surface Elev.: 790 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff *(continued)*							
		30	X	16	3-7-12 N=19	4.0	18.3	28-18-10
		35	X	18	2-4-5 N=9	1.5	20.0	
		40	X	18	3-8-10 N=18	3.5	18.0	
		45	X	18	4-5-8 N=13	2.5	19.0	
50.0	740+/-	50	X	18	3-7-10 N=17	3.5	20.0	
	Boring Terminated at 50 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-03-2022 | Boring Completed: 05-03-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-31

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0926° Longitude: -83.7462°

Approximate Surface Elev.: 792 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	791.7+/-							
TOPSOIL (4")								
LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff to stiff			X	8	1-2-4 N=6	1.0	26.0	
			X	12	2-4-8 N=12	2.0	23.0	
			X	10	2-3-6 N=9	1.0	15.0	
4.5	787.5+/-							
LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff		5	X	12	3-8-10 N=18	3.5	16.5	33-19-14
@ 4.5' - 6.0', contains shale fragments			X	12	3-6-9 N=15	3.5	16.0	
			X	18	3-9-11 N=20	4.5	16.0	
		10	X	16	4-7-12 N=19	4.0	15.0	
			X	16	2-3-6 N=9	2.0	18.0	
		15						
@18.5, color changes to gray			X	12	3-3-8 N=11	2.5	17.9	28-17-11
		20						
			X	18	1-3-5 N=8	1.5	20.0	
		25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-03-2022 | Boring Completed: 05-03-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-31

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0926° Longitude: -83.7462°

Approximate Surface Elev.: 792 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff *(continued)*							
		30	X	16	3-4-6 N=10	1.5	19.0	
		35	X	18	3-7-9 N=16	3.5	18.7	29-17-12
		40	X	18	3-5-8 N=13	2.5	20.0	
		45	X	18	3-5-7 N=12	2.5	21.0	
50.0	742+/-	50	X	18	4-6-9 N=15	3.5	20.0	
	Boring Terminated at 50 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-03-2022 | Boring Completed: 05-03-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-32

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0832° Longitude: -83.7268°

Approximate Surface Elev.: 807 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	Description
0.3	806.8+/-	**TOPSOIL (3")**
		LEAN CLAY WITH SAND (CL), trace gravel, dark brown, medium stiff, contains rootlets contains organic odor
3.0	804+/-	**LEAN CLAY (CL)**, trace sand, brown, medium stiff to stiff
		@ 6.0'- 7.5', contains iron stains
7.5	799.5+/-	**LEAN CLAY WITH SAND (CL)**, trace gravel, brown, stiff to very stiff
		@ 9.0'-10.5', contains shale fragments
		@ 13.5' - 15.0', contains rootlets, organic odor

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		8	2-4-3 N=7	1.0	33.0	
		8	2-2-4 N=6	1.0	44.0	
		10	2-3-4 N=7	1.0	26.0	
5		10	2-4-6 N=10	2.0	24.2	37-22-15
		12	2-2-5 N=7	1.5	18.0	
		12	2-5-6 N=11	2.5	16.0	
10		14	4-7-9 N=16	3.5	16.0	
		4	2-4-7 N=11	2.0	37.0	
15						
		10	3-3-8 N=11	2.0	17.3	30-18-12
20						
		1	3-5-7 N=12	-	32.0	
25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-03-2022 | Boring Completed: 05-03-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-32

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0832° Longitude: -83.7268°

Approximate Surface Elev.: 807 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	LEAN CLAY WITH SAND (CL), trace gravel, brown, stiff to very stiff *(continued)*							
	@ 28.5', color changes to gray	30						
				16	2-4-7 N=11	1.5	16.0	
		35						
				16	3-5-9 N=14	3.0	16.1	27-16-11
		40						
				18	4-4-6 N=10	2.5	18.0	
		45						
				18	5-6-8 N=14	3.5	18.0	
		50						
				18	4-9-11 N=20	4.0	19.0	
50.0	757+/-							
	Boring Terminated at 50 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-03-2022 | Boring Completed: 05-03-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-33

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0730° Longitude: -83.7079°

Approximate Surface Elev.: 787 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DESCRIPTION
0.3	786.7+/-	**TOPSOIL (4")**
		LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff to stiff @ 0 - 3.0', contains rootlets
		@ 6.0' - 7.5', contains cobble fragments
		@ 7.5', color changes to gray
18.5	768.5+/-	**SANDY LEAN CLAY (CL)**, trace gravel, gray, medium stiff to stiff

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		8	2-3-3 N=6	1.0	23.0	
		8	1-2-4 N=6	1.0	30.0	
		10	2-2-4 N=6	1.0	24.0	
5		8	2-2-5 N=7	1.5	26.2	43-24-19
		12	2-3-6 N=9	2.0	18.0	
		14	2-4-8 N=12	3.0	15.0	
10		16	4-6-9 N=15	3.0	17.0	
		16	1-3-6 N=9	2.0	18.0	
15						
		18	3-5-7 N=12	2.0	18.1	31-17-14
20						
		18	1-3-4 N=7	1.5	18.0	
25						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-05-2022 | Boring Completed: 05-05-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-33

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0730° Longitude: -83.7079°

Approximate Surface Elev.: 787 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	SANDY LEAN CLAY (CL), trace gravel, gray, medium stiff to stiff *(continued)*							
		30	X	16	3-4-5 N=9	2.0	17.0	
33.5	753.5+/-							
	SANDY LEAN CLAY (CL), trace gravel, gray, very stiff							
		35	X	16	4-8-10 N=18	3.5	11.3	21-13-8
		40	X	16	7-9-17 N=26	4.0	12.0	
43.5	743.5+/-							
	SHALE, very severely weathered, gray	45	X	14	18-26-33 N=59	-	12.0	
		50	X	16	39-42-48 N=90	-	13.0	
50.0	737+/-							
	Boring Terminated at 50 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-05-2022 | Boring Completed: 05-05-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-34

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0658° Longitude: -83.7079°

Approximate Surface Elev.: 782 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	Description
0.3	781.7+/-	**TOPSOIL (4")**
		LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff
4.5	777.5+/-	
		SILT WITH SAND (ML), trace gravel, brown, loose to medium dense
7.5	774.5+/-	
		LEAN CLAY (CL), trace sand, brown, stiff
		9.0', color changes to gray
23.5	758.5+/-	
		SILT WITH SAND (ML), trace gravel, brown, dense

DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	12	1-3-3 N=6	0.5	21.0	
	10	2-3-3 N=6	1.0	25.0	
	8	2-3-4 N=7	1.0	14.0	
5	12	2-3-5 N=8	-	27.4	37-30-7
	10	3-5-7 N=12	-	20.0	
	12	3-8-6 N=14	3.5	15.0	
	12	3-4-5 N=9	1.5	23.0	
10					
	14	2-4-7 N=11	2.0	22.5	31-20-11
15					
	12	3-6-8 N=14	3.0		
20					
	12	9-16-22 N=38	-	18.0	19-18-1
25					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-04-2022 | Boring Completed: 05-04-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-34

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0658° Longitude: -83.7079°

Approximate Surface Elev.: 782 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
SILT WITH SAND (ML), trace gravel, brown, dense *(continued)*											
28.5	753.5+/-										
SHALE, very severely weathered, gray		30		X	8	11-21-50/4"	-			10.0	
		35		X	5	21-43-50/3"	-			12.0	
39.2	742.8+/-			X	2	36-50/2"	-			12.0	
Auger Refusal at 39.2 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-04-2022 | Boring Completed: 05-04-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-35

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0658° Longitude: -83.6965°

Approximate Surface Elev.: 801 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	GRAPHIC LOG	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	800.7+/-											
TOPSOIL (4")												
LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff, contains rootlets contains organic odor						14	1-2-3 N=5	0.5			26.1	
						14	1-2-4 N=6	0.5			26.4	
3.0	798+/-											
LEAN CLAY (CL), trace sand, brown, stiff to very stiff						12	1-3-6 N=9	1.5			19.7	
			5			14	3-6-9 N=15	2.5			21.3	38-24-14
						16	3-10-12 N=22	4.0			20.2	
						16	3-7-11 N=18	3.5			18.0	
			10			16	4-9-15 N=24	4.5			18.2	
						18	5-7-13 N=20	4.0			13.4	
			15									
18.5	782.5+/-											
SILT (ML), trace gravel, brown, medium dense						18	3-8-16 N=24	-			22.9	29-24-5
			20									
@ 23.5, color changes to gray						16	3-7-10 N=17	-			19.9	
			25									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-05-2022 | Boring Completed: 05-05-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-35

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0658° Longitude: -83.6965°

Approximate Surface Elev.: 801 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
SILT (ML), trace gravel, brown, medium dense *(continued)*							
28.5	772.5+/-						
LEAN CLAY WITH SAND (CL), trace gravel, gray, very stiff		30	18	3-9-13 N=22	4.5	17.0	27-16-11
		35	18	4-5-10 N=15	3.0	20.3	
			18	4-7-12 N=19	3.5	21.5	
43.5	757.5+/-	40					
SILTY SAND (SM), gray, very dense			18	13-23-31 N=54	-	18.0	
48.5	752.5+/-	45					
49.3 **SANDY LEAN CLAY (CL)**, trace gravel, gray, hard	751.7+/-		4	21-50/4"	4.5	10.4	
Auger Refusal at 49.3 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

No free water observed

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-05-2022 | Boring Completed: 05-05-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-36

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0668° Longitude: -83.7074°

Approximate Surface Elev.: 794 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
0.3	793.8+/-										
TOPSOIL (3")											
CLAYEY SAND (SC), trace gravel, brown, loose to medium dense					12	2-2-2 N=4	-			13.9	
					10	1-2-4 N=6	-			20.6	
					12	2-3-3 N=6	-			18.8	
		5			12	2-5-6 N=11	-			17.2	
					14	3-4-7 N=11	-			19.2	36-21-15
7.5	786.5+/-										
LEAN CLAY WITH SAND (CL), trace gravel, brown, soft					10	1-1-1 N=2	0			20.3	
		10			23						
13.5	780.5+/-										
SILTY SAND (SM), gray, medium dense			▽		14	2-4-8 N=12	-			29.8	
		15									
			▽		16	4-7-9 N=16	-			26.5	29-18-11
		20									
23.5	770.5+/-										
LEAN CLAY WITH SAND (CL), trace gravel, gray, very stiff to hard					16	4-6-10 N=16	3.5			12.2	
		25									

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Water encountered at 14.5' while drilling*

▽ *Water observed at 19.0' upon completion*

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-04-2022 | Boring Completed: 05-04-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-36

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0668° Longitude: -83.7074°

Approximate Surface Elev.: 794 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
	LEAN CLAY WITH SAND (CL), trace gravel, gray, very stiff to hard *(continued)*										
		30		X	18	17-30-6 N=36	4.5			10.1	
		35		X	18	14-28-26 N=54	4.5			11.7	27-15-12
		40		X	18	16-32-39 N=71	4.5			11.8	
		45		X	10	21-29-33 N=62	4.5			18.3	
48.9	@ 48.5', encountered possible cobbles/boulder 745.1+/-			X	3	50/5"	4.5			9.7	
	Auger Refusal at 48.9 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water encountered at 14.5' while drilling

Water observed at 19.0' upon completion

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-04-2022 | Boring Completed: 05-04-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 8/30/22

BORING LOG NO. B-37

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0668° Longitude: -83.7074°

Approximate Surface Elev.: 794 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	Description
0.3	793.7+/-	**TOPSOIL (4")**
		LEAN CLAY WITH SAND (CL), trace gravel, brown, medium stiff, contains rootlets
3.0	791+/-	**LEAN CLAY WITH SAND (CL)**, trace gravel, brown, very stiff to hard
		@ 7.5' - 9.0', contains cobble fragments
13.5	780.5+/-	**LEAN CLAY WITH SAND (CL)**, trace gravel, gray, stiff to very stiff
23.5	770.5+/-	**SANDY SILT (ML)**, gray, loose

DEPTH (Ft.)	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
		12	1-3-4 N=7	1.0			24.0	
		10	2-3-4 N=7	1.0			17.8	
		12	4-7-11 N=18	3.5			15.1	
5		12	6-8-13 N=21	4.0			16.2	35-21-14
		14	8-11-21 N=32	4.5			15.9	
		4	6-16-30 N=46	4.5			16.6	
10		12	5-10-12 N=22	4.0			19.6	
		12	3-4-5 N=9	2.0			17.8	30-18-12
15								
		14	4-7-9 N=16	3.5			18.0	
20								
		10	3-3-3 N=6	-			21.9	29-16-13
25								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

Water encountered at 24.0' while drilling

Water observed at 29.0' upon completion

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-04-2022 | Boring Completed: 05-04-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

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BORING LOG NO. B-37

PROJECT: Rader Road- New Liberty 138 kV T Line

CLIENT: American Electric Power
New Albany, OH

SITE: McComb - Findlay
McComb, OH

LOCATION See Exploration Plan

Latitude: 41.0668° Longitude: -83.7074°

Approximate Surface Elev.: 794 (Ft.) +/-

DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	H.P. (tsf)	RQD %	UNCONFINED COMPRESSIVE STRENGTH (psi)	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI
SANDY SILT (ML), gray, loose *(continued)*											
28.5	765.5+/-										
LEAN CLAY WITH SAND (CL), gray, very stiff to hard			▽	X	14	3-58-12 N=70	4.0			21.5	
		30									
				X	18	5-9-16 N=25	4.0			14.5	
		35									
38.5	755.5+/-										
SHALE, very severely weathered, gray				X	16	33-27-19 N=46	-			15.7	
		40									
				X	16	18-26-29 N=55	-			15.2	
		45									
50.0	744+/-			X	16	31-35-43 N=78	-			15.7	
		50									
Boring Terminated at 50 Feet											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
3.25" HSA

Abandonment Method:
Boring backfilled with cement-bentonite grout upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Water encountered at 24.0' while drilling*

▽ *Water observed at 29.0' upon completion*

Terracon
800 Morrison Rd
Gahanna, OH

Boring Started: 05-04-2022 | Boring Completed: 05-04-2022

Drill Rig: Track (#614) | Driller: K. Reinhart

Project No.: N4225115

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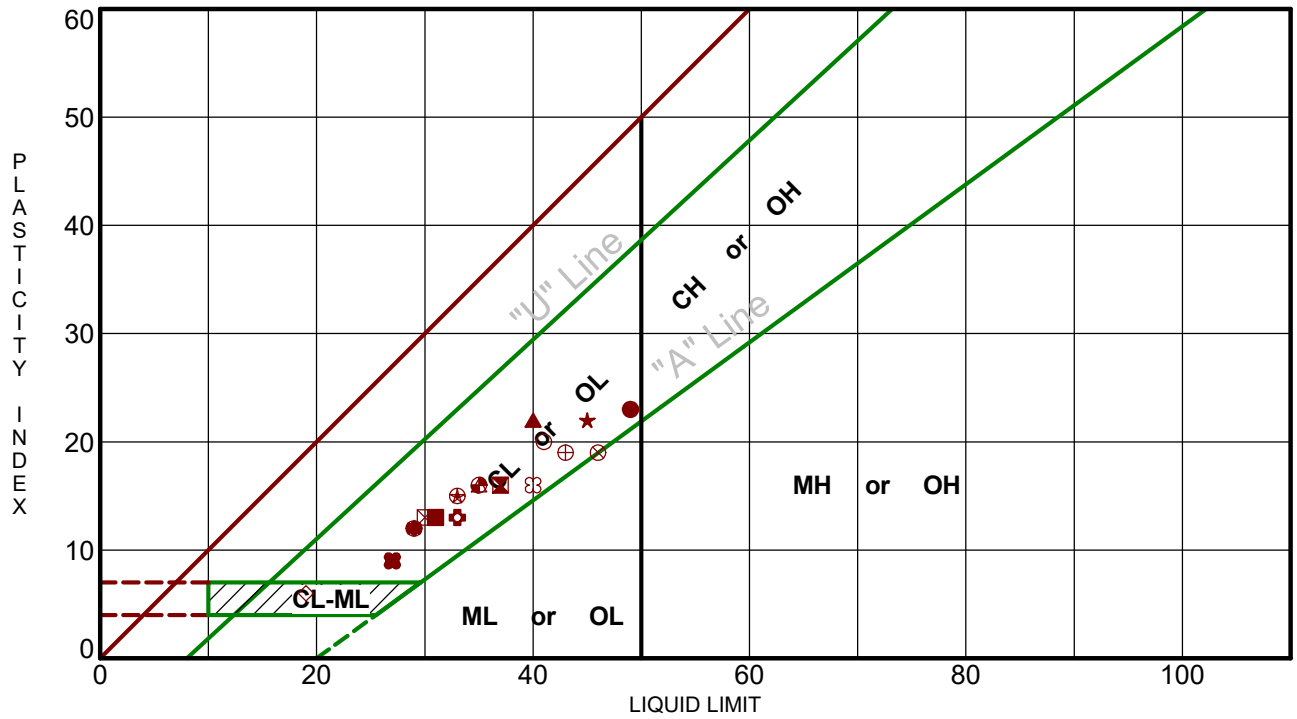
ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	B-21	3 - 4.5	49	26	23	64.8	CL	SANDY LEAN CLAY
⊠	B-21	13.5 - 15	37	21	16	84.4	CL	LEAN CLAY with SAND
▲	B-21	23.5 - 25	40	18	22	86.7	CL	LEAN CLAY
★	B-22	3 - 4.5	45	23	22	67.3	CL	SANDY LEAN CLAY
⊙	B-22	9 - 10.5	33	18	15	84.1	CL	LEAN CLAY with SAND
✿	B-22	18.5 - 20	33	20	13	91.2	CL	LEAN CLAY
○	B-23	4.5 - 6	41	21	20	80.7	CL	LEAN CLAY with SAND
△	B-23	18.5 - 20	35	19	16	77.7	CL	LEAN CLAY with SAND
⊗	B-23	28.5 - 30	46	27	19	95.8	CL	LEAN CLAY
⊕	B-24	4.5 - 6	43	24	19	18.5	SC	CLAYEY SAND
□	B-24	13.5 - 15	30	17	13	77.5	CL	LEAN CLAY with SAND
⊠	B-24	23.5 - 25	29	17	12	65.5	CL	GRAVELLY LEAN CLAY with SAND
◕	B-25	3 - 4.5	35	19	16	80.7	CL	LEAN CLAY with SAND
☆	B-25	9 - 10.5	33	18	15	80.7	CL	LEAN CLAY with SAND
✿	B-26	4.5 - 6	40	24	16	86.7	CL	LEAN CLAY
■	B-26	13.5 - 15	31	18	13	80.9	CL	LEAN CLAY with SAND
◆	B-26	33.5 - 35	29	17	12	81.8	CL	LEAN CLAY with SAND
◇	B-27	4.5 - 6	19	13	6	53.7	CL-ML	SANDY SILTY CLAY
×	B-27	18.5 - 20	30	17	13	77.2	CL	LEAN CLAY with SAND
✖	B-27	28.5 - 30	27	18	9	82.6	CL	LEAN CLAY with SAND

PROJECT: Rader Road- New Liberty 138 kV T Line

PROJECT NUMBER: N4225115

SITE: McComb - Findlay
McComb, OH

Terracon
800 Morrison Rd
Gahanna, OH

CLIENT: American Electric Power
New Albany, OH

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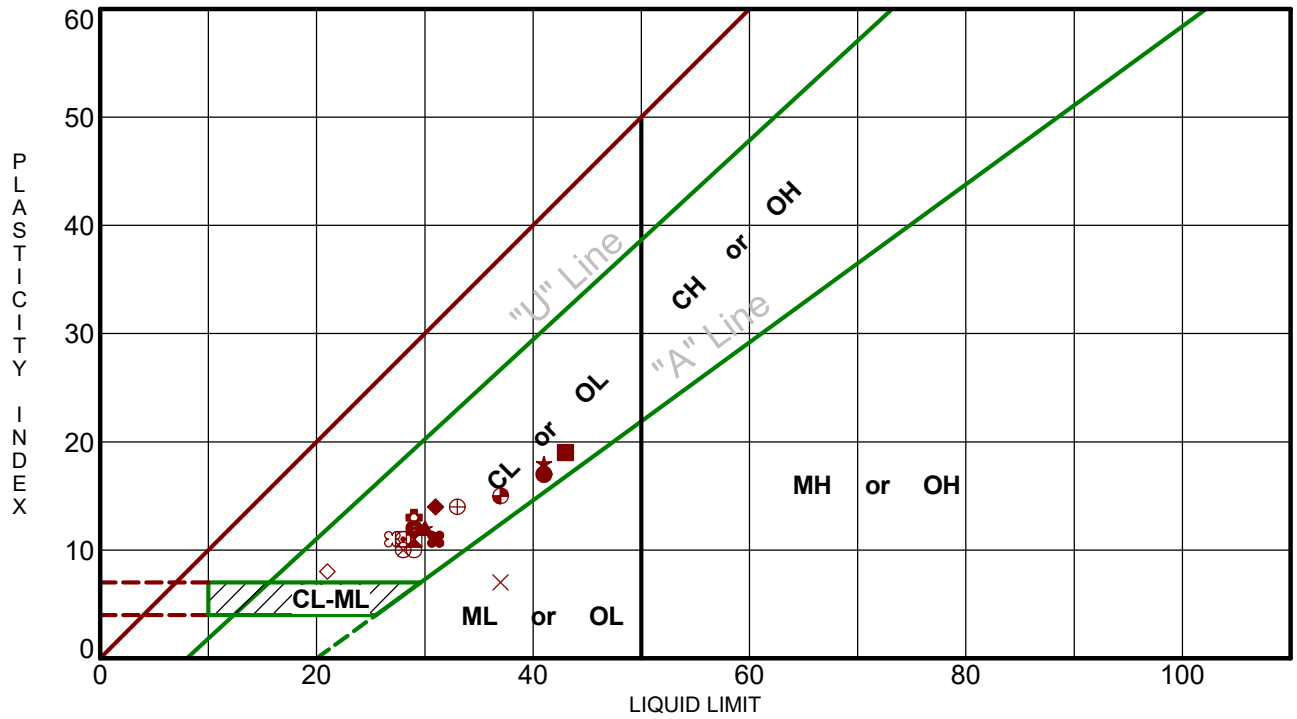
ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	B-28	4.5 - 6	41	24	17	76.3	CL	LEAN CLAY with SAND
⊠	B-28	18.5 - 20	29	18	11	80.9	CL	LEAN CLAY with SAND
▲	B-28	33.5 - 35	30	18	12	84.1	CL	LEAN CLAY with SAND
★	B-29	4.5 - 6	41	23	18	84.2	CL	LEAN CLAY with SAND
⊙	B-29	13.5 - 15	28	17	11	81.4	CL	LEAN CLAY with SAND
✿	B-29	23.8 - 25.3	29	16	13	81.8	CL	LEAN CLAY with SAND
○	B-30	4.5 - 6	29	19	10	77.8	CL	LEAN CLAY with SAND
△	B-30	13.5 - 15	29	17	12	81.4	CL	LEAN CLAY with SAND
⊗	B-30	28.5 - 30	28	18	10	81.2	CL	LEAN CLAY with SAND
⊕	B-31	4.5 - 6	33	19	14	79.5	CL	LEAN CLAY with SAND
□	B-31	18.5 - 20	28	17	11	79.8	CL	LEAN CLAY with SAND
⊛	B-31	33.5 - 35	29	17	12	80.4	CL	LEAN CLAY with SAND
◕	B-32	4.5 - 6	37	22	15	92.9	CL	LEAN CLAY
☆	B-32	18.5 - 20	30	18	12	80.2	CL	LEAN CLAY with SAND
❀	B-32	33.5 - 35	27	16	11	78.5	CL	LEAN CLAY with SAND
■	B-33	4.5 - 6	43	24	19	80.9	CL	LEAN CLAY with SAND
◆	B-33	18.5 - 20	31	17	14	79.3	CL	LEAN CLAY with SAND
◇	B-33	33.5 - 35	21	13	8	68.2	CL	SANDY LEAN CLAY
×	B-34	4.5 - 6	37	30	7	70.2	ML	SILT with SAND
✖	B-34	13.5 - 15	31	20	11	99.5	CL	LEAN CLAY

PROJECT: Rader Road- New Liberty 138 kV T Line

SITE: McComb - Findlay
McComb, OH

Terracon
800 Morrison Rd
Gahanna, OH

PROJECT NUMBER: N4225115

CLIENT: American Electric Power
New Albany, OH

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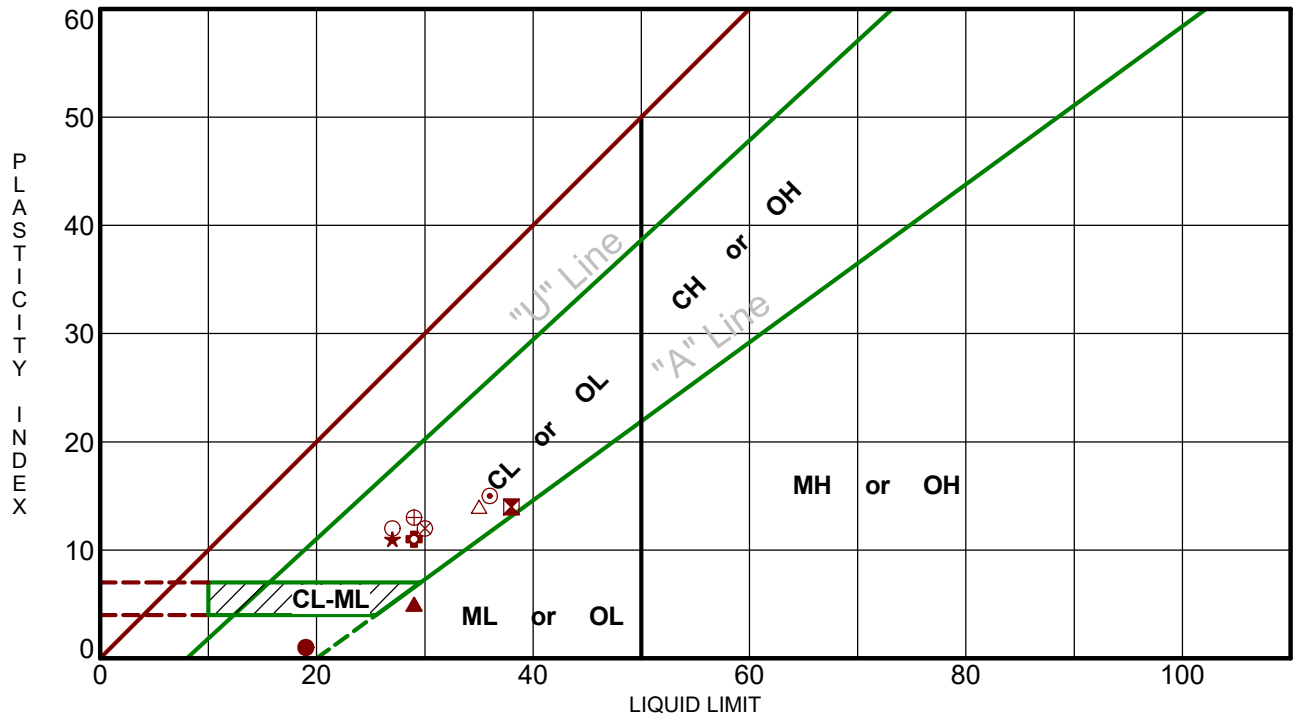
ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	B-34	23.5 - 25	19	18	1	71.5	ML	SILT with SAND
⊠	B-35	4.5 - 6	38	24	14	98.2	CL	LEAN CLAY
▲	B-35	18.5 - 20	29	24	5	99.3	ML	SILT
★	B-35	28.5 - 30	27	16	11	81.9	CL	LEAN CLAY with SAND
⊙	B-36	6 - 7.5	36	21	15	46.3	SC	CLAYEY SAND
✿	B-36	18.5 - 20	29	18	11	11.1	SP-SC	SILTY SAND
○	B-36	33.5 - 35	27	15	12	70.9	CL	LEAN CLAY with SAND
△	B-37	4.5 - 6	35	21	14	80.9	CL	LEAN CLAY with SAND
⊗	B-37	13.5 - 15	30	18	12	81.1	CL	LEAN CLAY with SAND
⊕	B-37	23.5 - 25	29	16	13	99.5	CL	SANDY SILT

PROJECT: Rader Road- New Liberty 138 kV T Line

SITE: McComb - Findlay
McComb, OH

Terracon
800 Morrison Rd
Gahanna, OH

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CLIENT: American Electric Power
New Albany, OH

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GRAIN SIZE DISTRIBUTION

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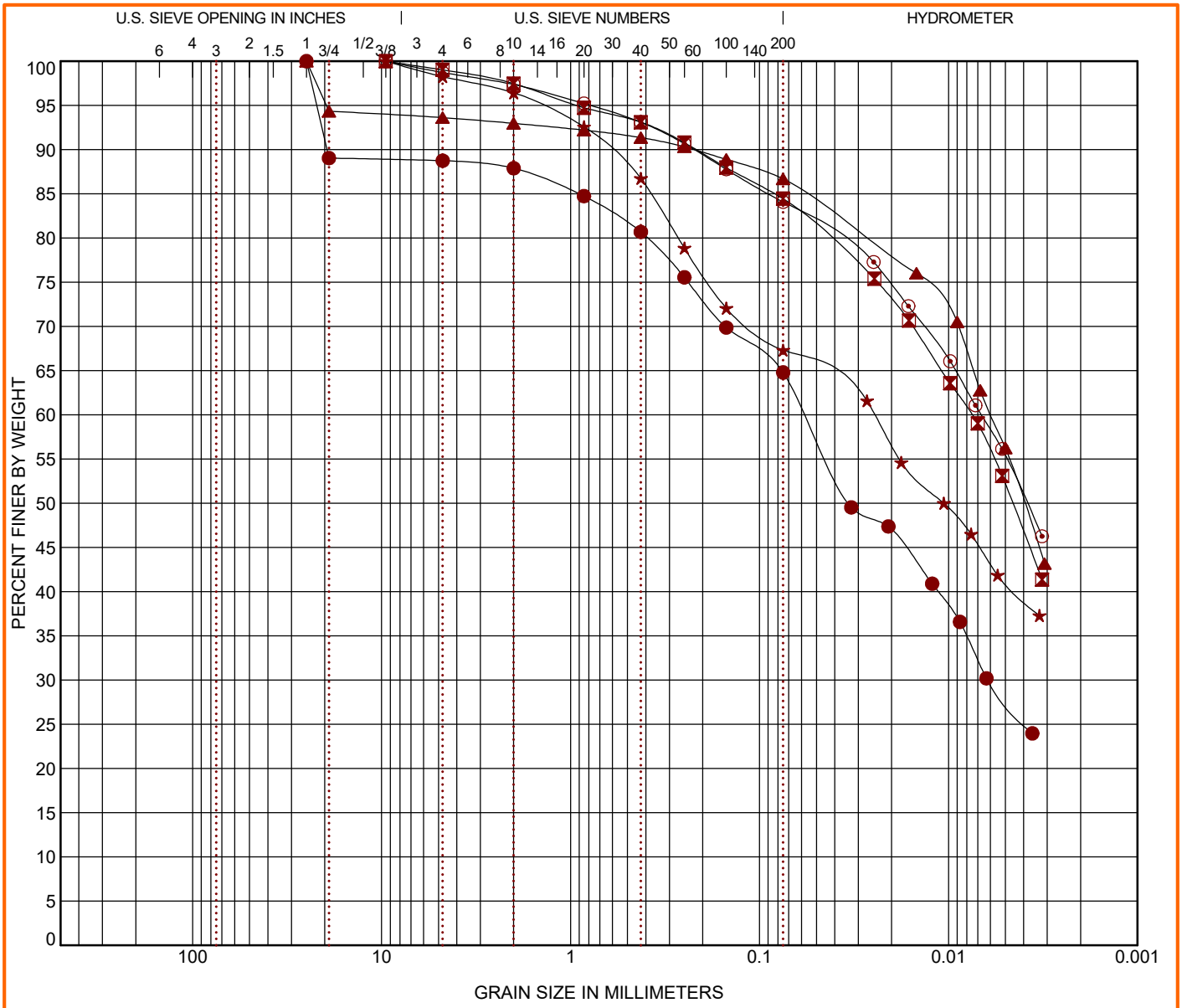

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-21	3 - 4.5	SANDY LEAN CLAY (CL)	26.0	49	26	23		
⊠	B-21	13.5 - 15	LEAN CLAY with SAND (CL)	18.1	37	21	16		
▲	B-21	23.5 - 25	LEAN CLAY (CL)	18.5	40	18	22		
★	B-22	3 - 4.5	SANDY LEAN CLAY (CL)	21.0	45	23	22		
⊙	B-22	9 - 10.5	LEAN CLAY with SAND (CL)	19.0	33	18	15		

Boring ID		Depth	D_{90}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-21	3 - 4.5	19.464	0.034	0.006		11.3	24.0	37.2		27.6
⊠	B-21	13.5 - 15	0.217	0.005			1.0	14.6	32.3		52.2
▲	B-21	23.5 - 25	0.223	0.004			6.4	6.9	30.4		56.2
★	B-22	3 - 4.5	0.626	0.011			1.7	30.9	26.3		41.0
⊙	B-22	9 - 10.5	0.222	0.004			1.3	14.6	28.7		55.3

PROJECT: Rader Road- New Liberty 138 kV T Line

PROJECT NUMBER: N4225115

SITE: McComb - Findlay
McComb, OH

Terracon
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New Albany, OH

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GRAIN SIZE DISTRIBUTION

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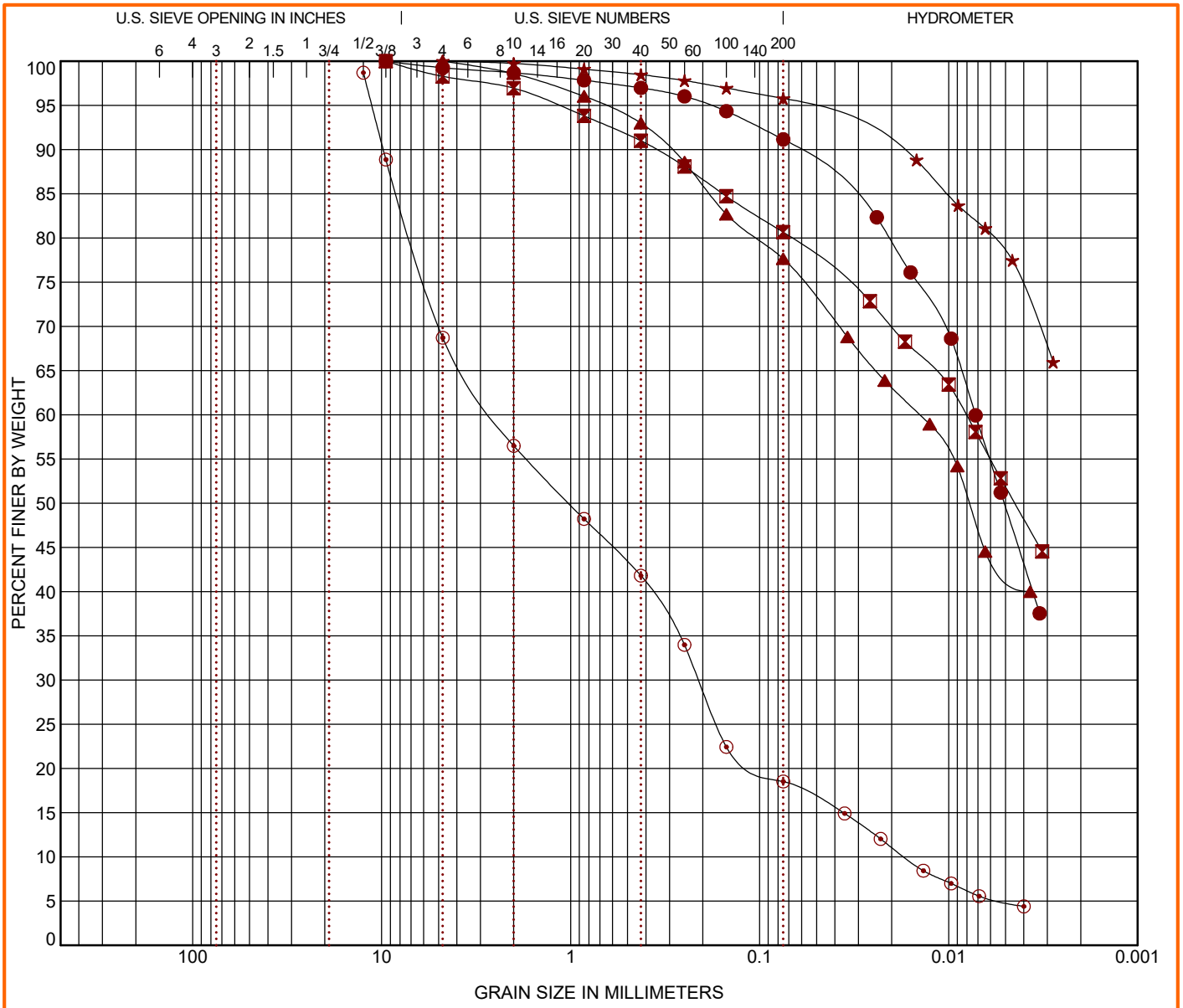

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-22	18.5 - 20	LEAN CLAY (CL)	15.4	33	20	13		
⊠	B-23	4.5 - 6	LEAN CLAY with SAND (CL)	17.7	41	21	20		
▲	B-23	18.5 - 20	LEAN CLAY with SAND (CL)	15.9	35	19	16		
★	B-23	28.5 - 30	LEAN CLAY (CL)	27.9	46	27	19		
⊙	B-24	4.5 - 6	CLAYEY SAND (SC)	6.7	43	24	19	1.00	150.23

Boring ID		Depth	D_{90}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-22	18.5 - 20	0.065	0.005			0.7	8.1	41.6		49.5
⊠	B-23	4.5 - 6	0.354	0.004			1.7	17.6	28.8		51.9
▲	B-23	18.5 - 20	0.296	0.008			0.0	22.3	35.2		42.5
★	B-23	28.5 - 30	0.019				0.0	4.2	17.4		78.4
⊙	B-24	4.5 - 6	9.805	1.021	0.21	0.017	30.0	50.2	13.7		4.9

PROJECT: Rader Road- New Liberty 138 kV T Line

SITE: McComb - Findlay
McComb, OH

Terracon
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Gahanna, OH

PROJECT NUMBER: N4225115

CLIENT: American Electric Power
New Albany, OH

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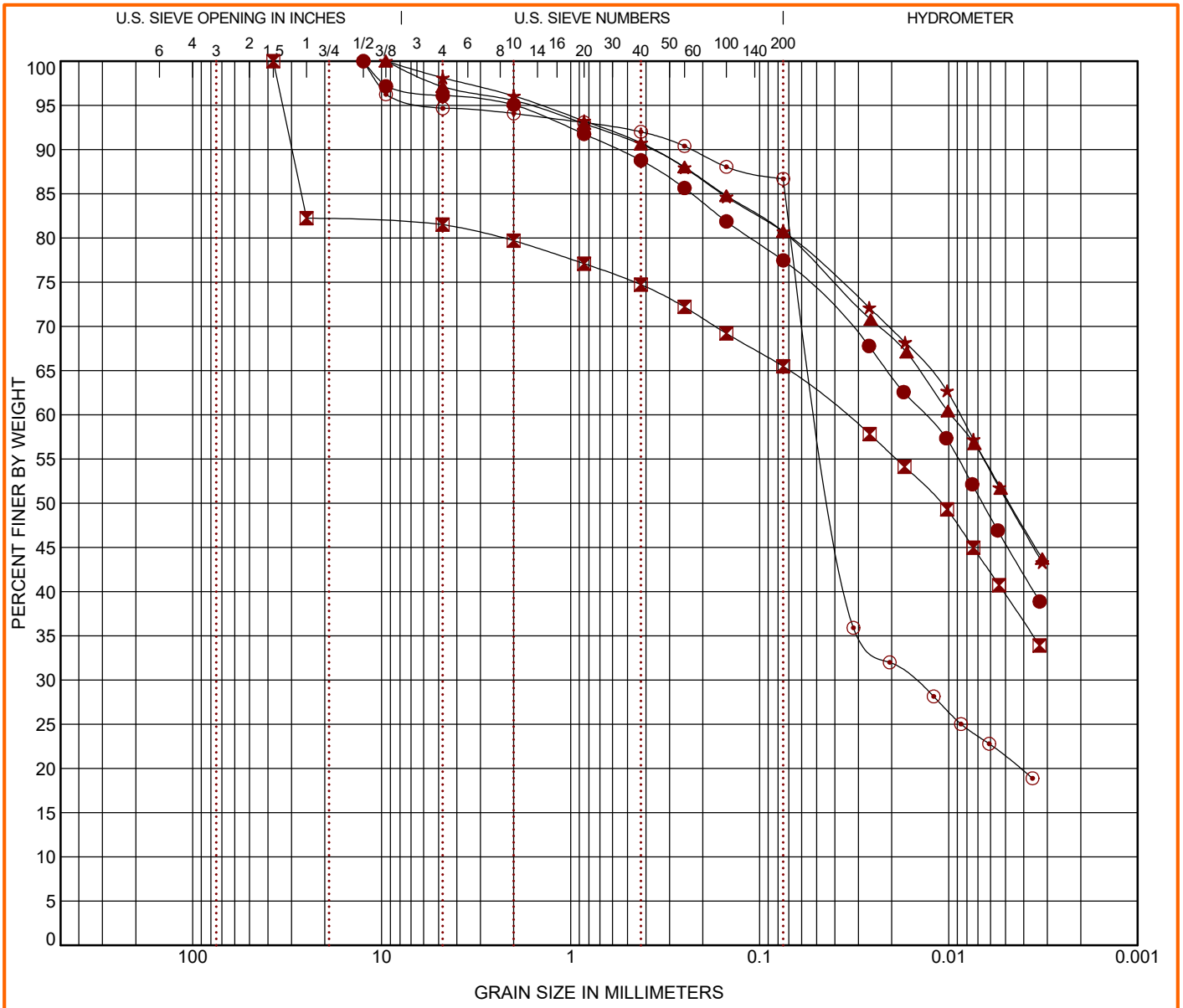

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-24	13.5 - 15	LEAN CLAY with SAND (CL)	15.2	30	17	13		
⊠	B-24	23.5 - 25	GRAVELLY LEAN CLAY with SAND (CL)	15.9	29	17	12		
▲	B-25	3 - 4.5	LEAN CLAY with SAND (CL)	17.2	35	19	16		
★	B-25	9 - 10.5	LEAN CLAY with SAND (CL)	17.5	33	18	15		
⊙	B-26	4.5 - 6	LEAN CLAY (CL)	29.1	40	24	16		

	Boring ID	Depth	D_{90}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-24	13.5 - 15	0.564	0.007			3.9	18.6	32.0		45.4
⊠	B-24	23.5 - 25	29.844	0.011			18.5	16.0	25.8		39.7
▲	B-25	3 - 4.5	0.375	0.005			2.9	16.4	30.0		50.7
★	B-25	9 - 10.5	0.368	0.005			1.9	17.4	30.2		50.5
⊙	B-26	4.5 - 6	0.229	0.04	0.016		5.3	8.0	65.4		21.3

PROJECT: Rader Road- New Liberty 138 kV T Line

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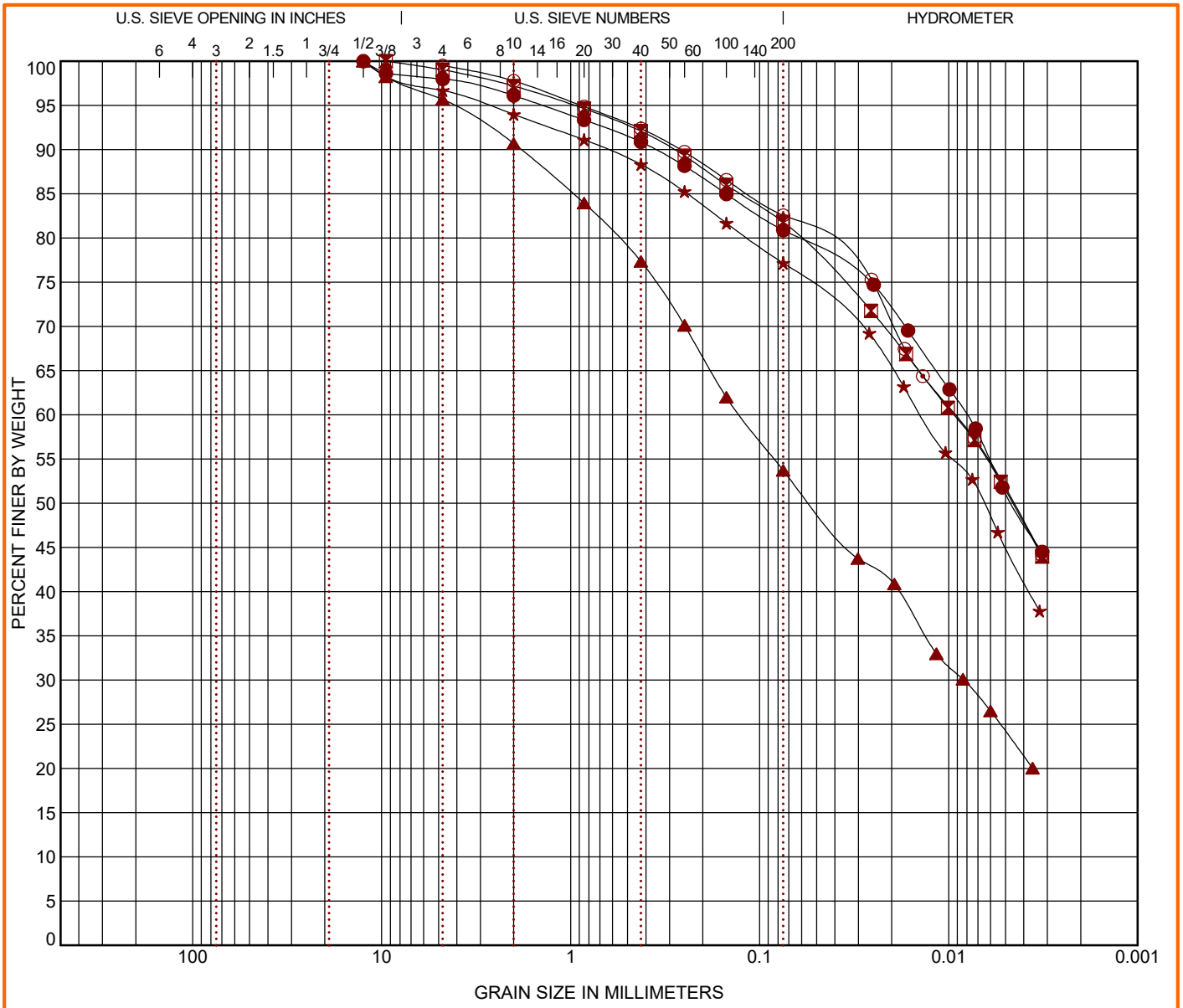

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-26	13.5 - 15	LEAN CLAY with SAND (CL)	19.7	31	18	13		
⊠	B-26	33.5 - 35	LEAN CLAY with SAND (CL)	19.2	29	17	12		
▲	B-27	4.5 - 6	SANDY SILTY CLAY (CL-ML)	15.3	19	13	6		
★	B-27	18.5 - 20	LEAN CLAY with SAND (CL)	15.9	30	17	13		
⊙	B-27	28.5 - 30	LEAN CLAY with SAND (CL)	18.1	27	18	9		

Boring ID		Depth	D_{90}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-26	13.5 - 15	0.358	0.005			2.0	17.1	29.7		51.2
⊠	B-26	33.5 - 35	0.285	0.005			1.0	17.2	30.4		51.4
▲	B-27	4.5 - 6	1.833	0.053	0.008		4.3	42.0	29.5		24.2
★	B-27	18.5 - 20	0.644	0.007			3.3	19.5	32.1		45.1
⊙	B-27	28.5 - 30	0.264	0.005				16.9	31.3		51.2

PROJECT: Rader Road- New Liberty 138 kV T Line

PROJECT NUMBER: N4225115

SITE: McComb - Findlay
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Terracon
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GRAIN SIZE DISTRIBUTION

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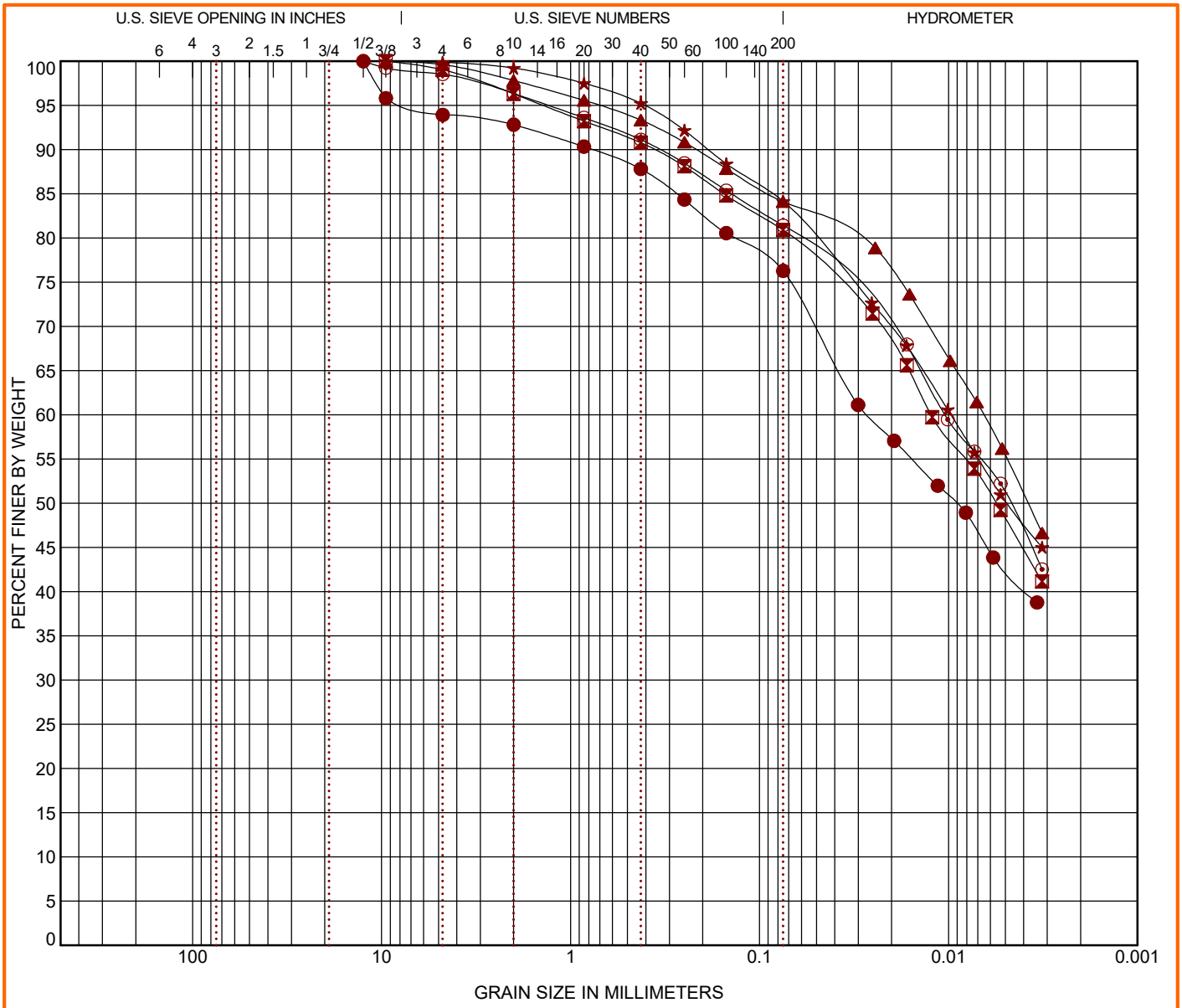


COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-28	4.5 - 6	LEAN CLAY with SAND (CL)	25.4	41	24	17		
⊠	B-28	18.5 - 20	LEAN CLAY with SAND (CL)	18.2	29	18	11		
▲	B-28	33.5 - 35	LEAN CLAY with SAND (CL)	21.5	30	18	12		
★	B-29	4.5 - 6	LEAN CLAY with SAND (CL)	23.1	41	23	18		
⊙	B-29	13.5 - 15	LEAN CLAY with SAND (CL)	16.0	28	17	11		

Boring ID		Depth	D_{90}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-28	4.5 - 6	0.775	0.009			6.1	17.6	33.8		42.4
⊠	B-28	18.5 - 20	0.364	0.006			1.0	18.1	32.6		48.3
▲	B-28	33.5 - 35	0.217	0.004			0.4	15.5	28.7		55.4
★	B-29	4.5 - 6	0.186	0.005			0.1	15.7	33.9		50.3
⊙	B-29	13.5 - 15	0.34	0.005			1.5	17.1	30.3		51.1

PROJECT: Rader Road- New Liberty 138 kV T Line

PROJECT NUMBER: N4225115

SITE: McComb - Findlay
McComb, OH

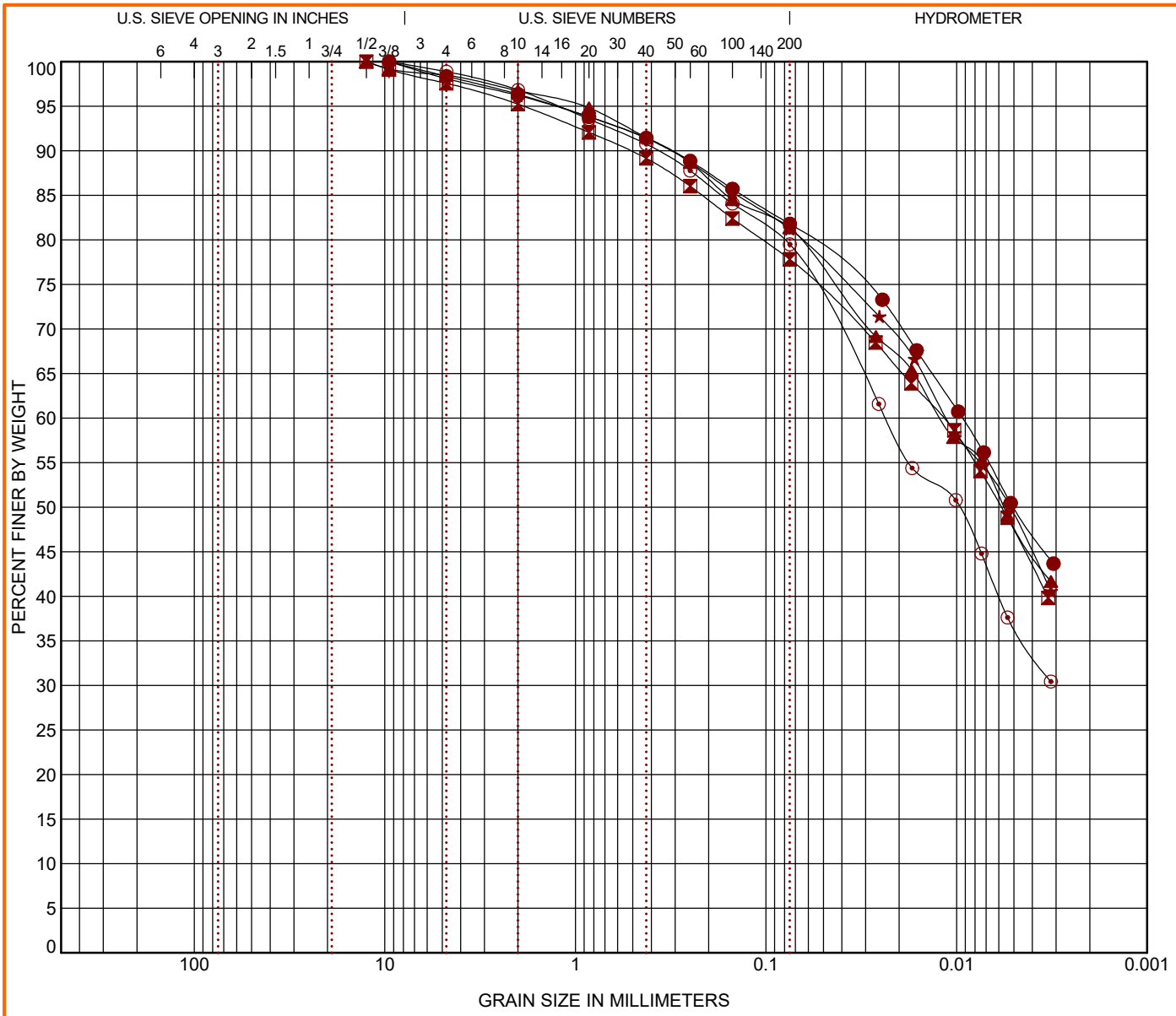
Terracon
800 Morrison Rd
Gahanna, OH

CLIENT: American Electric Power
New Albany, OH

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE USCS-2_SCOUR N4225115 RADER RD. - NEW LIBERTY - LAB DATA.GPJ TERRACON_DATATEMPLATE.GDT 7/12/22

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-29	23.8 - 25.3	LEAN CLAY with SAND (CL)	19.2	29	16	13		
⊠	B-30	4.5 - 6	LEAN CLAY with SAND (CL)	15.5	29	19	10		
▲	B-30	13.5 - 15	LEAN CLAY with SAND (CL)	17.7	29	17	12		
★	B-30	28.5 - 30	LEAN CLAY with SAND (CL)	18.3	28	18	10		
⊙	B-31	4.5 - 6	LEAN CLAY with SAND (CL)	16.5	33	19	14		

Boring ID		Depth	D_{90}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-29	23.8 - 25.3	0.317	0.005			1.6	16.6	31.9		49.9
⊠	B-30	4.5 - 6	0.52	0.006			2.4	19.7	30.4		47.4
▲	B-30	13.5 - 15	0.32	0.006			1.5	17.1	33.4		48.0
★	B-30	28.5 - 30	0.322	0.005			1.9	16.9	32.1		49.2
⊙	B-31	4.5 - 6	0.372	0.01			1.1	19.4	42.9		36.6

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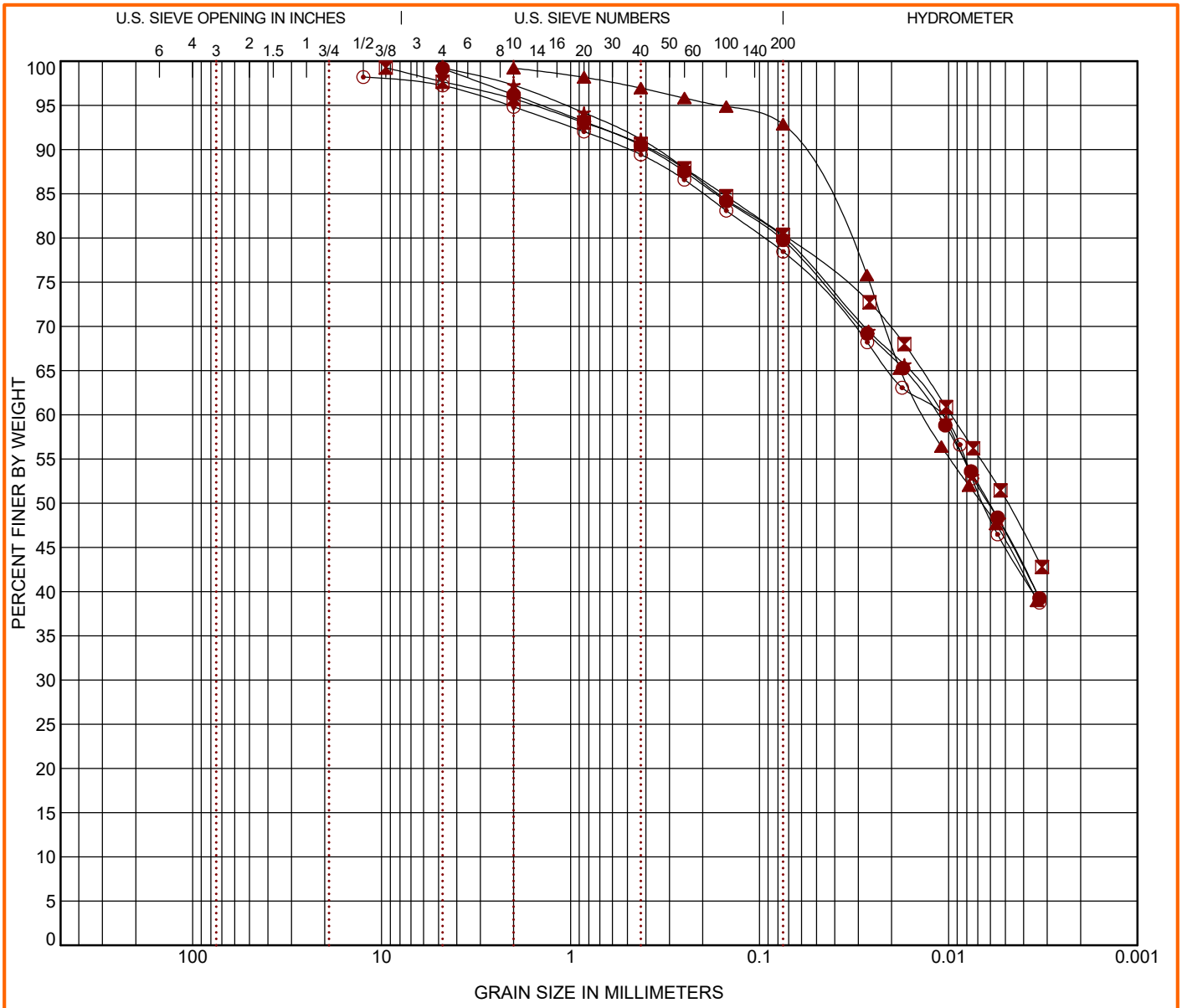

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-31	18.5 - 20	LEAN CLAY with SAND (CL)	17.9	28	17	11		
⊠	B-31	33.5 - 35	LEAN CLAY with SAND (CL)	18.7	29	17	12		
▲	B-32	4.5 - 6	LEAN CLAY (CL)	24.2	37	22	15		
★	B-32	18.5 - 20	LEAN CLAY with SAND (CL)	17.3	30	18	12		
⊙	B-32	33.5 - 35	LEAN CLAY with SAND (CL)	16.1	27	16	11		

	Boring ID	Depth	D_{90}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-31	18.5 - 20	0.389	0.006				19.4	33.1		46.7
⊠	B-31	33.5 - 35	0.376	0.005			1.6	17.3	29.9		50.5
▲	B-32	4.5 - 6	0.063	0.007				6.3	47.2		45.7
★	B-32	18.5 - 20	0.351	0.006				19.1	33.4		46.7
⊙	B-32	33.5 - 35	0.494	0.007			1.0	18.8	33.4		45.0

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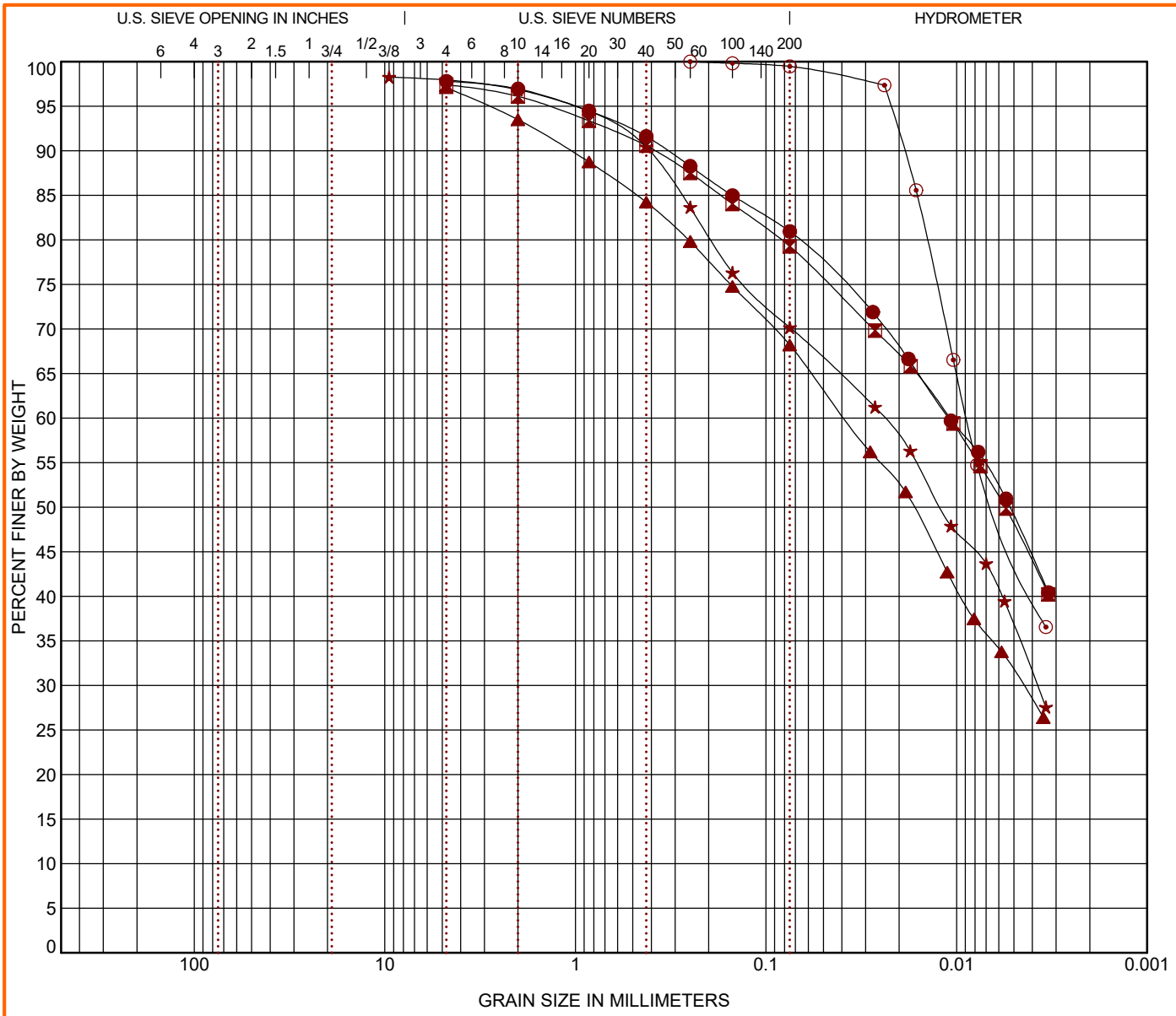

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-33	4.5 - 6	LEAN CLAY with SAND (CL)	26.2	43	24	19		
⊠	B-33	18.5 - 20	LEAN CLAY with SAND (CL)	18.1	31	17	14		
▲	B-33	33.5 - 35	SANDY LEAN CLAY (CL)	11.3	21	13	8		
★	B-34	4.5 - 6	SILT with SAND (ML)	27.4	37	30	7		
⊙	B-34	13.5 - 15	LEAN CLAY (CL)	22.5	31	20	11		

	Boring ID	Depth	D_{90}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-33	4.5 - 6	0.329	0.005				16.9	32.0		49.0
⊠	B-33	18.5 - 20	0.385	0.006				18.1	31.2		48.0
▲	B-33	33.5 - 35	1.066	0.017	0.004			28.9	36.6		31.6
★	B-34	4.5 - 6	0.411	0.012	0.004		0.6	27.5	33.4		36.8
⊙	B-34	13.5 - 15	0.019	0.006			0.0	0.5	54.5		45.0

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GRAIN SIZE DISTRIBUTION

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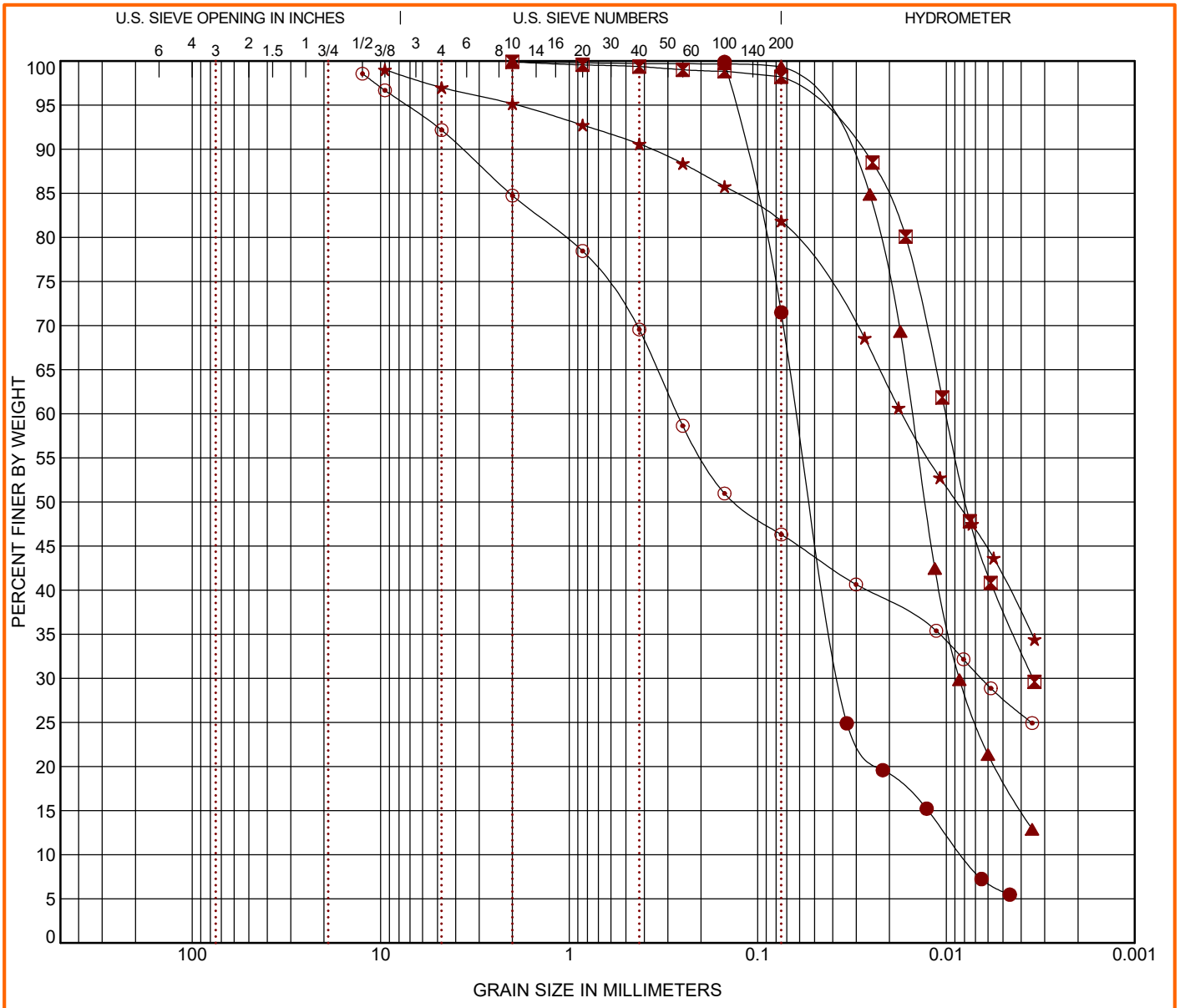

COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-34	23.5 - 25	SILT with SAND (ML)	18.0	19	18	1	2.68	7.51
⊠	B-35	4.5 - 6	LEAN CLAY (CL)	21.3	38	24	14		
▲	B-35	18.5 - 20	SILT (ML)	22.9	29	24	5		
★	B-35	28.5 - 30	LEAN CLAY with SAND (CL)	17.0	27	16	11		
⊙	B-36	6 - 7.5	CLAYEY SAND (SC)	19.2	36	21	15		

Boring ID		Depth	D_{90}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-34	23.5 - 25	0.118	0.052	0.037	0.008		28.4	65.6		5.9
⊠	B-35	4.5 - 6	0.029	0.008	0.003			1.7	60.5		37.7
▲	B-35	18.5 - 20	0.037	0.013	0.009			0.6	80.8		18.5
★	B-35	28.5 - 30	0.368	0.009			2.0	15.1	40.3		41.5
⊙	B-36	6 - 7.5	3.688	0.13	0.007		6.4	45.9	18.6		27.7

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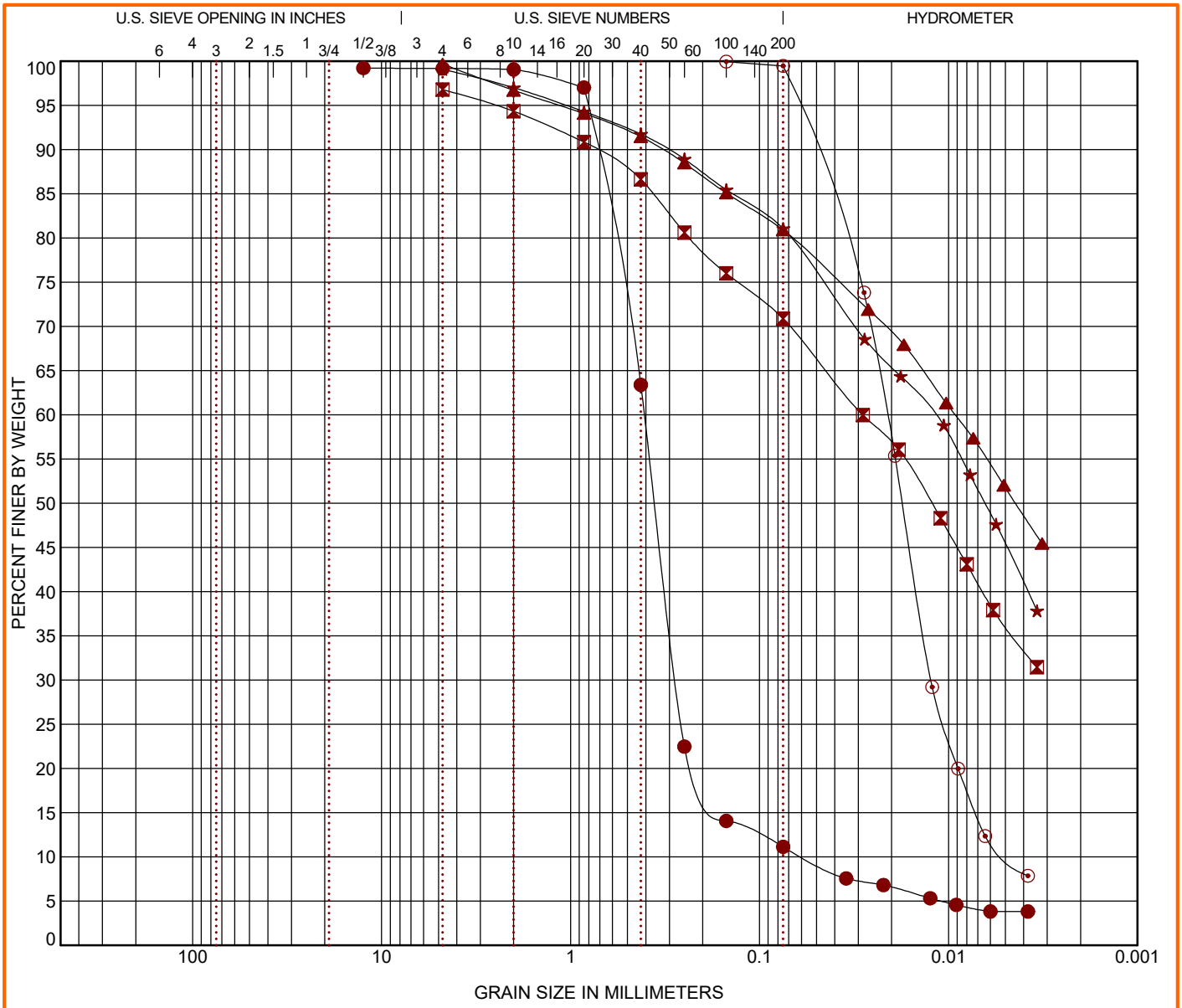
GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring ID	Depth	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-36	18.5 - 20	SILTY SAND (SM)	26.5	29	18	11	3.18	6.92
⊠	B-36	33.5 - 35	LEAN CLAY with SAND (CL)	11.7	27	15	12		
▲	B-37	4.5 - 6	LEAN CLAY with SAND (CL)	16.2	35	21	14		
★	B-37	13.5 - 15	LEAN CLAY with SAND (CL)	17.8	30	18	12		
⊙	B-37	23.5 - 25	SANDY SILT (ML)	21.9	29	16	13	1.49	4.33

	Boring ID	Depth	D_{90}	D_{50}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-36	18.5 - 20	0.736	0.357	0.276	0.059	0.0	88.0	7.3		3.8
⊠	B-36	33.5 - 35	0.739	0.012				25.9	34.8		36.1
▲	B-37	4.5 - 6	0.328	0.004				18.8	29.2		51.7
★	B-37	13.5 - 15	0.305	0.006				18.0	35.7		45.4
⊙	B-37	23.5 - 25	0.052	0.017	0.012	0.005		0.5	89.2		10.2

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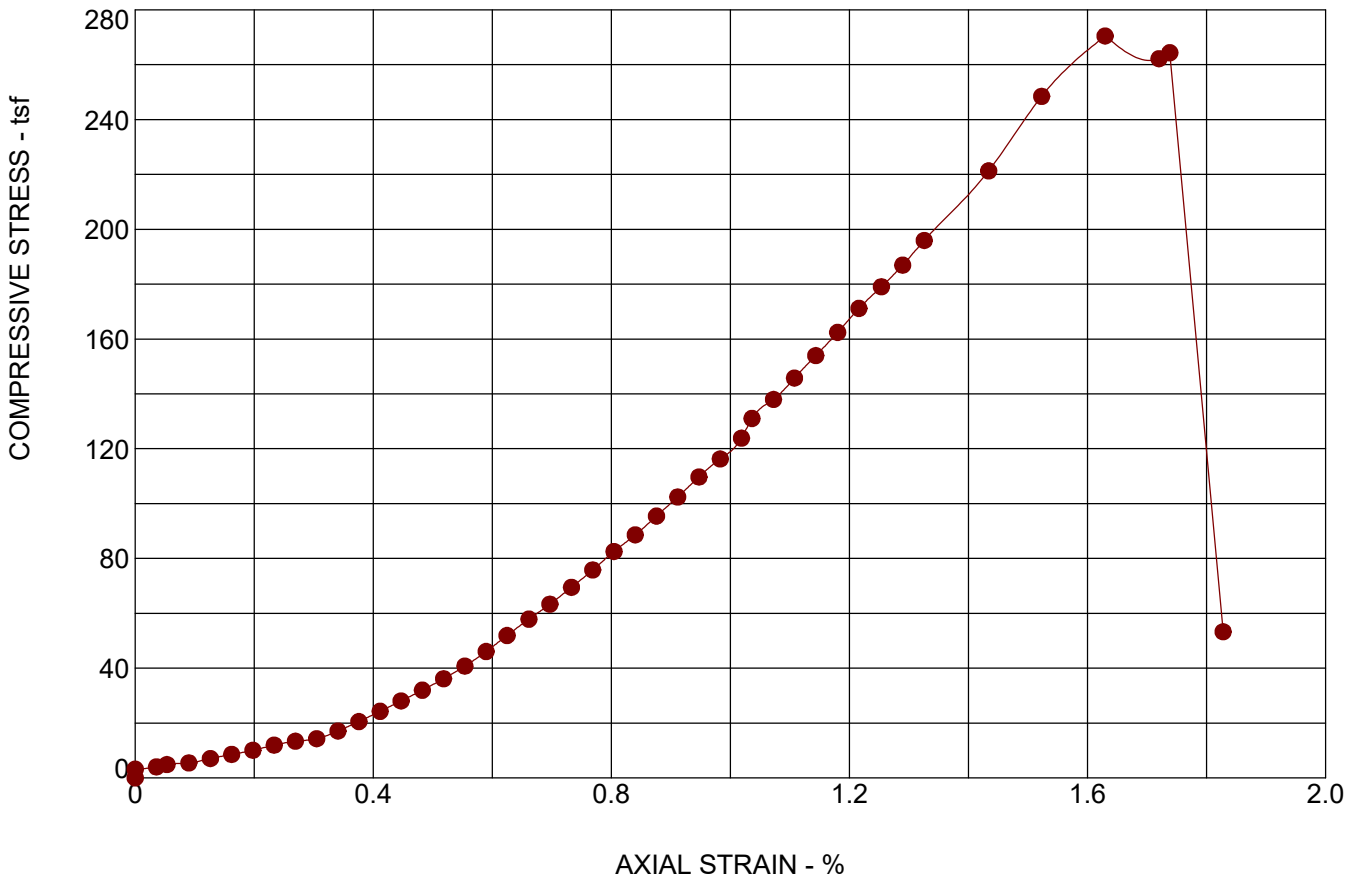
UNCONFINED COMPRESSION TEST



SPECIMEN FAILURE PHOTOGRAPH

SPECIMEN TEST DATA

Moisture Content:	%	1
Dry Density:	pcf	160
Diameter:	in.	1.97
Height:	in.	3.96
Height / Diameter Ratio:		2.01
Calculated Saturation:	%	
Calculated Void Ratio:		
Assumed Specific Gravity:		
Failure Strain:	%	1.63
Unconfined Compressive Strength	(tsf)	270.49
Undrained Shear Strength:	(tsf)	135.24
Strain Rate:	in/min	0.0792
Remarks:		

SAMPLE TYPE:

SAMPLE LOCATION: B-21 @ 30 feet

DESCRIPTION: DOLOMITE

LL	PL	PI	Percent < #200 Sieve

PROJECT: Rader Road- New Liberty 138 kV T Line

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McComb, OH

Terracon

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New Albany, OH

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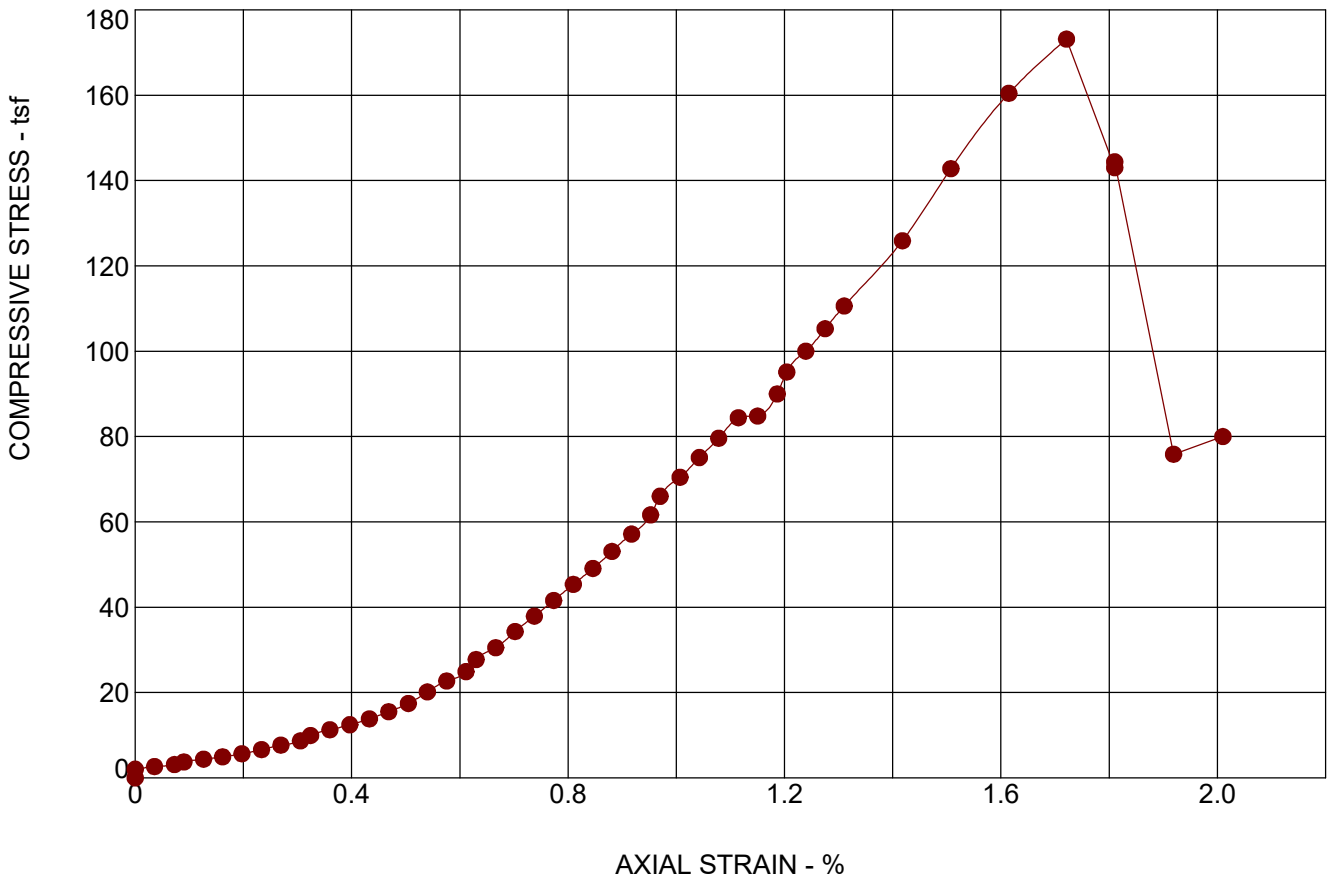
UNCONFINED COMPRESSION TEST



SPECIMEN FAILURE PHOTOGRAPH	SPECIMEN TEST DATA		
	Moisture Content:	%	1
	Dry Density:	pcf	156
	Diameter:	in.	1.98
	Height:	in.	4.04
	Height / Diameter Ratio:		2.04
	Calculated Saturation:	%	
	Calculated Void Ratio:		
	Assumed Specific Gravity:		
	Failure Strain:	%	1.72
	Unconfined Compressive Strength	(tsf)	173.14
	Undrained Shear Strength:	(tsf)	86.57
	Strain Rate:	in/min	0.0813
	Remarks:		

SAMPLE TYPE:	SAMPLE LOCATION: B-21 @ 37 feet			
DESCRIPTION: DOLOMITE	LL	PL	PI	Percent < #200 Sieve

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New Albany, OH

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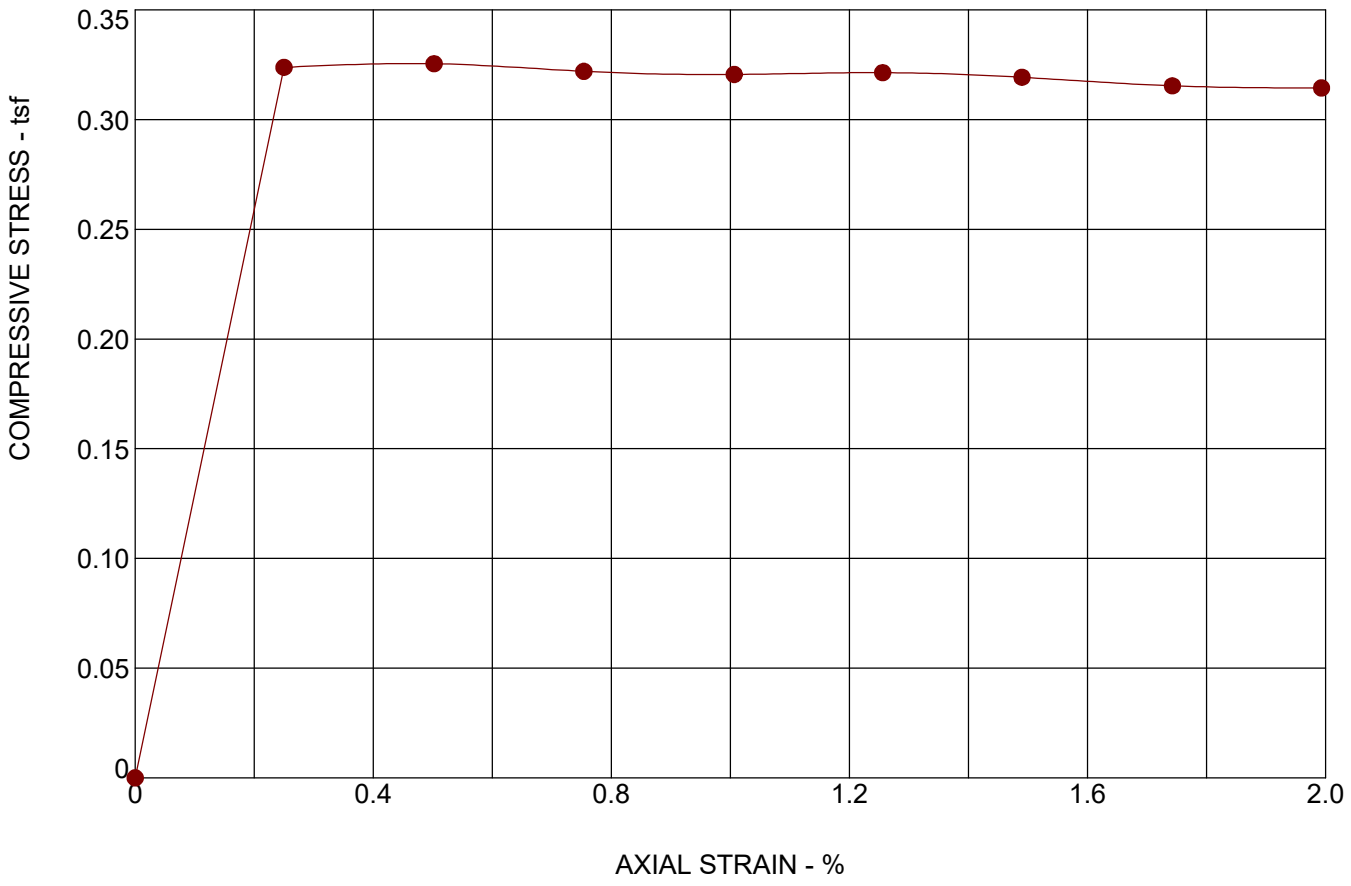
UNCONFINED COMPRESSION TEST

ASTM D2166



SPECIMEN FAILURE PHOTOGRAPH

SPECIMEN TEST DATA

Moisture Content:	%	17
Dry Density:	pcf	113
Diameter:	in.	2.87
Height:	in.	5.65
Height / Diameter Ratio:		1.97
Calculated Saturation:	%	
Calculated Void Ratio:		
Assumed Specific Gravity:		
Failure Strain:	%	0.50
Unconfined Compressive Strength	(tsf)	0.33
Undrained Shear Strength:	(tsf)	0.16
Strain Rate:	in/min	0.1107
Remarks:		

SAMPLE TYPE: Shelby Tube

SAMPLE LOCATION: B-36 @ 9 - 10.5 feet

DESCRIPTION: SILTY, CLAYEY SAND(SC-SM)

LL	PL	PI	Percent < #200 Sieve
NP	NP	NP	17

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SUPPORTING INFORMATION

Contents:

General Notes
Unified Soil Classification System

Note: All attachments are one page unless noted above.

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS
Rader Road- New Liberty 138 kV T Line ■ McComb, OH
Terracon Project No. N4225115

SAMPLING	WATER LEVEL	FIELD TESTS
Rock Core Shelby Tube Standard Penetration Test	**Water Initially Encountered** **Water Level After a Specified Period of Time** **Water Level After a Specified Period of Time** **Cave In Encountered** Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	**N** Standard Penetration Test Resistance (Blows/Ft.) **(HP)** Hand Penetrometer **(T)** Torvane **(DCP)** Dynamic Cone Penetrometer **UC** Unconfined Compressive Strength **(PID)** Photo-Ionization Detector **(OVA)** Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (tsf)**	**Standard Penetration or N-Value Blows/Ft.**
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or [$Cc<1$ or $Cc>3.0$] [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F, G, H]
			Fines classify as CL or CH		GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or [$Cc<1$ or $Cc>3.0$] [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G, H, I]
			Fines classify as CL or CH		SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"		CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K, L, M, N]
			Liquid limit - not dried			Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K, L, M]
			PI plots below "A" line		MH	Elastic Silt [K, L, M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K, L, M, P]
			Liquid limit - not dried			Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

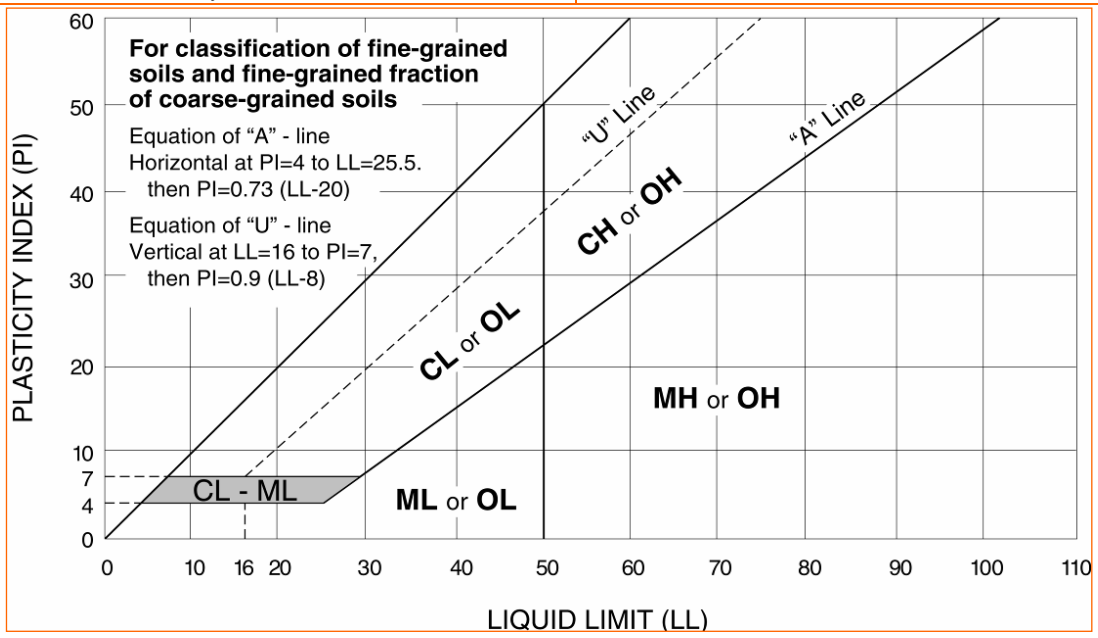
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



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Case No(s). 22-0856-EL-BTX

Summary: Response Responses to Staff's 3rd Set electronically filed by Hector Garcia-Santana on behalf of AEP Ohio Transmission Company, Inc..